ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT COMPREHENSIVE PROJECT REPORT

FOR

PROPOSED CONSTRUCTION OF NATIONAL MARICULTURE RESOURCE AND TRAINING CENTRE AND HATCHERY AT SHIMONI, KWALE COUNTY.

Coordinate: Latitude 4°38'34.27"S and Longitude 39° 22'30.60"E.

Kenya Marine Fisheries Socioeconomic Development Project (KEMFSED)
Maktaba Kuu Building,Mezzanaine floor
Ngong, opposite NHIF building
P.O. Box 58187-00200
Tel: +254-20-2718870
E-mail: info@kemfsed.org
Website: www.kemfsed.org

MAY, 2024

CERTIFICATION

This Environmental and Social Impact Assessment Project Report has been prepared by a team of EIA experts lead by Mr. Godfrey Wabomba; NEMA registered EIA/EA Lead Expert No. 6127. The project report was prepared in accordance with the requirements of the Environmental (Impact Assessment and Audit) (amendment) Regulations, 2019, pursuant to *The Environmental Management and Coordination Act, (CAP 387).*

DISCLAIMER

This Environmental and Social Impact Assessment Project Report is strictly confidential to the proponent and any use of the materials thereof should strictly be in accordance with the agreement between the client/proponent, Mr. Godfrey Wabomba (the lead EIA Expert). It is, however, subject to conditions in the Environmental (Impact Assessment and Audit) Regulations, 2019.

We, the undersigned, certify that the particulars given in this report are correct to the best of our knowledge.

Signature:  Date: 10/11/2022

Mr. Godfrey Wabomba

Email: ***gwabomba1@gmail.com****Mobile: +254 721712640*

Proponent

Kenya Marine Fisheries and Social Economic Development Project (KEMFSED) under the State Department for Blue Economy and Fisheries (SDBE&F)

Name: Mr Patrick Kiara

National Project Coordinator (NPC)

Signature_____ Date……..

Stamp

EXECUTIVE SUMMARRY

Aquaculture provides an opportunity to grow fish where they could not grow in the past. Yet mariculture as an alternative to capture fisheries has not taken root in spite of dwindling stocks in the natural. The main challenges are associated with inadequate availability of; fingerling, affordable feeds, husbandry skills and technical knowledge, market information, accessibility to credit for fish farmers, and water scarcity. To exploit the potential and attain economic benefits from the coastal and marine resources, the Government of Kenya, through SDBE&F, requested the World Bank to support the development of the sector through the Kenya Marine Fisheries and Socio-Economic Development (KEMFSED) project. The project shall enhance the blue economy sector to support coastal livelihoods and contribute to food security. As part of efforts under KEMFSED project to reduce pressure on near-shore fishing and provide local communities with alternative sources of livelihoods, funding has been committed for the construction of National Mariculture Resource and Training Centre (NAMARET) and Hatchery. The urgency in being innovative in addressing the existing gap is critical and therefore the establishment of the centre is a timely idea and requirement for Kenya. Implementation and operation of the proposed development is anticipated to have social and environmental implications which if not well anticipated, the optimal benefits of the project may not be realized. This was in line with the World Bank OP 4.01 and section 58 of the Environmental Management and coordination Act (EMCA), 1999 CAP 387. The World Bank's Safeguards Policies[1] applied to the project are mandatory (see below the list and links) and all applicable Kenya regulations on construction, environmental, labor, water, air, *occupational health and safety, and others* are required for the environmental and social due diligence in both construction and operation stages.

Applicable World Bank Safeguards Policies for NAMARET centre

Code	Name of the Policy	Link in the internet in the public World Bank webpage
OP 4.01	Environmental Impact Assessment	https://policies.worldbank.org/en/policies/all/ppfdetail/1565
OP 4.04	Natural Habitats	https://policies.worldbank.org/en/policies/all/ppfdetail/1566
OP 4.11	Physical Cultural Resources	https://policies.worldbank.org/en/policies/all/ppfdetail/1571

Applicable National Laws and Regulations for KEMFSED and NAMARET centre

NO.	Name of Law or Regulation	Link in the internet
	Construction Laws and Regulations	
1.	The National Construction Authority Act No. 41 of 2011	https://eregulations.invest.go.ke/media/NationalConstructionAuthorityAct_No41of2011.pdf
2.	The National Construction Authority regulation 2014	http://kenyalaw.org:8181/exist/rest//db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/N/National%20Constructi

[1] https://www.worldbank.org/en/projects-operations/environmental-and-social-policies

		on%20Authority%20Act%20Cap.%20449A%20-%20No.%2041%20of%202011/subsidiary%20legislation/docs/NationalConstructionAuthorityAct41of2011_subsidiary.pdf
	Environmental Management Laws and Regulations	
3.	Environmental Management and Coordination Act, EMCA CAP 387 1999 (amended in 2015)	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/EnvironmentalManagementandCo-ordinationAct_No8of1999.pdf
4.	The Environment (Impact Assessment and Audit) Regulations, 2003, amended in 2019	https://www.nema.go.ke/images/Docs/Regulations/Revised%20EIA%20Regulations-1.pdf
5.	EMCA Waste Management Regulations, 2006	https://www.nema.go.ke/images/Docs/Regulations/Waste%20Management%20Regulations-1.pdf
6.	EMCA Air quality regulations, 2014	https://www.nema.go.ke/images/Docs/Regulations/air%20quality%20regulations2014-1.pdf
7.	EMCA Noise and Excessive Vibration Pollution Control Regulations, 2009	https://www.nema.go.ke/images/Docs/Regulations/Noise%20regulations.pdf
8.	EMCA Water Quality Regulations, 2006	https://www.nema.go.ke/images/Docs/water/water_quality_regulations.pdf
9.	The Environment and Land Court Act, No 19 of 2011	http://www.parliament.go.ke/sites/default/files/2017-05/EnvironmentandLandCourtAct_No19of2011.pdf
	Devolved Governance	
10.	The Physical and Land Use Planning Act, 2019	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/2019/PhysicalandLandUsePlanningAct_No13of2019.pdf
11.	County Government, Act 2012	http://www.parliament.go.ke/sites/default/files/2017-05/CountyGovernmentsAct_No17of2012_1.pdf
	Labour Laws and Regulations	
12.	Occupational Safety and Health Act, 2007	https://www.health.go.ke/wp-content/uploads/2015/09/OSH%20Act%202007.pdf
13.	Work Injury Benefits Act, (2007)	https://www.health.go.ke/wp-content/uploads/2015/09/Work%20Injury%20Benefits%20ACT%202007.pdf
14.	Labour Relations Act, 2007	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/LabourRelationAct_No14of2007.pdf
	Public Health Laws and Regulations	
15.	Public Health Act, 1986 (Cap 242 Revised edition 2012)	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/PublicHealthActCap242.pdf

16.	Tobacco Control Act No 4 of 2007	https://www.tobaccocontrollaws.org/files/live/Kenya/Kenya%20-%20Tobacco%20Control%20Act%20-%20national.pdf
	Cross Cutting Issues	
17.	Persons with disability Act No. 14 of 2003	https://www.treasury.go.ke/wp-content/uploads/2020/11/Persons-with-Disabilities-Act.pdf
18.	Public Participation Act 2016	https://hakicentre.org/docs/PublicParticipationBill_2016.pdf
19.	The National Gender and Equality Commission Act 2011	http://kenyalaw.org/kl/fileadmin/pdfdownloads/RepealedStatutes/NationalGenderandEqualityCommissionAct15of2011.pdf
20.	Sexual Offences Act, 2006	http://kenyalaw.org/kl/index.php?id=1894
21.	HIV and AIDS Prevention and Control Act, 2006	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/HIVandAIDSPreventionandControlAct_No14of2006.pdf
22.	The Children Act, 2001	http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/ChildrenAct_No8of2001.pdf

Project Location

The proposed project is located in Kwale County, Lunga Lunga Sub- County, Pongwe Kikoneni ward, Pongwe Kidimu location and in Shimoni Sub-location. The proposed facilities will be located at KMFRI NAMARET centre Shimoni village on the West of Shimoni market and North of Shimoni primary school as shown on **Error! Reference source not found.**Figure 0-1, from a Google image. The area is situated on a 6 Ha piece of land with an elevation of 14m above sea level and GPS coordinates of the project site being Latitude 4°38'34.27"S and Longitude 39° 22'30.60"E.

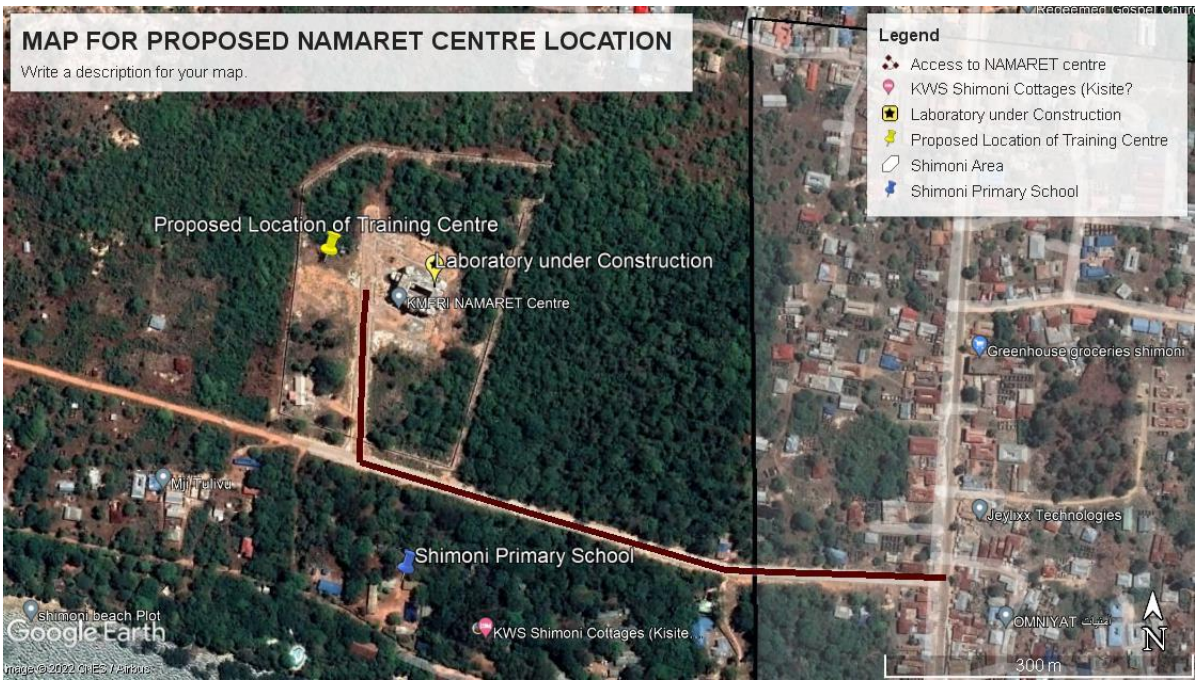

Figure 0-1: Proposed Training and Resource centre site Location relative to Shimoni Market, Shimoni primary and other NAMARET structures.

Project Description

The sub-component of NAMARET centre being funded under KEMFSED project shall consist of constructing; Four storey resource center building with a roof top, a single-storey guard house building, landscaping works, 2 No. single-storey hatchery blocks, an algae production building, 3 No. Hatchery office/washroom blocks, a single-storey power house building block, a Reverse Osmosis building with Reverse Osmosis machine, 2 No. a pump room buildings, construction of artificial wetland, constructing 2 No. seawater storage tanks, 2 No. trial Tanks, civil works *(drainage and roads)*, painting of nearby Shimoni primary school, electrical and mechanical works. The laboratory which is key to the hatchery is being constructed under funding from the government. In addition, other facilities funded under the Government of Kenya is the sea intake and part of the hatchery brood stock and larval rearing tanks. The detailed description of the project design for the various facilities proposed under NAMARET is highlighted in chapter 2 of this report.

Alternatives Project Analysis

The analysis of alternatives focused on; without project option, implementing the project, implementing the project but in a different location and considering the different technologies while implementing and operating the facilities. Without the project option means no facilities will be implemented to influence the environment and the option was noted to be suitable from an environmental and social management perspective with no negative impacts or changes to the status quo but not good for social-economic purposes. The opportunity cost incurred will imply that the challenges affecting mariculture development in Kenya shall remain unaddressed. Implementation of the project though not the best considering the environmental and social economic costs, but is ideal because of the ability to solve the challenges facing mariculture in Kenya. Relocating the proposed NAMARET center though an option but currently the proponent does not have an alternative spacious site with a land title. The application of the best technology is important in reducing the impacts of the project the environment and the design team took cognizance of appropriate technology existing on the market in the proposed project facilities and activities. More is provided in chapter 2

Project Cost

The estimated cost for constructing the proposed NAMARET Center in Shimoni is about KShs. 821,288,154.23 with the resource center costing 443,097,346.00 and Hatchery costing 378,190,808.23.

Approach and Methodology

The main approach and methods employed during the ESIA study were desktop literature review and field survey. The desktop study involved; reviewing available published and unpublished reports including previous ESIA reports and project design report to compile relevant baseline biophysical and socio-economic information about the study area. Field surveys were conducted on several occasions as indicated in section 1.4 which included environmental and socio-economic data collection. Environmental profiling of the proposed project area was done through assessment of various environmental parameters, including; climatic factors, solid and liquid waste, noise receptors and sources, air quality sources and receptors, landscape, and aesthetic

value of the proposed project area as indicated in sections 4.3 of this report. The socio-economic survey approach consisted of collecting data from community meetings and various key informants from institutions. Data needs were based on predetermined socio-economic parameters, as highlighted in section 4.5 and chapter 5.

Public Consultation and Stakeholder Engagement

There were several issues that were raised by the community during public participation meeting with NPCU and KMFRI team as captured in chapter 5 of this report. And a summary of the issues were as indicated in table 0.1

Table 0-1: Summary of Stakeholders Issues raised and the Responses

Names	Issues	Responses
Village Elder	The project is worthwhile, and the community supports it. But there is a really risk that an KMFRI administration or management won't pay attention to community issues both throughout the construction and operational phases of the NAMARET centre? Now that we have given you our approval, how can you possibly avoid becoming condescending?	KMFRI will employ a Community Liaison Person to link the community with KMFRI and ensure that community issues/concerns are well addressed.
Snr. Village Elder	In your Masterplan presentation, I did not see where you will plan to deposit the waste generated by the persons that will be staying and operating from NAMARET Resource Centre.	We'll employ the MBBR system. The Moving Bed Biofilm Reactor is known as the MBBR system (MBBR). A fill-and-draw activated sludge system for wastewater treatment. This approach involves adding wastewater to a single "batch" reactor, treating it to get rid of unwanted materials, and then releasing it. Using a single batch reactor, normalization, oxygenation, and purification can all be accomplished. SBRs have the benefit of allowing for the simultaneous completion of equalization, primary clarification, biological treatment, and secondary clarification in a similar heat exchanger. These benefits can lower the cost and treatment area.
Shimoni Developm ent Org,	Do you have land for the NAMARET Training Resource Centre? And has the community approved it for this development project	The project will be done on KMFRI's 6 hectares of land - Plot Number: PDP No. 141.KWL.4.94 at Shimoni, Kwale County. The land was approved by the community to be a KMFRI Shimoni Center in previous meetings.
Human Right	The project is likely to result in an increase in foreign tourists	We anticipate that the Contractor will ensure that every one of his employees signs a code of conduct(CoC)

Activist, Shimoni Child Care	and scholars, which could result in sexual tourism, child sex exploitation, and the commercialization of sex among our 18 to 20-year-old teenagers. How does the project intend to lessen the potential for gender-based violence, sexual exploitation and probably sexual harassment? Can we educate more women and young people so they won't be exploited by the scholars likely to influx Shimoni?	throughout the construction period, pledging to refrain from gender-based violence, sexual exploitation of minors, and any conduct that could be interpreted as sexual harassment. We also anticipate that KMFRI will develop a sexual harassment policy in accordance with the Employment Act 2020 requirements and compel all of her staff/visitors to sign a code of conduct that permits avoidance of sexual harassment, exploitation, and actions that may result in GBV.
Children Rights protection Activists.	How will the project benefit the Shimoni community, which is hosting it? Instead of our local members, we're likely to see a rise in the number of non-locals hired here.	All Kenyans are expected to profit from the project, which is supported by the Kenyan government and the World Bank. However, employment that doesn't require a lot of specialization will be reserved for Shimoni residents during the construction and operational phases. The competitive hiring process will be followed for additional specialist jobs.
Teacher, Shimoni Primary School	This idea of a mariculture research training institute in Shimoni is really ingenious and profound, especially for Shimoni Primary School, who are your neighbours. Is there a way the school may be inspired further, perhaps by starting a club for aquaculture or mariculture? The institutions of KMFRI and KWS might work well together to inspire young kids to mariculture interest and wildlife conservation.	This is possible and the school could initiate this idea with KMFRI. I am sure KMFRI is open to such interesting ideas that help inspire next generation of leaders.
Youth Representative	What happen to "Mikoko" (Mangrove trees" that may be brought down during clearance of the site and laying of the extraction pipeline.	We are all aware the role mangrove trees play in providing natural infrastructure and protection to nearby populated areas by preventing erosion and absorbing storm surge impacts during extreme weather events such as hurricanes and we must protect Mikoko at all costs. They are also important to the ecosystem too and the local ecosystem in Shimoni. Their dense roots help bind and build soils. During the laying of the Shimoni water

		pipeline from the sea, we may lose Mangroove trees along the Right of Away. However, the design has tried as much as possible to avoid destruction of Mangrove trees (Mikoko).
Patron of Christian Churches Shimoni	Will the project have a component for youth and women especially during the award of tenders or some works.	Young people and women who could be interested in aquaculture or mariculture will likely receive training at the center. Youths who perform manual labor or non-specialized services will be given consideration for employment prospects throughout the construction period of the centre by the contractor.
Fisheries Officer	How do you intend to use indigenous knowledge to address fish disease? The fishermen here have a lot of indigenous knowledge that could be tapped to support the research centre	We acknowledge that fact that fisheries resources have existed on earth for centuries and their management has depended on the knowledge available to those that were, and are, entrusted with management responsibilities. Formal technical and traditional knowledge have formed the basis for the formulation of fisheries management approaches in Kenya and we cannot ignore the indigenous knowledge. In the midst of fisheries crises, such as fish stock over-exploitation and effects of climate change on fisheries, there has been great interest in fostering sustainable fisheries management as a means to improve the capacity of fishing communities to adapt to the changes. We have not adequately involved local people who have acquired traditional knowledge through their direct experience with nature and especially fishing. The NAMARET centre will document indigenous knowledge used in fisheries management within the wider context of livelihood systems and indigenous technologies that offer insights of its value to biological scientists of international repute and fisheries managers in Kenya; second, to demonstrate the value of indigenous knowledge as a lens through which biological scientists can look when managing fishery resources. We believe that fisherfolk have a better understanding of the wide range of fishing systems and we will also learn from them.
Wakifundi Initiative, VMGs	How will this project of constructing NAMARET centre benefit the VMGs in Shimoni. Is there a 10% that goes to the community for this support of the VMGs?	We are much aware that Shimoni has Wakifundi, Watshwaka, Wavumba, Washiratzi indigenous minorities. The larger project KEMFSED has a much larger component and budget that mainstreams aspects of VMGs. In fact we will be coming to talk to you on how the project can be of assistance to you.
Imam-	We support the project but we	No matter their personal opinions, we will expect that

Shimoni	are also keen not to lose our culture and traditional values. We hope the visit will be as respect to our cultural norms as much as possible.	the visitors to the NAMARET will willingly step into the cultures and traditions of Shimoni area. They are the guests in Shimoni's community and the rules and traditions of Shimoni should hold of significance way of doing things — they must willingly respect the community and relate respectfully to people in the locality of Shimoni. Being culturally responsive requires openness to the viewpoints, thoughts, and experiences of others. This is not about changing others to be more like you. It is about respect and we will expect them to show you respect. On the other hand, we also expect you to develop understanding for other cultures. Developing your understanding of other cultures, or 'cultural awareness', lets you have more meaningful interactions with those around you by celebrating their differences as well as your similarities. We hope this will dispel negative stereotypes and personal biases about different groups. In addition, cultural diversity helps us recognize and respect "ways of being" that are not necessarily our own. So that as we interact with others we can build bridges to trust, respect, and understanding across cultures.
Chairman BMU Network	Does the project also have intention to improve for us the Beach Landing Sites?	The bigger project KEMFSED has a budget of KES 800M to improve fish landing sites and not beach landing site. However, we need to first ascertain the land ownership document of the proposed fish landing site.

Impacts of the Project

The implementation of the proposed Marine hatchery and training centre is anticipated to have both negative and positive impacts on; mariculture research, aquaculture technology, contribution to the blue economy, economic empowerment, to the environment and on the society in general, as indicated in chapter 6 and 7 of this report.

Positive Impacts

The project is anticipated to have an overall positive impact, particularly in enhancing food security, general economic development, availability of high quality seed, improved access to quality and quantity fish feeds, contribution to policy development, increased uptake of mariculture, transform mariculture practice, adoption of new technologies, enhanced mariculture project management skills, provision of consistent technical and extension services, knowledge and skills of managing pest and disease, improvement in pond management skills, enhance education and awareness among farmers, as well as supporting local employment

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The Negative Impacts

The proposed project is anticipated to have some negative impacts. Some of the negative impacts are; Occupational Health and Safety (*accidents and Injuries*), Public health and safety (*accidents and Injuries*), Inorganic discharges from excretory products, entanglement by marine mammals, risk to genetic diversity of the wild fish from escapes, deposition of organic matter, spread of parasites viruses, bacterial infection, Leakages and oil spills, Noise and vibrations, Air pollution, Solid Waste generation, Waste water generation, Fire Hazards, Increased Energy consumption, Gender-based violence at community level, Increased Water consumption, Risk of Spread of HIV/AIDS, increase in Grievances, Child Labour risk, Gender Equity in allocation of roles and responsibilities, Sexual Harassment and abuse amongst workers in the workplace, Gender-based violence at community level, GBV: Sexual exploitation and abuse (SEA), Spread of COVID-19 amongst community members during consultation processes and Spread of COVID-19 during construction at work sites. Measures have been put in place to mitigate the negative impacts at construction, operation stages and decommissioning phase. The negative impacts for the construction phase were as captured in table 0.2, for operation phase in table 0.3 and captured in table 0.4 are impacts during the decommissioning phase of the project.

Table 0-2: Environmental and Social Management Plan During Construction

ASPECT	MITIGATION MEASURES
Occupational Health and Safety (accidents and Injuries)	▪ Contractor to complete hazard identification and risk assessment, develop a site safety action plan detailing safety measures/procedure, equipment to be used, emergency procedures, restriction on site and personnel responsible for safety inspections and controls. This shall be ready and approved by the joint supervising committee before commencing of the proposed works ▪ Contractor shall hire and retain a duly qualified construction safety and health officer throughout the construction period, to ensure implementation of the safety plan. ▪ Train workers on safety and first aid skills before commencing works ▪ Ensure safety of the construction workers by putting first aid facility, and having trained first aiders among the workers and injury reporting mechanism. The ration of first aiders to works shall be in line with the OSHA First Aid Rules. ▪ Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. (Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, fall arrestors, welding masks etc.). The safety plan shall identify the mandatory PPEs by the tasks performed. ▪ Adequate provision of requisite sanitation facilities for human waste disposal for workers on site ▪ Recording of all injuries that occur on site in the incident register, corrective actions for their prevention as appropriate. ▪ The contractor is required to have WIBA insurance policy to compensate workers in the event of injuries. ▪ Provide clean drinking water for the workers to mitigate against dehydration. ▪ Have an understanding with a nearby health facility for emergency cases on-site

	before decisions are made. ▪ Adherence to Covid-19 rules/guidelines as provided from time to time by the ministry of health and the bank with provision of easily accessible and adequate covid-19 PPE to all persons on site. The specific action to be captured in the contractor ESMP. ▪ Training of workers on covid-19 rules and requirements. ▪ As applicable, only qualified personnel shall be allowed to operate construction equipments on site that may require specialized skills
Public health and safety (accidents and Injuries)	▪ Ensure the safety of residents and officers with offices near the site by providing safety signs at strategic places around the access roads. ▪ Hoarding off working sites to protect the public or unauthorized persons from entry. ▪ Reduce unnecessary speeding by the construction vehicles to control for accidents from the movement of pedestrians in the area. ▪ Prior creation of awareness and sensitization of the public and the officers of any activities that is likely to have an impact in adequate time (2 weeks) before commencement. ▪ Implement Grievance mechanism and use feedback to improve any management measures as may be necessary.
Visual/ aesthetic Impacts	• Cleaning of the site and organized sitting different construction materials. • Backfilling of soil cuttings • Landscaping of the project site • hoarding of the construction site using appropriate screening materials
Leakages and spills	▪ In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose of contaminated soils. ▪ Disposing of contaminated soils in cutting pit if volumes are low. ▪ Use of NEMA licensed hazardous waste handlers to dispose off in licensed disposal areas. ▪ Development of site-specific incident management or response plan. ▪ Use of an authorized garage or fuel station in the project area by the contractor. ▪ No servicing of construction equipment shall be undertaken on site. For emergency works, fuel and oil trays shall be used.
Excessive Noise	• The contractor to use equipment with low noise levels or fitted with silencers where appropriate. • Regular servicing of the equipment to reduce the possibility of noise from worn-out parts. • Informing the public about the possibility of unusual noise levels, particularly to residents and nearby offices, whenever working on such activities. • Ensure adherence to PPE by workers[2] working on excessive noise and vibration activities • Minimize unnecessary hooting and speeding by construction vehicles. • Restricting noisy activities to be during the day and no noisy activities should be conducted on site at night. • Regular measurement of noise levels and devising control measures.
Air pollution	• Vehicles to be used on-site to meet NEMA emission standards as required under NEMA air quality regulations. • Reduce unnecessary speeding or idling of construction vehicles

[2] The measure should be according to the law (Occupation safety and health Act 2007, National Construction Act

	• Use of non-lead paints during construction. • Adherence to proper uses of PPE by the workers, especially those working on activities requiring mixing of cement. • Inform the public and residents about activities with possibility of unusual air pollutants • Use of silt screens to reduce dust from site. • Consider wetting all the sand or soil materials being transported to or from the construction site. Where appropriate, cover the materials being transported to avoid being blown by the wind during transportation.
Solid Waste generation	• Provision of mobile sanitation facilities for adequate human waste management[3] during the construction phase for workers and persons on site. • Promotion and adoption of the principles of waste avoidance, reduction, reuse and recycle. Through avoiding unnecessary generation of waste, use of debris for backfilling where possible, use of waste materials on-site for other purposes where appropriate, or selling to recycling merchants. • Designate proper waste transfer stations onsite with controlled access. • Seek appropriate approvals from NEMA and County Government on management and Disposal of the waste[4].(this may include using authorized disposal sites, use of NEMA authorized waste pickers/transporters, acquiring dumping certificates, and keeping proper records or use of authorized vehicles to ferry waste from site) • Consider formulating a site-specific waste management plan informed by waste characterization[5]. • Observing waste management standards proposed under NEMA waste management regulations 2006. (with a particular focus on waste separation and management before disposal)
Increased Water consumption for construction	• The civil works to consider having vertical drains for surface storm water runoff to replenish the water table after abstraction. The vertical drains to be done cautiously to avoid any possible pollution to the water table. • Sensitization and awareness creation among construction workers on significance of water conservation measures. • Curing the concrete structures during evening and early morning to reduce evaporation. • Covering the concrete structures to be cured with sand or any water retaining material to shield from direct sunlight • Regular maintenance and prompt response to leakage in the water system during construction phase. • Use of alternative water sources if available, particularly rain water if any during construction phase
Risk of Spread of HIV/AIDS	• Promote HIV/AIDS Prevention messaging • Access to safe sex (condoms-Male and female) • Install HIV testing services at the construction site or an MoU with an existing government health facility in the area. • Support infected workers with access to ARVs from local public health facilities.

[3] According to the Public Health Act Cap 242, 2012 and Occupation safety and Health Act 2007 requirements

[4] Waste management and disposal procedures need to be in accordance to waste management standards proposed under NEMA waste management regulations of 2006 (legal notice 121).

[5] Waste characterization should consider waste from construction site and the contractors' camp if any.

	• Peer counseling services at the site
Grievances	• Establish grievance redress committees at the site • Ensure that there is a trained focal person to facilitate the receipt and management of the grievance resolution process • Ensure contractor staff grievance structures exist • Sensitization and awareness creation among workers and the public on grievance redress mechanisms in place
Effects of Immigrant workers	▪ Contractor should use the local workforce as much as possible (preference to local community members on skills locally available). ▪ Effective community engagement and strong grievance redress mechanisms on matters related to labour ▪ All workers to sign an employment contract including a Code of Conduct governing appropriate behaviour ▪ The workforce should be sensitized to local social and cultural practices and be educated on the expected behaviour and conduct ▪ Contractor should prepare and enforce a No Sexual Harassment and Non-Discrimination Policy ▪ Contractor should prepare and implement a gender action plan ▪ The contractor as part of the C-ESMP will Prepare labor Management Plan (LMP) that included mandatory requirement to procure all unskilled (and as much as possible, semi-skilled) labour as well as locally available materials from the local community while ensuring equal pay for equal work for men, women and people with disability
Risk of Child Labour and other labour related disputes.	▪ Ensure no children are employed on site in accordance with national labour laws. This can be done through incorporating prohibitive provisions in the code of conduct and also having the recruitment policies that prohibits child labour. ▪ Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police. ▪ Ensure that the CoC and the employment contract has clear measures in dealing with such contraventions ▪ Prioritize to the extent possible recruitment of local labor ▪ Adherence to labor laws and practices such as the working hours and payment ▪ Ensure the workers have contracts with terms and conditions consistent with national labor laws and policies ▪ The Contractor shall keep complete and accurate records of the employment of labor at the Site to include the names, ages, genders, hours worked, wages paid to all workers ▪
Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	▪ The contractor should prepare and enforce a No Sexual Harassment and Non-Discrimination Policy ▪ The contractor will strive to ensure equitable distribution of employment opportunities between men and women. ▪ Provision of gender disaggregated bathing, changing, sanitation facilities ▪ Whenever harassment are recorded on site, the contractor should ensure prompt and effective remedial action ▪ The employees should be trained and sensitized on appropriate behavior ▪ All workers signing a code of conduct ▪ Sensitization and awareness creation ▪ Measures that will allow for the uptake of complaints without the fear of

	retaliation (whistle blower policy)
Gender-based violence at community level	▪ The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: ▪ Engagement with community liaison person, effective and on-going community engagement and consultation, particularly with women and girls; ▪ Review of specific project components that are known to heighten GBV risk at the community level, ▪ Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to employment, representation, management, school pupils etc ▪ The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.
Sexual exploitation and abuse (SEA)	▪ Develop and implement a SEA/SH prevention and response Action plan with an Accountability and Response Framework as part of the ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing. ▪ The SEA action plan will include how the project will ensure necessary steps are in place for: ▪ Prevention of SEA: including CoCs and ongoing sensitization of staff on responsibilities related to the CoC and consequences of non-compliance; project-level IEC materials; ▪ Response to SEA: including survivor-centred coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level, including confidential data management; ▪ Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ▪ Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.
Spread of COVID-19 amongst community members during consultation processes	• Electronic means of consulting stakeholders and holding meetings shall be encouraged, whenever feasible. One-on-one engagements with stakeholders while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating people in a small area based on need basis as the spread of the virus among the population remains dynamic. • The team carrying out engagements within the public on one-on-one basis will be provided with appropriate PPE for the number of people and stakeholders they intend to meet. • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to allow participants to provide feedback and suggestions.

	• Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chat groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.
Spread of COVID-19. During construction at work sites	• The Contractors will develop standard operating procedures (SOPs) for managing the spread of Covid-19 during project execution and submit them for the approval of the Joint Supervision committee and the client, before mobilizing to site. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors; • Avoid concentrating more than 15 workers at one location. Where two or more persons are gathered, maintain social distancing of at least 1.5 meters; • Install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;

Table 0-3: Environmental and Social Management Plan (ESMP) during Sub-project Operation

ASPECT	MITIGATION MEASURES
Occupational Health and Safety (*accidents and Injuries*)	• Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations standards including: registering the office as a workplace, constituting a safety committee, providing first aid facilities, conducting emergency drills and annual office safety audits. • Provide personal protective equipment to operation and maintenance workers • Recording all injuries that occur on-site to workers while doing their daily duties in the incident register, corrective actions for their prevention should be initiated as appropriate. • Cordoning off working sites to protect the public or unauthorized persons during repair and maintenance of the different utility systems on site • Creation of awareness and training of workers on site on safety and first aid skills, as well as the facility emergency response plan. • Hiring employees with proper qualifications for specialized and risky tasks during operation and maintenance of the various utility systems. • Adherence to Covid-19 rules as provided by the ministry of health and the bank while conducting daily duties. • Providing requisite PPE and training of workers on covid-19 rules and requirements.
Public health and safety (*accidents and Injuries*)	• using signage during cleaning, maintenance, or repair to warn the public • Easily accessible fire risk information to the public visiting the premise

Deposition of organic matter	• Filter feeders to be integrated into the hatchery together with finfish to use uneaten feed. • the cages to be located at least 5 meters above the seascape to allow the benthic organisms to feed on the extra feeds • Locating the cages within areas with optimal environmental factors *(wind, temperature, tidal waves benthic community composition and the size of the feeds)* that will not allow settlement to the sediments.
Inorganic discharges from excretory products	• Automate hatchery monitoring systems to mitigate against any human error since marine species are highly sensitive to slight changes in water quality parameters. • Adoption of bio-security measures that prevents introduction of disease pathogens • Limit treatment to substances that do not negativity affect the bio-filter • Adherence to international code of conduct regarding chemical usage
entanglement by marine mammals	• Before location of the cages undertake site specific assessment to determine the risks associated with the cages. • The assessment to consider temporal and spatial distribution of ecological communities with the cage location area. • conduct regular assessments to determine the impacts of the cages to the marine mammals • Consider using the appropriate cage net based on the community within the location to reduce entanglement.
Risk to genetic Diversity of the wild fish from escapes	• control for the amount and frequency fish escapes from the cages • Avoid or minimize the alteration of natural genome after capture of the fingerlings from the wild to reduce genetic differentiation from similar species. • Retain genetic compatibility between the cultured and wild fish through sourcing sufficient brood stock from the wild population in arandom manner • Have mating program that prevents in-breeding and maintain sufficient effective population size • Conduct regular genetic compatibility between cultured and wild fish population as well as before caging • Maintaining a lower population of caged fish in comparison to wild population • Adopt reproductive sterility to eliminate mating by the escaping cultured fish • Regular assessment of the comparative genetic profiles of cultured and wild population.
Spread of parasites viruses, bacterial infection	• Use of vaccines to be considered as a way of reducing the reliance on antibiotics and anti-parasitics. • Regular backwash of inlet pipe with fresh water shall be conducted to kill marine pathogenic organism building up in the pipes • Adopt selective breeding, vaccination, and observing fish health management to control parasitic diseases • regular surveillance and reporting of diseases and parasites • Responsible use of chemicals and antibiotics • Optimizing feeding • Adopting good husbandry techniques
Solid Waste generation	• Consider giving back the RO filters to the supplier for safe disposal at the time of replacement. • Consider contracting NEMA registered hazardous waste management expert to manage solar energy related waste or having an agreement with the repair and

	maintenance firm to return the waste to the supplier replacing the warn out parts for safe disposal. • Sensitization and awareness creation among the office and hatchery users on the significance of waste separation and in addition provide for waste sorting bins at the premise with clear labeling. • Provide for a waste transfer station at the premise for temporal holding of waste before final disposal. • Sensitization and awareness creation among the office building users on the significance of waste recycling. • To engage the county government environment and natural resources department mandated with waste management to collect and properly dispose of the waste.
Waste water generation	• Brine waste water from the RO to be connected to the artificial wetland. • Regular monitor of outlet for water quality parameters before being discharged to the environment. • Regular sensitization and awareness to facility users as well as discouragement on releasing detergents or other chemical solutions in black water system. • Regular cleaning of the wastewater drainage system • Regular and proper maintenance of the drainage system • Prompt response to any reported blockage and leakages • Sensitization and awareness of building users from discharging or emptying any chemical solutions or oils to the sewer system. • Treating the waste water through an MBBR and using the water for landscaping.
Fire Hazards	• Provide for fire risk and appropriate response equipment as well as signages with short and clear information. • Train selected staff as fire marshals who can take lead in case of fire emergency in the building • Regular fire drills for the building users • Regular awareness and sensitization on fire safety measures and response to the users of the building. • Clear fire incidents reporting procedures and response. Ensure regular provision of operational emergency reporting contacts. • Regular servicing and maintenance of the fire extinguishers. • Ensuring availability of adequate water resources at the premise at all times for the hydrants as per the OSHA requirements..
Increased Water consumption	• Sensitization and awareness creation among users of the building on significance of water conservation measures. • Use of water efficient appliance such as delay taps • Regular maintenance and prompt response to leakage in the water system. • Use of alternative water sources eg rain harvesting • Prompt reporting of leakages through sensitization of the public members
Increased Energy consumption	• Sensitization and awareness creation among office users on the significance of energy conservation measures • Sensitization and awareness creation among the maintenance team to continue observing the use of energy-saving electrical appliances on the building. • Proper and regular maintenance of the green energy appliances and equipment provided for in the design of the building.
Spread of COVID-19.	• The county departments of fisheries to develop Standard Operating Procedures (SOPs) for managing the spread of Covid-19 during office operation and submit them for the

During operation at work sites	approval by the county department of public health before use of the building. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all office users including visitors; • Install hand washing facilities with adequate running water and soap, or sanitizing facilities at building entrance including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;

Table 0-4: Environmental and Social Management Plan (ESMP) during Decommissioning.

ASPECT	MITIGATION MEASURES
Occupational Health and Safety (*accidents and Injuries*)	• Preparation of project decommissioning plan. • Ensure the safety of the decommissioning workers by putting first aid area and injury reporting mechanism • The contractor should consider having a WIBA insurance policy to compensate workers in an event of an accident on site. • Provide personal protective equipment to workers. • Recording all injuries that occur on site in the incident register, corrective actions for their prevention. • Cordoning off demolition sites to protect the public or unauthorized persons • use of signs and warnings on sites with high risks • Creation of awareness and training of workers on-site on safety and first aid skills. • Hiring employees with proper qualifications for specialized and risky tasks. • Ensure compliance to Occupational Safety and Health Act Cap. 514 and it's Subsidiary Legislations.
Leakages and spills	• In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose of contaminated soils. • Disposing of contaminated soils in cutting pit if volumes are low. • Use of NEMA licensed waste handlers to dispose of in licensed disposal sites. • Development of site-specific incident management or response plan. • Use of an authorized garage or fuel station in the project area by the contractor or specific concrete and oil traps should be constructed at the contractor's yard.
Excessive Noise	• Adequate use of PPE by the workers e.g. earplugs • Working on and restricting noisy activities during the day • Reducing the duration of exposure of workers to high occupational noise levels during demolition. • Acquisition of permits/Licenses for any activity with high noise levels eg drilling of walls or slabs for demolition. • Using models of machines and equipment with low noise levels. • workers using drilling or handheld pneumatic equipment to be provided with specialized anti-vibrating gloves, • Switching off vehicles and machines when not in use, • Avoiding unnecessary hooting, • Warnings to be issued to the locals in case of any unusual noise levels,

	• Ensure that NEMA noise and Vibration standards are observed in all project activities.
Air pollution	• Workers to use masks when working in dusty conditions during the decommissioning process. • Use all means possible to suppress dust if considered to be a menace during demolishing of obsolete walls or structures on-site
Solid Waste generation	• Proper disposal of any hazards waste from the decommissioned site. • Preparation of waste management plan to guide waste management and disposal activities of all debris from demolition activities. • Disposal of debris to NEMA authorized damping sites • Use of certified vehicles or NEMA licensed waste disposal firms for waste management and disposal
Spread of COVID-19. During construction at work sites	• The Contractors will develop standard operating procedures (SOPs) for managing the spread of Covid-19 during project decommissioning and submit for approval to the county department of public, before mobilizing to site. The SOPs shall be in line with Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel • Install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;

The estimated total cost for the implementation of the ESMP during construction phase including monitoring is Kenya Shillings 17.36 Million. However, the actual cost shall be prepared by the contractor and captured in the C-ESMP. The project's Bid Documents will incorporate the Environment, Social Health and Safety Provisions discussed under the ESMP in chapter 7. The cost could not be estimated for the operation phase which will be prepared as part of the operation and maintenance manual.

Conclusion

The implementation of the proposed project is critical for aquaculture development in Kenya and the East Africa Region in general. The project has generally positive impacts and for the negative impacts, readily implementable mitigation measures have been proposed. The proposed project area was noted to be a highly modified habitat through anthropogenic activities mainly from settlement. The environmental and social assessment findings indicate that the project impacts are of low impacts. The implementation of the project therefore is not anticipated to significantly influence the physical, biological and social environment. The environmental assessment team proposes the implementations of the sub-project with key observations including; conducting site specific assessments before culturing activities, close supervision of sea-based cage culture technology and regular monitoring of the wetland's to ensure proper operation

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ABBREVIATIONS AND ACRONYMS

AOI	Area of Interest
DOSHS	Directorate of Occupational Safety and Health Services
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMoP	Environmental Monitoring Plan
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESS	Environment Safeguard Specialist
FAO	Food and Agriculture Organization
GBV	Gender Based Violence
GO	Grievance Officer
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
KeFS	Kenya Fisheries Service
KEMFSED	Kenya Marine Fisheries and Socio Economic Development
KMFRI	Kenya Marine Fisheries Research Institute
KP&LC	Kenya Power and Lighting Company
KWS	Kenya Wildlife Service
NAMARET	National Mariculture Resource and Training Centre
NCA	National Construction Authority
NEMA	National Environmental Management Authority
NPCU	National Project Coordination Unit
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
PvC	Polyvinyl Chloride
RH	Relative Humidity
SDBE&F	State Department for Blue Economy and Fisheries.
SSS	Social Safeguards Specialist
STI	Sexual Transmitted Infection
WIBA	Work Injury Benefit Act

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1. INTRODUCTION

1.1. Background

Aquaculture provides an opportunity to grow fish where they could not grow in the past. Yet mariculture as an alternative to capture fisheries has not taken root in spite of dwindling stocks in the natural. The main challenges are associated with inadequate availability of; fingerling, affordable feeds, husbandry skills and technical knowledge, market information, accessibility to credit for fish farmers and water scarcity. To exploit the potential and attain economic benefits from the coastal and marine resources, the Government of Kenya, through SDBE&F, requested the World Bank to support the development of the sector through the Kenya Marine Fisheries and Socio-Economic Development (KEMFSED) project. The project shall enhance the blue economy sector to support coastal livelihoods and contribute to food security. As part of efforts under KEMFSED project to reduce pressure on near-shore fishing and providing local communities with alternative sources of livelihoods, funding has been committed for the construction of National Mariculture Resource and Training centre (NAMARET). The urgency in being innovative in addressing the existing gap is critical and therefore the establishment of the centre is a timely idea and requirement for Kenya. NAMARET centre is an integrated facility consisting of several components including; a marine hatchery, a laboratory block, training centre with auditorium, an administration block, an accommodation block and resource centre. However, the focus of funding under KEMFSED project shall be the construction of a hatchery and a training centre with auditorium.

There is no doubt that NAMARET centre will make certain that farmers access good quality and quantity seed to guarantee sustainability, food security and nutrition, employment opportunity, feeds, technical services to farmers, specimens (live feed), Manuals, guidelines, Training services and research. The sub-component of NAMARET centre being funded under KEMFSED project shall consist of constructing; Three floors resource center building with a roof top, a single-storey guard house building, 2 No. single-storey hatchery blocks, an algae production building, 3 No. Hatchery office/washroom blocks, a single-storey generator/power house building block, a Reverse Osmosis building with Reverse Osmosis machine, a pump building, construction of artificial wetlands, constructing 2 No. sea water storage tanks, constructing 2 No. trial tanks, civil works *(drainage and roads)*, painting of nearby Shimoni primary school, electrical and mechanical works.

The proposed implementation and operation of the facility is anticipated to have social and environmental implications which if not well anticipated and enhanced or mitigated, the maximum benefits of the component may not be realized. It was therefore essential to appreciate the environmental and social significance of the site conditions, likely to be influenced by the sub-project component's activities through an assessment. This was in line with the World Bank OP/BP 4.01 Environmental Assessment and section 58 of the Environmental Management and coordination Act (EMCA) CAP 387; which requires a project proponent to prepare Comprehensive Project Report or an ESMP before being permitted to undertake any activities with potential harm to the environment or effect to social aspects. This

includes observance of related national legislations guiding stakeholder consultation, work place safety, conservation, management and utilization of natural resources.

In response to the requirements of the law, the NPCU safeguards team prepared the comprehensive ESIA project report for the proposed NAMARET resource centre and Hatchery at Shimoni. Undertaking the study for the proposed activities under NAMARET sub-project has allowed for early identification of key environmental and social issues that need to be considered during implementation of construction works, operation of the facilities and decommissioning activities.

1.2. The rationale for the ESIA study

The proposed facilities to be implemented under NAMARET sub-project falls under the World Bank's support to the government through investment lending towards transforming and strengthening sectors related to the blue economy, focusing on strengthening technological and mariculture skill capacity development in Kenya. The proposed sub-project activities thus trigger the Bank's Safeguard Operational Policies *(OP/BP 4.01 Environment Assessment)* which requires undertaking environmental and social due diligence for all sub project activities and preparing environmental and social impact assessment for sub-projects. Under EMCA it's a requirement that a proponent prepares a comprehensive project report for the authority to approve any development activities. This includes compliance with the Environment Impact Assessment (EIA) and Environmental Audit (EA) Regulations of 2003 (amended in 2019) and consideration of other national legislations guiding conservation, management, and utilization of natural resources. This report builds on the initial ESIA report that was developed, submitted to NEMA and licensed (NEMA/KWL/PR/5/2/0894). Some of the proposed sub-components under the current funding were not part of the report that was licensed. The current report captures the facilities that were not envisioned in the initial report for example the improved hatchery design, the training centre, the reverse osmosis plant as well as the power sources.

1.3. Objectives and Scope of the ESIA Project Study

1.3.1. General Objectives of the ESIA study

The main objectives of the study were to conduct environmental and social assessment for the proposed construction works of the training and resource centre component in line with EMCA and World Bank requirements. The specific objectives of the assessment therefore, focused on;

- Identifying significant potential impacts of the proposed sub-project to the physical, biological, social, cultural, and economic environment during all the project phases (construction, operation and decommissioning).
- Propose mitigation measures to the anticipated adverse environment, social and occupational health, and safety impacts throughout all phases of the project while enhancing the positive changes.
- Assess the considerations of climate change adaptation, green building and green energy in the designs of the building ensures the proposed project is environmentally friendly, socially acceptable, and sustainable.

1.3.2. The Scope of ESIA Assignment

The scope of the assignment was to;

- Describe the national environmental legislative and regulatory framework for construction and managing the proposed fisheries office and the associated facilities.
- Description of the proposed sub-project design and proposed works including technology, materials, by products, procedures and processes to be used during construction operation and decommissioning.
- Description of the project area's physical, biological, social, cultural, and economic environment.
- Conduct an assessment of environmental and social impacts due to the proposed construction works.
- Conduct consultations with key stakeholders
- Identify mitigation measures for negative impacts as well as enhancing measures for the positive impacts of the project.
- Develop an Environmental and Social Management Plan (ESMP), capturing aspects of gender-based violence GBV, sexual exploitation, and abuse (SEA) and child labor issues.
- Develop an Environmental and Social Monitoring Plan (EMoP)
- Prepare Grievance Redress Mechanism (GRM)
- Acquire NEMA EIA license

1.4. The Study Approach and Methodology

The main approaches applied in the course of collecting environmental and social baseline data, were desktop literature review and field surveys using key informant interviews and focus group discussions for environmental and social aspects.

1.4.1. Desktop Review

A desktop study was conducted to review available published and unpublished reports in order to compile relevant baseline biophysical and socio-economic information about the study area. The biophysical information was compiled on environmental aspect such as flora, fauna, climate and general environmental management. On the socio-economic aspects, the study compiled information on factors such as population, social amenities and physical infrastructure, land use and ownership, water and sanitation coverage, cultural heritage and properties, livelihood systems, gender based violence and sexual harassment, HIV/AIDS and child labour.

1.4.2. Field Survey

The study team conducted field survey within the project area on several occasions in October and November 2022, between 27thOctober and 9th November 2022. The main objective of the activity was to carry out on-site field assessments on the expected effects of the planned developments on the physical, biological and socio-economic environment. The field work exercise involved visiting and paying courtesy calls to the area chief, key informant interviews with key stakeholders like KMFRI, Shimoni primary, KWS, BMU, KFS, KeFS, County

government representatives and conducting public meeting and consultations. The survey team further conducted a site visit to familiarize and appreciate the general setting in respect to the proposed project site accessibility, social amenities, environmental setting and physical features among others. The team took the opportunity to conduct community stakeholder consultations meetings and consultations on social economic related issues.

1.4.3. Environmental Data Collection

The environmental and social study team carried out environmental profiling of the proposed project area, by conducting a transect walk through the proposed project site, the transect walk was conducted by a team of representatives from NPCU environmental and social safeguards, design team, survey officer from Kwale physical planning office as captured in Plate 1-1 and community opinion leaders as shown in Plate 1-2. The aim was to appreciate the proposed project and its integration with other components under the same sub-project, waste generation and management within the area of interest, sanitation and existing impacts to water resources, identifying potential sources of noise and vibrations as well as likely receptors, potential sources of air quality issues, vegetation type and cover, invasive species management if any, habitats types in the area, landscape and aesthetic value of the proposed project area. The main data collection methods were through observations, photo taking, expert judgment and informal consultations with members of the public. The data collected was triangulated with data from secondary information sources.

Plate 1-1: The Assessment team Walking along one of the Transects

Plate 1-2: One of the Mariculture Specialist from KMFRI taking to Local Opinion leaders through the Hatchery proposal during Stakeholder consultations

1.4.4. Socio-Economic Data Collection

The socio-economic data for the report was collected through a desk review and other qualitative techniques, key informants' interviews, focused group discussions and public consultative meeting. Key informant consultations targeted KMFRI, BMU representatives, KeFS officers, local administration leaders, land and physical planning, administration Shimoni primary school, Department of Water, Kenya Wildlife Service, Department of Environment and

Natural Resources, county ecosystem conservators, trade and tourism, Department of Social Services and the Department of Public Health among others. The process of consulting key informant was conducted over several occasions between the 27th October and 9th of November 2022. Public consultation meeting was conducted on 6th of November 2022 to seek opinion of the public on the possible impacts of the project. The findings during the discussions of the consultative process were as indicated in chapter 5.

1.5. ESIA Project Report Study Team

The Environmental and social Impact Assessment Comprehensive project report for the proposed construction of NAMARET training and resource centre in Shimoni was prepared by a team of NPCU team and officers from public works. Environmental scoping and subsequent preparation of the ESIA Comprehensive Project Report were accomplished and several experts provided varied inputs in the development of the report. The CPR preparation team composition is as indicated in **Error! Reference source not found.**.

Table 1-1: ESIA Assessment and Report Preparation Team

NO	NAME OF EXPERT	POSITION
1.	Eng. Stephen Agwenyi	Civil/structural engineer
2.	Stephen Mwangi	
3.	Dr. James Mwandawiro Mwaluma	Marine specialist/Fish larvae ecologist
4.	Pol Franseco	Reverse Osmosis Specialist
5.	Eng. Edwin Lenga	Hydro-geologist and water quality testing
6.	Eng. Sidney Chihenga	Hydro-geologist
7.	Kennedy Mwachala	Hydro-geologist
8.	Alexander Mutuku Nzomo	Hydrologist
9.	Godfrey Wambua Maina	Hydrologist
10.	Nelson Ojwang	Surveyor
11.	Dr. David Mirera	Mariculture specialist
12.	Kibet Ruto	Architect
13.	Derrick Wambua	Quantity Surveyor
14.	Godfrey Wabomba	Environmental Safeguards Specialist
15.	Lazarus Kubasu	Social Safeguards Specialist

1.6. Content and Structure of the Report

1.6.1. Purpose of the report

This report is intended to meet the overall assignment objectives of carrying out environmental due diligence for the construction works of the proposed NAMARET training and resource centre and the associated facilities in accordance with statutory requirements by NEMA on

projects under EMCA CAP 387 schedule II. The report will assist NEMA and lead agencies in decision-making process and ensure that the sub-project activities comply with sound environmental management practices. The report is also intended to assist the project proponent KEMFSED under the State Department for Blue Economy and Fisheries (SDBE&F) and the contractor in their obligation of maintaining environmental integrity during the overall management of the project activities during the training and resource centre construction, operation and decommissioning. The report is also meant to meet the World Bank safeguards requirements on KEMFSED project to conduct environment and social assessments before undertaking any activities sub-projects.

1.6.2. Structure of the Report

The report has been structured in 10 chapters to capture requirements under project ESMF, EMCA CAP 387 and Environmental Impact Assessment and Audit regulations 2003. The report is also consistent with the international best practices as outlined below;

- Chapter 1 introduces the sub-project activities in general, giving the background, project justification, study methodology, and rationale used to achieve the objectives of the study.
- Chapter 2 describes the proposed project design and the various alternatives considered for implementation.
- Chapter 3 highlights the environmental policy, legal and institutional framework that will inform the overall management of the works and its components at various phases of the project cycle.
- Chapter 4 briefly outlines existing environmental baseline information including physical, biological and socio-economic conditions of the project area. The content in the chapter also highlights how the project will influence or be influenced by the baseline conditions,
- Chapter 5 summarizes public and key stakeholder consultative process and the outcomes,
- Chapter 6 give the project impacts both positive and negative impacts associated with proposed project activities at the three phases (construction, operation and decommissioning),
- Chapter 7 presents the project Environmental and Social Management Plan (ESMP) at project constructions, operation and decommissioning,
- Chapter 8 presents Environmental and Social Monitoring Plan (EMoP),
- Chapter 9 captures the grievance redress mechanism on the sub-project,
- Chapter 10 presents the ESMP assessment team's conclusions and recommendations.

2. PROJECT DESCRIPTION

2.1. Chapter Overview

This chapter highlights the project location, sub-project objectives, proposed project design, project activities, project resources and by-products, project alternatives and the estimated financial cost for the proposed construction of NAMARET training resource centre and hatchery at Shimoni.

2.2. Project Location

The proposed project is located in Kwale County, Lunga Lunga Sub- County, Pongwe Kikoneni ward, Pongwe Kidimu location and in Shimoni Sub-location. The proposed facilities will be located at KMFRI NAMARET centre Shimoni village on the West of Shimoni market and North of Shimoni primary school as shown on **Error! Reference source not found.**Figure 2-1, from a Google image. The area is situated on a 6 Ha piece of land with an elevation of 14m above sea level and GPS coordinate of the project site being Latitude 4°38'34.27"S and Longitude 39° 22'30.60"E.

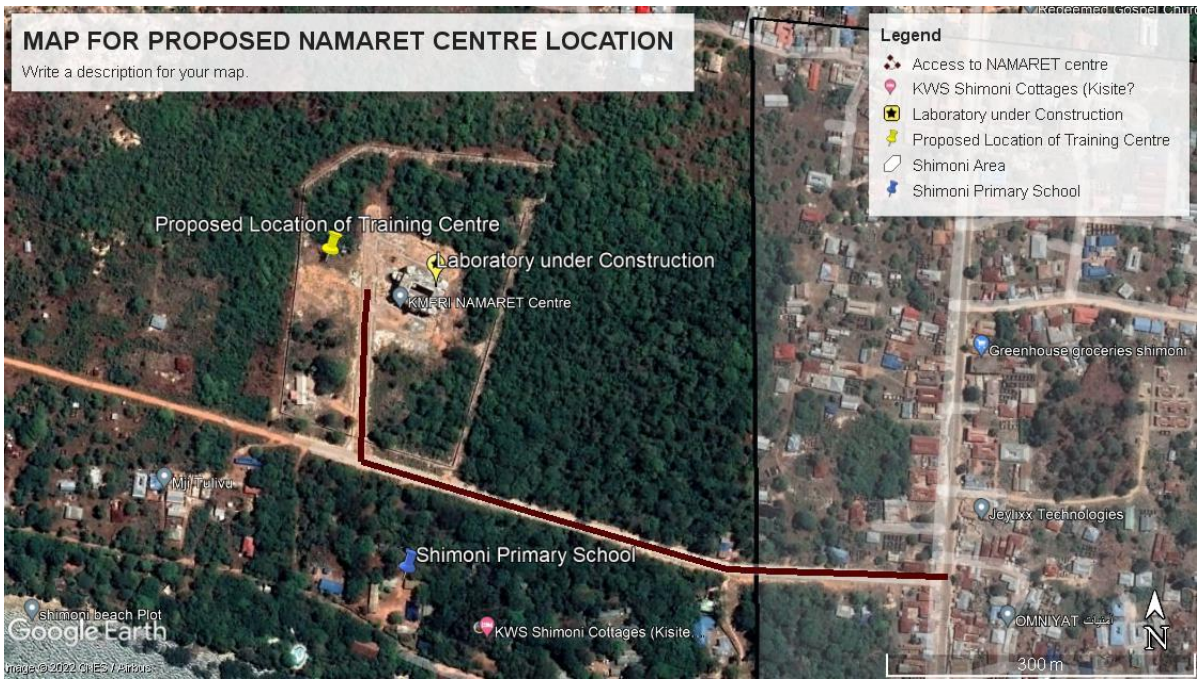


Figure 2-1: Proposed Training and Resource centre site Location relative to Shimoni Market, Shimoni primary and other NAMARET structures.

2.3. Proposed Project Objectives

The project development objective is to improve priority fisheries and mariculture management, and to increase access to complementary livelihood activities among the coastal communities. The aim of the sub-project is to support enhancing of mariculture development under KEMFSED project, through the development of National Mariculture Resource and Training Centre (NAMARET) and Hatchery. Implementation and operation of the proposed sub-project is anticipated to ensure; sustainable availability of seeds to farmers, development in skills for local communities in mariculture husbandry, ensure improved access to quality and quantity

feeds, access to improved quality of fin and shellfish species for growth, access to improved mariculture technology, contribution to policy framework and dissemination of critical mariculture research information. This is anticipated to contribute towards the development of current small-scale mariculture sector from subsistence to a medium size commercial state to reduce pressure on near-shore fishing, and to enhance access to alternative livelihoods among the coastal communities for improved living standards.

2.4. Justification of the Project

Kenya marine fisheries are of strategic significance in supporting local employment, nutrient rich food, income generation, and improved livelihoods of coastal communities. About 80% of the Kenya Marine products are from the near-shore and territorial waters. However, the use of destructive gears and increase in population relying on the resources has led to overexploitation and degradation of critical marine habitats thus affecting the fish stock. Aquaculture provides an opportunity to grow fish to supplement fish deficit from the wild capture. Yet mariculture as an alternative to capture fisheries has not taken root due to inadequate availability of; fingerlings, affordable feeds, diseases, skills husbandry and technical knowledge, market information, accessibility to credit for fish farmers and water scarcity. Farmers engaged in mariculture activities are faced with challenges, the main being; relying on seeds from the wild which are seasonal and whose quantities are not sustainable, application of rudimentary technology, practicing of mariculture at subsistence level and lacking a research centre for new technology innovations.

Nonetheless, it is the government policy to develop aquaculture so as to contribute up to 50% of fish production in the country. Aquaculture if developed has potential to be a major contributor to food security, poverty reduction, and employment to coastal communities. The urgency in being innovative in addressing the existing gap is critical and therefore the establishment of the marine hatchery was a timely idea and requirement for Kenya. The components of NAMARET centre and Hatchery shall consist of a marine hatchery, Laboratory block, training centre with auditorium, administration block, accommodation block, and a resources centre. However, KEMFSED project shall focus on a few of the anticipated facilities as indicated in section 2.5 of this report. It is expected that operation of NAMARET centre and Hatchery shall generate a lot of new knowledge which need to be shared by the farmers if the mariculture sector shall be transformed from the current small-scale venture into medium commercial status. The hatchery will ensure the farmers access good quality and quantity seed to ensure sustainability, food security and nutrition, employment opportunity, feeds and feed formulae, technical services to farmers, specimens (live feed), manuals, guidelines, training services and research. The construction of the proposed training and resource centre as part of other proposed infrastructures in particular is anticipated to contribute towards dissemination of information on new technology for capacity development and training of skills in mariculture.

2.5. NAMARET Centre and Hatchery Sub-Project Components

The completed NAMARET centre and hatchery shall have 20 new structures and 2 already established on a 6 Ha landscaped area bounded by a perimeter wall, with parking areas, internal

roads, , an onsite waste water treatment plant comprising of a Moving Bed Biofilm Reactor (MBBR) and all related facilities to function appropriately. The proposed Centre and hatchery is primarily intended to serve as a catalyst for the development of productive and profitable private mariculture ventures along the Kenya coast, with particular focus on ventures involving coastal communities in out-grower initiatives to strengthen livelihoods. . The structures composing the NAMARET centre shall include:

i. A The NAMARET resource center,
ii. A laboratory block,
iii. A guard house building
iv. 2 N0. Marine hatchery blocks
v. 1 No. Algae Production building block
vi. 1 No. existing prawn hatchery block
vii. 3 No. Hatchery office/washroom blocks
viii. 2 No. generator/power house building blocks
ix. 2 No. pump room buildings
x. An articifiical wetland
xi. 2 No. sea water storage tanks
xii. 2 No. trial tanks
xiii. 1 No. revserse osmosis building
xiv. Civil works (drainage, roads and parking spaces)

The orientation of the structures under NAMARET centre on the plot shall be us indicated in **Error! Reference source not found.Error! Reference source not found.**Figure 2-1. It's important to note here that it's only the laboratory and part of the hatchery facility that is under implementation on site by the Government of Kenya. The facilities funded and to be implemented under KEMFSED project will mainly be the training centre, the remaining parts of the hatchery and associated facilities as provided in the design description in the next sub-section and highlighted in Figure 2-1 **Error! Reference source not found.**.

Figure 2-2: The Master Plan Depicting the Orientation of NAMARET centre structures to be funded under KEMFSED project

2.6. Proposed Project Design for the Facilities under NAMARET centre

2.6.1. Proposed Resource Center Building

The resource center building shall be 3 floors high with a height of 15.9meters from the ground level. The area in space of the resource center building is proposed to be 10,000m2 with office and training space taking up taking up (60%), Auditorium (27%), Landscaped courtyard and Circulation Spaces (8%), restaurant (3%) and library (2%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IA

Error! Reference source not found. below is a summary of proposals of how the spaces of the resource center shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-1: Proposed Space Accommodation for the Resource Centre Block

SPACE	SUB-SPACES
Ground Floor	• Entry ramp, entry stairs, entry lobby which serves as a fire exit point, reception, corridor, 2 No lifts, 2 No stairs, 1No ramp, Waiting area,1 No. meeting room, land scaped courtyard, 5 No multipurpose spaces, meeting room, 1 No. Lactating room with a kitchenette and wash area comprising of 1 No. wash basin, toilet and a shower, 2 no offices, store, 2 No. Male washrooms each with a cleaner's closet, 2 No urinals, 2 No. toilets, 2 No. wash hand basin and 1 No. P.W.D toilet, 2 No. Female washrooms each

	with a cleaner's closet, 2 No. toilets, 2No. wash hand basin and 1 No. P.W.D toilet, Auditorium with back and main stages, and preparation rooms, cleaner's closet with access ramps and stairs, restaurant and kitchen, Outdoor seating space with access ramps and stairs.
First Floor	• Corridor, 2 No lifts, 2 No stairs, 1 No ramp 2 No break out rooms, 2 No. meeting room, 4 No Training rooms, translation booth, 2 No. Sound lock rooms, control room, 2 No. Male washrooms each with a cleaner's closet, 2 No urinals, 2 No. toilets, 2 No. wash hand basin and 1 No. P.W.D toilet, 2 No. Female washrooms each with a cleaner's closet, 2 No. toilets, 2No. wash hand basin and 1 No. P.W.D toilet, 2 No. Cleaner's rooms, auditorium with back and main stages, and preparation rooms with access ramps and stairs, roof over restaurant and void over landscaping courtyard
Second Floor	• Corridor, 2 No lifts, 2 No stairs, 1 No ramps, Break out room, 2 No Meeting rooms, 4 No. offices, Training secretariat room, 4 No Training rooms, 2 No. Male washrooms each with a cleaner's closet, 2 No urinals, 2 No. toilets, 2 No. wash hand basin and 1 No. P.W.D toilet, 2 No. female washrooms each with a cleaner's closet, 2 No. toilets, 2 No. wash hand basin and 1 No. P.W.D toilet, 2 No. Cleaner's rooms, auditorium gallery and void over landscaping courtyard
Third Floor	• Corridor, 2 No lifts, 2 No stairs, 1 No ramp, break out space, 2 No Training rooms, training secretariat room, 2 No. meeting, 3 No offices, Library, Librarian office, 2 No. Male washrooms each with a cleaner's closet, 2 No urinals, 2 No. toilets, 2 No. wash hand basin and 1 No. P.W.D toilet, and 2 No. Female washrooms each with a cleaner's closet, 2 No. toilets, 2No. wash hand basin and 1 No. P.W.D toilet, 2 No. Cleaner's rooms, void over landscaping courtyard
Roof Level	• Roof terrace, 2 No lifts, 2 No stairs, 2 No Machine rooms, storage room, service yard and void over landscaping courtyard

Proposed Finishes

The finishes are proposed to entail paving slabs for paving finishes while the external wall to have plastered walls, stone cladding and silicone painting to plastered surfaces. Mazeras cladding will be of machine cut stone cladding with heavy duty powder coated Venetian aluminum blinds for exterior window sunshades. The internal wall finishes will also be plastered and painted with emulsion paint and with glazed ceramic wall tiles. The floor will have, Ceramic floor tiles, Granito floor tiles, Terrazzo paving and Fitted carpeting. The door finishes will have, gloss paint while the grilles are proposed to have corrosion resistant marine metal paint and the ceiling will be of suspended moisture resistant moulded gypsum plasterboard ceiling with metal grid system and skimming.

2.6.2. Proposed Guard House Building

The guard house building shall be a single-storey with a height of 3.6meters from the ground level. The area in space of the guard house building is proposed to be 13m^2 with Guard's space taking up taking up (56%) and Male and female washrooms (46%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IA. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the Guard House building shall be utilized and the type of finishing envisioned for each space as captured from the design report. The proposed Guard House Building is envisioned to have paving finishes that is anticipated to entail paving slabs, plastered walls and silicone painted for external walls. The floors are proposed to be of screeded concrete surface with a terrazzo paving. The door finishes will have, gloss paint with the grilles proposed to have corrosion resistant marine metal paint. The Ceiling to be plastered and trowelled smooth and the concrete surfaces painted with emulsion paint. The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane.

2.6.3. Proposed 2 No. Hatchery Building Blocks

The 2 No. Hatchery buildings blocks shall be a single-storey with a height of 3.6meters from the ground level. The total area in space of the 2 No. Hatchery buildings blocks is proposed to be 1254m2 with Rabbit Fish brood stock area taking up (36%), Tilapia Fish brood stock area taking up (36%), and Washing area (28%) of the total space area. The proposed space accommodation of the building blocks is as captured in the design drawings attached in Annex IB. **Error! Reference source not found.**; below is a summary of proposals of how the spaces of the 2 No. Hatchery building blocks shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-2: Proposed Space Accommodation for the Hatchery Block

SPACE	SUB-SPACES
Ground Floor	• Rabbit fish brood stock area • Tilapia fish brood stock area
Roof	• To have suspended sloping roof slab. • A Corrugated aluminum roof sheet covering on steel trusses

Proposed Finishes

The proposed hatchery building blocks will have paving finishes that is anticipated to entail paving slabs. The external walls shall be plastered and silicone painted. and the internal wall finishes will also be plastered and painted with emulsion paint and with glazed ceramic wall tiles. The floors are proposed to be of screeded concrete surface with a terrazzo paving as well as for the drain channels finishes but the drainage channel covers to be reinforcement with mild steel. The Ceiling to be plastered and trowelled smooth, the concrete surfaces painted with emulsion paint and T&G UPVC Ceiling applied where applicable. The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane. The other area of the roof will have pre-painted corrugated aluminum roofing sheets and a precast

concrete coping. The fitting and fixtures finishes shall include; Counter Slabs of granite, Toe kick, non-slip Ceramic floor tiles with edge protectors.

2.6.4. Proposed Algae Production Building

The Algae Production building shall be a single-storey with a height of 3.6meters from the ground level. The area in space of the Algae production building is proposed to be 627m2 with Feed trial tanks area taking up taking up (25%), Algae production area taking up taking up (25%), Griding room area taking up taking up (4%), Feed storage area taking up taking up (4%), Steam room area taking up taking up (3%), Store room area taking up taking up (8%), and Washing area (33%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IB. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the Algae Production shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-3: Proposed Space Accommodation for the Algae Production Building

SPACE	SUB-SPACES	PROPOSED FINISHES
Ground Floor	• Feed trial tanks area • Algae Production area • Grinding Room • Feed Storage • Steam • 2 No. Stores • Washing area	The building will have paving finishes that, anticipated entailing paving slabs. The external walls shall be plastered and silicone painted. The internal wall finishes will also be plastered and painted with emulsion paint and with glazed ceramic wall tiles. The floors are proposed to be of screeded concrete surface with a terrazzo paving as well as for the drain channels finishes but the drainage channel covers to be reinforcement with mild steel. The Ceiling to be plastered and trowelled smooth, the concrete surfaces painted with emulsion paint and T&G UPVC Ceiling applied where applicable. The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane. The other area of the roof will have pre-painted corrugated aluminum roofing sheets and a precast concrete coping. The fitting and fixtures finishes shall include; Counter Slabs of granite, Toe kick, non-slip Ceramic floor tiles with edge protectors
Roof	• Suspended sloping roof slab. • Corruagted aluminum roofing sheets covering on steel trusses	The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with a water proof bituminous membrane and a precast concrete coping.

2.6.5. Proposed 3 No. Hatchery Office/Washroom Building Blocks

The 3 No. Hatchery office/washroom building Blocks shall be a 2 storey with a height of 3.6meters from the ground level. The area in space of the 3 No. Hatchery office/washroom building blocks is proposed to be 219m2 with Head of section office area taking up taking up (24%), Washrooms area taking up taking up (31%), Store area taking up taking up (11%), and Verandah area (33%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IB. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the 3 No. Hatchery office/washroom building blocks shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-4: Proposed Space Accommodation for the Hatchery Office/Washroom Building Blocks

SPACE	SUB-SPACES	PROPOSED FINISHES
Ground Floor	• Head of Section office • Washrooms • Store • Verandah • 1 No. male washroom with 1 No. toilet and 1 No. P.W.D toilet • 1 No. female washroom with 1 No. toilet and 1 No. P.W.D toilet	The finishes is proposed to entail paving slabs for paving finishes while the external wall to have plastered walls, stone cladding and silicone painting to plastered surfaces. Madzeras cladding will be of machine cut stone cladding with heavy duty powder coated Venetian aluminum blinds for exterior window sunshades. The internal wall finishes will also be plastered and painted with emulsion paint and with glazed ceramic wall tiles. The floor will have, ceramic floor tiles, Granito floor tiles, Terrazzo paving and Fitted carpeting. The Ceiling to be plastered and trowelled smooth, the concrete surfaces painted with emulsion paintand T&G UPVC Ceiling applied where applicable. The fitting and fixtures finishes shall include; Counter Slabs of granite, Toe kick, non-slip Ceramic floor tiles with edge protectors.
Roof	• Suspended sloping roof slab.	The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane and a precast concrete coping.

2.6.6. Proposed Power House Building

The Power House building shall be a single-storey with a height of 3.6meters from the ground level. The area in space of the Power House building is proposed to be 27m2 with Generator room area taking up taking up (27%), Power room and KPLC transformer room areas taking up taking up (27%), and Verandah area (46%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IB. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the Power House building shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-5: Proposed Space Accommodation for the Power House Building

SPACE	SUB-SPACES	PROPOSED FINISHES
Ground Floor	• 2 No. Generator rooms • Power room • KPLC Transformer room • Verandah	The external walls shall be plastered, stone cladding and silicone painting to plastered surfaces. The internal wall finishes will also be plastered and painted with emulsion paint. The floors shall be of screed concrete surface finish with paving slabs and sloping sides and bed of channel for the cable channels. The cable channel covers to be reinforced with mild steel.
Roof	• Suspended sloping roof slab.	The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane and a precast concrete coping.

2.6.7. Proposed Reverse Osmosis Building

The Reverse Osmosis building shall be a single-storey with a height of 3.6 meters from the ground level. The area in space of the Reverse Osmosis building is proposed to be 57m^2 with Reverse Osmosis room area taking up taking up (59%), and Verandah area (41%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex IB. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the Reverse Osmosis building shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-6: Proposed Space Accommodation for the Reverse Osmosis Building

SPACE	SUB-SPACES	PROPOSED FINISHES
Ground Floor	• Reverse Osmosis room • Verandah	The external walls shall be plastered and silicone painting to plastered surfaces. The internal wall finishes will also be plastered and painted with emulsion paint. The floors are proposed to be of screeded concrete surface with a terrazzo paving and sloping sides and bed of channel for the cable channels. The cable channel covers to be reinforced with mild steel. The Ceiling to be plastered and trowelled smooth, the concrete surfaces painted with emulsion paint
Roof	• Suspended sloping roof slab.	The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane and a precast concrete coping.

2.6.8. Proposed Pump House Building

The Pump building shall be a single-storey with a height of 3.6meters from the ground level. The area in space of the Pump House building is proposed to be 20m^2 with Pump room area taking up taking up (59%), and Verandah area (41%) of the total space area. The proposed space accommodation of the building is as captured in the design drawings attached in Annex

IB. **Error! Reference source not found.** below is a summary of proposals of how the spaces of the Pump House building shall be utilized and the type of finishing envisioned for each space as captured from the design report.

Table 2-7: Proposed Space Accommodation for the Pump House Block

SPACE	SUB-SPACES	PROPOSED FINISHES
Ground Floor	• Pump room • Verandah	The external walls shall be plastered and silicone painting to plastered surfaces. The floors shall be of screed concrete surface finish with paving slabs. The Ceiling to be plastered and trowelled smooth, the concrete surfaces painted with emulsion paint**.**
Roof	• Suspended sloping roof slab.	The roof will have a flat roof slab laid to fall and cross falls with a primed surface screed with bituminous membrane and a precast concrete coping.

2.6.9. Proposed Corporate Social Responsibility (CSR) Activity

The Proposed NAMARET Center shall include painting of the nearby primary school classrooms as a C.S.R activity with 2,260 square meters of 3 coats of first quality emulsion paint or equal and approved.

2.6.10. Reverse Osmosis Plant

There will be a reverse osmosis plant for water reticulation to be used in the NAMARET existing laboratory facility. This plant will include a desalination unit capable of delivering 5000 Litres per Hour at 12 bars pure water (quality to comply with ISO 23500-3:2019, maximum conductivity 5µs/cm @27oC, minimum Ionic Rejection 96%, minimum Bacterial and particles rejection 99%) consisting of Replaceable sedimentation Coarse filters, Activated carbon filters, Water softeners(Ion Exchange Unit) with regeneration salt, Fine filters(5 Microns), Replaceable Micro filter, RO system with Replaceable Membrane type and pump, UV treatment with Replaceable lamps, LCD display of conductivity and resistivity, Monitoring and safety devices(Audio and Visual Alarm on water quality, water level, system failure, system shut down), 5000Litres Clean water Reservoir tank/heat disinfection unit, Circulation/booster pump and accessories (Pressure 2Bars), high grade pipes capable of maintaining high microbiological quality in the system including all other accessories for proper functioning of the entire unit. Power Requirements 415V, A/c 50 Hz, three phase, Ambient temperature 10o C to 40o C, Relative humidity 40% to 90%. The reverse osmosis plant will be supplied by water pumped for an onsite borehole to a vertical close end plastic molded water storage tank of capacity 24,000 litres and (size 3220mm diameterx3400mm high) and the water from the reverse osmosis plant will be temporarily stored to vertical close end plastic molded water storage tank of capacity 10,000 litres and (size 2500mm diameterx2300mm high) before being supplied to the buildings.

2.6.11. Proposed On-site Waste Water System

i. All UpVC, MUpVC, soil and waste systems, will be respectively to B.S 5255 with fittings fixed Key Terrain High Grade Golden Brown and Grey UPVC soil and waste pipe and jointing in accordance with manufacture's printed instructions and manufactured by reputable manufacturers.

ii. Two (2) pipes system of soil and waste with a vent pipe to be adopted for toilets.

iii. Kitchen waste pipe system will be provided. One (1) Floor Trap will be provided within the F&B spaces for use.

iv. Dedicated kitchen waste pipe line will be provided to serve the Kitchens.

v. Soil and waste drainage for the above-ground floor will be gravity discharged to ground level inspection chambers before being transferred to an on-site waste water treatment plants and soak pits. Sewerage disposal by gravity method will be adopted as far as possible, and a sump and pump system will be applied for those areas where the levels of the sanitary fittings are too low to be disposed to the on-site waste water treatment systems and soak pits by gravity.

vi. The NAMARET resource center hatchery facility with each have a moving Bed Biofilm Reactor (MBBR) Waste Water Treatment System, with a capacity of treating 650PE with an average flow rate of 103,000 lts per day. With a BOD load of 40Kgs per day, Ammonia Nitrogen load of 4Kgs per day. With minimum treated discharge requirement of BOD <30mg/lt, TSS <30mg/lt, Ammonia Nitrogen <20mg/lt. Complete with all Media, Screens, Pumps, Aeration Blowers, Aeration Diffusers, Manifolds, Level sensors, Valves, Piping, Fittings and Accessories to fully conform to the specified discharge requirements.

2.6.12. Electrical Design for the Proposed NAMARET Center

Electrical Supply and Distribution System is essential as a vital means for the operation of the NAMARET Center during normal utility power, utility power failure, and emergency operation periods. System Supply will be a 3-phase power supply of 11kV step down to 415/240Volts. The proposed electrical works that shall be provided to the proposed building will include:

• Main Power Distribution.
• Standby Power Generating System.
• Solar supply system.
• General Lighting will be provided for all buildings.
• Interior and external, Landscape, Façade and solar street Lighting by Specialist Lighting Consultant
• General Emergency Lighting and Exit Signs will be provided.
• Lightning Protection System.
• Earthing and Equip-potential Bonding System.
• Telecommunication and Data System.
• Fire Detection and Alarm System
• Public Address System
• Security and surveillance system

2.6.12.1. Total Load Demand

The total Demand Load for the entire development has been calculated to be **429,047.16 VA** with the Hatchery facilities having a total load demand of **155,067.00VA** and **273,980.16VA** for the Resource center facilities. There is a potential for an increase in load, which will be associated with the reception of more definitive load from Mechanical requirements in addition to the latest architectural plan and adoption of recommended minimum electrical density done by architects.

2.6.12.2. Electrical MV Intake, Generator Plant Power House and Solar System

Electricity will be provided by Kenya Power & Lighting Company Ltd at 11KV and will be distributed at 415/240V. A dedicated intake Power House will be provided for Kenya Power & Lighting Company MV equipment and will serve as Utility Company point of isolation at MV side. The Power house will connect the Kenya Power & Lighting Company supply, and the whole Mixed Used Development electrical system. The power house will be turn-over to Kenya Power & Lighting Company and the facility's maintenance staff for their exclusive access and maintenance. The power house will house a total of one (1) no. distribution board with a 400/5A current transformer and its associated fittings, as well as 12 chamber control panel. To ensure power supply reliability, 100% generator backup with 9hrs fuel supply capacity has been provided for. There will be one no. of 150KVA for the Hatchery Facilities and 300KVA resource center facilities, prime rating, and diesel engine generators. The generators will be connected in parallel using Generator Paralleling Switchgear to allow alternate and sharing operations. There will also be a 300kw Grid-Tied solar system serving the resource center with and a 3 Phase 150KW solar system for powering the Reverse Osmosis plant and hatchery.

2.6.12.3. Medium Voltage Distribution System

Kenya Power & Lighting Company will provide 11 kV electricity supply to the site from Existing Utility 11kV Substations. The proposed LV rooms will be located on the Ground Floor of each facility. The 11kV cables will run from the nearest utility infrastructure manhole just outside the plot boundary to the Utility Company MV room. The exact location of the 11kV supply point or nearest infrastructure manhole shall be consulted to Kenya Power and Lighting Company.

2.6.12.4. Power Supply

Low Voltage distribution for major mechanical and services plants will be provided using a respective Sub-Main Distribution Board/s, Motor Control centre/s, Local Motor Control Panel/s, Distribution Board/s, and feeder/s emanating from respective Low Voltage Switchboard. All major plants will be sub-metered via an electronic digital meter connected to Building Management System for history, event recording, and monitoring. The Electrical Board supplying power will be located near the equipment or within the nearest electrical room. The entire building as a whole will be metered in bulk at the secondary of the dedicated transformer. Utility Company electricity consumption bulk meter is expected to be at the **11kV** voltage. The bulk meter will be located in the main LV room.

2.6.12.5. Main Switchboard

A dedicated set of LV switchboards (MDB) will be provided for the building. The LV switchboard will be located in the main LV rooms. The Low Voltage switchboard (MDB) will be Form 4, Type 6, free-standing, type-tested, fully certified with a minimum fault capacity of 50kA for 1 sec, and fully rated to operate at 50ºC. The Low Voltage Switch Board will comprise but not limited to: The main incoming ACB from utility power and the main incoming ACB from the emergency supply will be electrically and mechanically interlocked and will serve as the Automatic Transfer Switch (ATS) to avoid parallel supply coming from utility and emergency supply at the same time. Where spare capacity permits, a minimum of 20% spare switchgear space will be provided for all low voltage switch boards.

2.6.12.6. Power Factor Correction

Every installation shall have a power factor within the range of 0.9 lagging to unity. The installation of suitable correction equipment may improve a lagging power factor of less than 0.9. Where a capacitor is installed for power factor correction, it must be provided with a means for its automatic prompt discharge immediately after the supply is disconnected. Power factor correction will be provided at each LV Main Switchboard.

2.6.12.7. Automatic Voltage Regulator (AVR)

A-line Automatic Voltage Regulator (AVR) to compensate voltage variance and ensure safe operation of the electrical system has been provided. AVR shall be an industrial type with a rectifier/ filter circuit to ensure a clean power supply to the electrical system. The AVR will be provided adjacent to each Main LV switchboard to automatically mitigate and improved any voltage variation before entering the building electrical system

2.6.12.8. Final Circuit Distribution Board (DB)

Each Floor will have a number of final circuit distribution boards. All distribution boards will be at least three (3) sections. Each section will be provided with appropriate Earth Leakage Circuit Breaker protection in accordance with Local Authority requirements. It will also include the main isolation switch, with outgoing circuits protected by miniature circuit breakers. Distribution boards will be metal-clad type, complete with a lockable hinged front cover. Distribution boards within the front of house areas will be located within dedicated lockable enclosures or flush into the wall. Distribution boards in plant spaces, back of the house, and service areas will be surface mounted within plant room or dedicated electrical rooms.

2.6.12.9. Lighting

General lighting for public areas such as staircases, corridors, plant rooms, carparks, and staff circulation areas will be provided with LED luminaries for energy-saving purposes and supplied with solar PV. All luminaries in all potentially wet areas and exterior installation shall be IP55 minimum. Lighting for the garden, landscape, building facade, lift lobbies, restaurants, General Offices, etc., will take into consideration both functional and aesthetic aspects. Lighting System for function room, banquet, all-day dining, common restaurant corridor, Offices, and other Front of Building Areas will be designed in collaboration with the specialist and interior designer. Lighting control, in general, will be a Centralized Automatic Lighting

Control System using workstation computers, control module, dimmer modules, gateways, user interface, motion and occupancy detectors, etc.

2.6.12.10. Lightning Protection System

The Lightning Protection System will utilize the steel reinforcement in concrete structures as down conductors. Exposed horizontal copper tapes will be provided at roof levels around all roof parapets, and earth electrodes at ground level will be designed. Lightning protection system shall be designed in accordance with the BS EN 62035.

2.6.12.11. Fire Detection and voice evacuation System

The buildings will be provided with a complete fire alarm system designed and installed in accordance with the NFPA-72 and local Authority Having Jurisdiction (Kwale County Government). The whole building will have about Fire alarm and detection system points, including the smoke detectors, the break glasses, the washers, and the sounders. These devices will be placed at strategic locations such as corridors, entrances, and exit areas where they can be easily accessed in the event of a fire. Each alternate floor of every building in the NAMARET Center will have a Fire Alarm Repeater Panel (FARP).

2.6.13. Fire Fighting System

The following firefighting equipment will be provided; **Stand Pipe and Hose System, G.I** Pipework and fittings, **Portable Fire Extinguishers** (Carbon Dioxide gas, Water Carbon dioxide and Dry Chemical), **Fire Detection and Alarm System**, **Signages and Fire exits (**fire hose Reel, fire exits and fire instruction) The resource center has 7 fire exit points of which 6 of them will be at the auditorium and 1 of them will the at the entry lobby where people can safely evacuate in the event of a fire. There will be 3 No. fire assembly points outside the resource center building to provide a safe and organized location for people to evacuate to, and to ensure that everyone is accounted for in the event of fire. All this is shown in the site plans.

2.6.14. Domestic Water Supply

Based on the expected population of the building, the estimated daily water consumption was noted to be **36,229 litres** with the Hatchery facilities having a water consumption of **13,093 litres** and **23,136 litres** for the resource center facilities. Water supply will be by gravity from holding tank at roof level. Water will be stored in the UpVC water tank at ground level, including both shallow well and municipal water. Distribution will be via a transfer pump to the UpVC roof water tanks located on the Roof Floors of buildings. There will be no hot water provision for toilets, office spaces.

2.6.15. Rain/Storm Water Drainage

All building roof drainage will be collected and piped to the storm water drainage system and collected in a tank for onsite use for washing and landscaping. This will be so because the quality of the water may not be good. Surface running storm water will be collected and directed to storm water utilities of road drainage and channels. In view of flooding effects on

the plot the drainage system has been designed as indicated in the civil engineer's design detail to manage surface water flows.

2.6.16. Artificial Wetlands Description

The artificial wetland proposed in the project designs with a 5445 cubic meters capacity has been engineered to emulate the functions of natural wetlands, as it will act as a natural filter to improve the quality of water as well and storing waste water from the hatchery. The following are the wetland design elements, which will help it achieve its purpose:-

a) A 350mm reinforced concrete floor slab on 100mm mass concrete blinding, on 100mm insecticide treated murram layer, 300mm hardcore layer. To prevent the polluted water from sipping into the ground, the reinforced concrete floor slab will be finished with a water proofing slurry on its exposed surfaces and a water bar fitting in joints and expansion joints to seal them. A 1600mm long x 1600mm wide x 700mmdeep x 350mm thick reinforced concrete manhole sump will be built on the floor slab to enable access to the wetland components for cleaning and maintenance.
b) finished with a water proofing slurry on its exposed surfaces and a water bar fitting in joints and expansion joints to seal them. A 1600mm long x 1600mm wide x 700mmdeep x 350mm thick reinforced concrete manhole sump will be built on the floor slab to enable access to the wetland components for cleaning and maintenance.
c) e wetland components for cleaning and maintenance.
d) 2 meter high and 350mm thick reinforced concrete walls will be built staggering form to act as channels through which the hatchery waste water will circulate and provide enough surface area for it to evaporate and get absorbed by algae planted in the wetlands. The reinforced concrete walls will also be finished with a water proofing slurry on their exposed surfaces to prevent the polluted water from sipping into the ground.

The artificial wetland has been preferred as it is a cheaper alternative for wastewater treatment, aesthetically more pleasing and promotes sustainable use of local resources, which is more environmentally friendly. Moreover, for such large amounts of waste water coming from the hatchery, it is provides a better alternative for toxicant management, leachate management,nutrient removal and groundwater recharge to list a few and also serve as a wildlife sanctuary and provide habitat for wetland animals.

2.6.17. Reticulating Aquaculture and Root Blower System

The NAMARET Hatchery and Algae Production facilities will be supplied with sea water in the following stages;

i. Pumping sea water 1 Kilometer away from the shore to 2 No. receiving reinforced concrete tanks each of 350 cubic meters capacity, which would be pumped to through UPVC PN 20 Pressure pipes and fittings, as well as mechanical filters at the sea intake point to filter sand and other foreign sea materials. The pump to be used will be a Centrifugal Type Sea water intake Pump Sets mounted on a common Stainless steel base Frame to approval comprising of 2No. centrifugal type pumps with AISI 316 body - impeller and shaft in AISI 316 stainless steel fused with 3 phase motors whose shaft

power matches the pump flow rate to approval, designed for the challenging conditions of seawater intake. Each pump shall have a flow rate capacity of 100m3/hr against a head pressure of 40 meters. All pump components in contact with seawater shall be constructed from Stainless Steel. Additional components shall include: - Suction and discharge 100mm diameter HDPE piping approx. 1000m long with appropriate fittings, Strainers or screens to prevent debris and marine life from entering the pumping system, An electrical control panel with necessary switches, indicators, and safety features.

ii. The water will then be pumped to 2 No. reinforced concrete trial tanks each of 450 cubic meters capacity and 3 No. plastic molded tanks of capacity 10,000 litres and (size 3220mm diameterx3400mm high) using a swimming pool Pump through Fully assembled and hydro tested energy efficient compact skid filtration and self-contained system of capacity 20m3/hr compact unit nominal flow, manufactured in-house from Polypropylene plastic, offering robust fabrication, appropriate for heavy duty use and made to operate in saline and humidity conditions. The Skid Systems shall be equipped with: High Performance built-in Protein Fractionator/ Skimmer and sludge auto wash system, Degasification Bio tower/Trickle Filter Bioreactor, Moving Bed Bioreactor, Multipurpose media canister – suitable for Active Carbon, Phosphate Absorption Media Bio-pellets, Ultraviolet Disinfection System, Ozone Generator System, Water Level Sensors with alarm, mechanical Flow sensors through all built in systems, Basic Functions Button Console, Venturi Pump, Feed Pump, IP64 Fuse Box, Steel 316 Bolts and Nuts including all other necessary items for proper functioning of the unit . Additionally, a set of operation and maintenance manuals, technical data sheets, and certification documents is provided.

iii. The swimming pool pump will be Sets (2 No.) mounted on a common Stainless steel base Frame to approval comprising of, one pump duty, one pump stand-by, and each of capacity 50m3/hr against a Maximum Head of 30metres. The pump sets shall be complete with control panel, MCBS, Pressure and Float switches, Overload protection, ON/OFF Buttons, Indicator Lights, Non -Return, 50mm diameter Foot valve with Strainer, Gate valves, suction lines (50mm dia internal diameter PPR PN 20) and a Pressure Vessel of Approx Capacity 300Litres including all other accessories for proper functioning. The pumps shall be connected in that when the Running Duty pump fails the Standby Pump starts up automatically.

iv. The sea water from the 3 No 10,000litres plastic molded tanks will flow to the aquaculture tanks in the Hatchery and Algae Production facilities respectively. The tanks will be cylindrical tanks manufactured using food grade UV stabilised high density polyethene/fibre reinforced plastic. The tanks shall be supplied complete with sight windows, net holders, central drain, swirl separator, heavy duty factory supplied supports and other accessories for proper functioning of the tank. A 500mm thick x 3000mm dia R.C tank base should be constructed on which the tanks will be mounted which will include 4 No. 10,000litres brood stock tanks, 8 No. 5,000 litres rearing tanks, 24 No. 2,000 litres rearing tanks, 14 No. 1,000 litres rearing tanks, 16 No. 600 litres hatch tanks, 8 No. 500 litres rotifer tanks and 8 No. 500 litres artemia tanks. The water being pumped to the aquaculture tanks will flow by gravity through a UV disinfection

unit which shall consist of a high-efficiency UV lamp housed in a corrosion-resistant, watertight chamber. The unit shall be designed to effectively eliminate pathogens, bacteria, and other microorganisms present in the water as it circulates through the RAS system. Key specifications include: UV Lamp Type: Low-pressure, high-intensity UV lamp with 87-watt output. UV Transmittance (UVT): The unit shall be capable of accommodating water with varying levels of UVT to ensure effective disinfection. Flow Rate: The unit shall be sized to accommodate the system's maximum flow rate of 30m3/hr. Chamber Material: The UV chamber shall be constructed from durable, UV-resistant material suitable for long-term immersion in water. Control System: The unit shall include an integrated control system with automatic monitoring and alarms for UV lamp status and system performance. Safety Features: Safety interlocks and alarms shall be provided to ensure safe operation, and the unit shall comply with all applicable safety standards and regulations.

v. Once the water has been used in Hatchery and Algae Production facilities, it will be treated through repumping it through the UV disinfection unit and reoxygenating through a root blower system made of PN 20 HPDE pipes and fittings and Double Stage Ring Blower Pump Sets (2 No.) mounted on a common Stainless steel base Frame to approval comprising of, one pump duty, one pump stand-by, and each of capacity 150m3/hr against a Maximum pressure psi of 4.06. The pump sets shall be complete with control panel, MCBS, Overload protection, ON/OFF Buttons and Indicator Lights including all other accessories for proper functioning. The pumps shall be connected in that when the Running Duty pump fails the Standby Pump starts up automatically.

vi. Waste water from the Hatchery and Algae Production facilities will be disposed to a reinforced concrete wetland of 5445 cubic meters capacity where the water will circulate through channels that provide enough surface area for it to evaporate and get absorbed by algae planted in the wetlands.

2.6.18. Waste Water Treatment Plant:

i. The hatchery will have a Moving Bed Biofilm Reactor (MBBR) Waste Water Treatment System, with a capacity of treating 650PE with an average flow rate of 103,000 lts per day. With a BOD load of 40Kgs per day, Ammonia Nitrogen load of 4Kgs per day. With minimum treated discharge requirment of BOD <30mg/lt, TSS <30mg/lt, Ammonia Nitrogen <20mg/lt. Complete with all Media, Screens, Pumps, Aeration Blowers, Aeration Diffusers, Manifolds, Level sensors, Valves, Piping, Fittings and Accessories to fully conform to the specificied discharge requirements.

ii. The Moving Bed Biofilm Reactor (MBBR) plant will pretreat waste water using bacteria/biofilm that facilitate B.O.D and C.O.D removal as well as nitrification and denitrification. The bioreactor will not have moving parts that require maintenance, instead, it will have specially designed submerged media providing an abundant surface area for the bacteria to attach themselves and thrive in multiple layers, thus allowing the MBBR to be very robust and self-regulating in case of accidents like huge P.H fluctuations. The plastic media will be kept in motion within the reactor and avoid being clogged by mechanical agitation from root blower pumps blowing

air in the reactor through manifolds evenly distributed at the floor of the reactor. This will ensure the biofilm-covered media remain in contact with the waste water and aerates the waste water to allow not only for growth of the bacteria, but also for the biofilm to effectively digest soluble organic pollutants into biomass, water and carbon dioxide during the reactor's retention time. The treated solid waste will be collected and dewatered in a sludge collection chamber for disposal to approved dumping sites. The treated clarified effluent water will then be drained from the plant and used for non-potable activities such as landscaping and cleaning. This waste water treatment system requires less space, cost effective, provides good effluent water quality, has less energy consumption, easy to operate, has high resistance to corrosion, influent heat, P.H and grease leaks compared to other waste water treatment systems

iii. **Bio-digester and soak pit:** There shall be a reinforced concrete biodigester one for the resource center and another one for the hatchery to treat toilet waste/sewage through an anaerobic process where microorganisms break down the organic matter in the sewage into a nutrient-rich digestate which can be used as fertilizer for agricultural purposes and effluent treated water. The treated water will soak away in a soak pit of 1.2m internal diameter with 150mm thick perforated stone walling and 100mm thick concrete base class 25/20 and 150mm thick RC slab class 25/20; including 600 x 450mm heavy duty manhole cover and frame and 200mm diameter crushed stone chips filling. The biodigester has a great advantage over the conventional septic tank as it covers a smaller land footprint, and it using an anaerobic process to treat waste, it emits less odor, provides a cleaner effluent and a more nutrient rich digestate

2.7. Measures to Mitigate Bio-risk in the Designs

All the hatchery modules at the NAMARET facility require access to clean, sterile seawater. The infrastructure to deliver raw seawater to the site is currently being installed. In preparation for access to raw seawater, consideration needs to be given to the treatment and storage of the seawater. As for the configuration of the Re-circulatory Aquaculture System (RAS), it is important to understand the basic principles of design and operation of the seawater intake and treatment system. The composition of raw seawater varies from site to site but treatment is always required to remove suspended inorganic and organic solids, dissolved organic matter and microorganism that may include harmful protists, fungi, bacteria and viruses. Compared to the water from hatchery production, raw seawater does not contain the relatively high loads of suspended

and dissolved organic wastes that are created during hatchery operations. The key steps in treating raw seawater are: The first step is primary filtration to remove suspended solids, because most of the suspended solids are inorganic particles the water can be pumped through the primary filter. Most hatcheries use sand filter systems with backwash pumps as the primary filtration system. Sand filters are very effective but only filter down to the 20-to- 100-micron range so the next step is to use a sequence of cartridge filters. Some hatcheries have initial raw seawater storage ponds or tanks, providing time for sedimentation of the suspended solids.

Although this reduces the level of total suspended solids prior to sand filtration, it requires subsequent drainage of the storage ponds or tanks to remove the accumulated sediment.
The next step after sand filtration is a step-down series of cartridge filter sizes starting at 50 microns down to I to 2 microns. This level of filtration optimises the effectiveness of the final sterilisation step using a UV or Ozone system. The clean, sterile seawater can then be stored in a separate storage tank of fed into the RAS storage tanks (Figure 2).

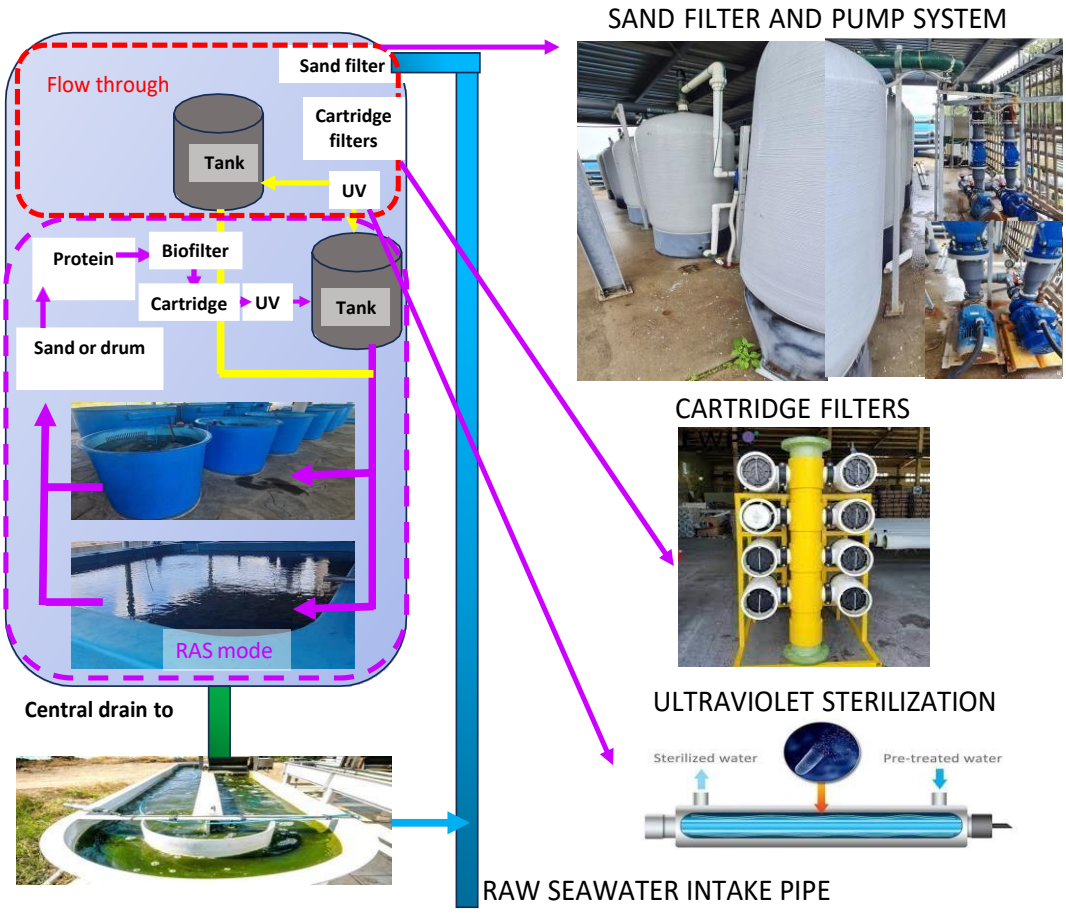


Figure 2. Schematic of the seawater intake and treatment system for the prawn hatchery. The raw seawater from the intake pipe is pumped through a sand filter, then through cartridge filters and then sterilised via a UV or Ozone system. The hatchery can then operate in RAS mode (purple arrows) or flow though mode (yellow arrows). The waste water from either mode flows via a central drain to the on-site bio-treatment pond).

Apart from ensuring that the RAS seawater can be replenished, it is important to have the option to run the prawn hatchery in “flow-through” system in case the RAS breaks down. As noted earlier, running the prawn hatchery in either RAS or flow though mode will require a drainage system and an on-site bio-treatment pond to be installed. Water from the biotreatment pond can be filtered through the raw seawater treatment system as part of the whole NAMARET on-site recirculation system. It is important to make the changes to the RAS

configuration and to install the raw seawater intake and treatment system before attempting prawn hatchery runs. Failure to do so is likely to result in hatchery failures due to poor water quality.

2.8. Project Resources and By Products

The following are the main resource input in the proposed project but not limited to**:**

i. **Land:** Land is critical for the location of the proposed training and resource centre, and has been provided by Kenya Marine Fisheries Research Institute (KMFRI) at Shimoni Kwale County. The building will be part of other proposed development on the land including a marine hatchery, laboratory block, an administration block, an accommodation block and a resource centre. The land title is as attached in Annex II.

ii. **Water:** Water supply shall be from an existing shallow well at the project site which will be used for construction of the building. The shallow well current supplies the office on site and will supply water to the facilities ones the proposed *(training center and hatchery office*) structures are implemented. Though the water is hard as per the attached water quality test reports in Annex IX, plans are under way to clean the water through a reverse Osmosis plant for supply to the proposed NAMARET facilities. The design has also considered for rain water harvesting and grey water treatment by a biodigester is proposed and the water shall be used for landscaping purposes.

iii. **Labour:** Different forms of labour, both skilled and unskilled, will be utilized. It is a requirement under KEMFSED project that the contractor provides long term contracts to the workers and that child labour, harassment and discrimination of workers in any form shall not be allowed on site or activities associated with the project. This shall apply to the sub-contractors who will be engaged on proposed component activities.

iv. **Construction Materials:** Cement, Sand (LungaLunga Sand Quarries - 45km from NAMARET Shimoni Site), Ballast (Lunguma Quarries - 83kms from NAMARET Shimoni Site) , murram (Golini Quarries – 84km from NAMARET Shimoni Site) , reinforcement steel bars, Coral Blocks (Funzi Quarries – 37km from NAMARET Shimoni Site), Aluminum Windows and Doors, Steel Doors, Emulsion Paint, Textured Paint, Granitto Floor Tiles, Acoustic and Gypsum Ceiling, PPR and PVC pipes, Ceramic Sanitary Fittings, Gravel, Water, Soil, Electrical wires, gadgets and equipment, Steel (reinforcement, casement, wiring, and standard fittings), Glass, PVS Material: (tiles, PVC pipes, conduits, and fittings), Concrete and paving, Paints and vanishes, Plant materials –grass and trees seedlings for landscaping.

v. **Electrical Works:** Electrical work during construction of the training and resource centre will include installation of electrical gadgets and appliances including conduit cables, lighting apparatus, bulb, sockets, etc. In addition, there will be other activities involving the use of electricity, such as welding and metal cutting, to attain the desired results. The building will also have solar panels that shall supply 300Kw to the resource centre and 150Kw for the RO machine to provide renewable energy for both training centre and operation of the hatchery. All the electrical works will be carried out by a qualified and experienced professional.

vi. **Plumbing:** Installation of pipe-work for water supply will use PvC pipes and distribution will be carried out within the component layout and associated facilities. In addition, pipe work will be done to connect grey water from the training and resource centre building to a sequential batch reactor system and to drain storm water from the rooftop into rain water harvesting facilities. Plumbing activities will include plastic cutting, the use of adhesive and wall drilling, among others.

2.9. Project Activities, Material and Waste during Construction

Error! Reference source not found. highlights anticipated project activities, materials and source as well as anticipate waste that shall be generated during the implementation of project activities.

Table 2-8: Proposed Materials and Waste

Element	Proposed Activities	Materials	Equipment's	Expected waste	Sources of materials
Foundation	• Excavation of trenches and column bases. • Foundation walling • Hardcore filling • Murram blinding • Antitermite treatment • Damp proofing course • Concrete works (Blinding, footing, column bases and columns, ground beam,	• Coral stone walling • Reinforcement bars • BRC • Hardcore • Antitermite • Murram • Hardcore • DPC and DPM • Cement • Ballast • Formwork • water	• Excavators • Tippers • Jembes • Mattock • Fork jembe • Spades • Concrete mixer • Poker vibrator • PPEs • Drum vibrator • Pneumatic hammer (25kg)	Debris, waste, Dust, Soil wastewater	Quarry, Hardware Manufactures and general suppliers.

	floor slab)				
Reinforced Superstructure (Beams, Columns and Floor Slabs etc.)	• Formwork placing • Steel fixing • Concreting • Curing of concrete	• Cement • Ballast • Formwork • Reinforcement bars • DPM	• Spades • Concrete mixer • Concrete pump • Poker vibrator • Wheelbarrows • PPEs • Scaffolding • Hoists • 60m3/hr Concrete Pump	Dust, Concrete wastes and steel debris.	Quarry, Hardware Manufactures and general suppliers.
Walling and partitions	• Coral Block Walling	• Coral stones • Sand • Cement • Hoop Iron • Aluminum frame sections	• Levers. • Drills • Grinder • Pickups 3 tons • Tippers 10 tons • Water pump 1000lts/hr	Dust, Concrete wastes and steel debris.	Quarry, Hardwares, Manufactures and Suppliers
Windows	• Windows fitting • Burglar proofing • Painting • Window Blinds	• Aluminum windows • 6mm Glazing • Steel Burglarproof • Window Blinds	• Drills • Grinder • Paint brush • Portable Electrical welding	Dust, Metal debris, Paint.	Hardware Manufactures and general suppliers.
Doors	• Door fittings • Painting • Ironmongery	• Aluminum doors • Steel casement doors • Ironmonger	• Drills • Grinder • Paint brush • Portable Electrical welding	Dust, Metal debris, Paint.	Hardware Manufactures and general suppliers.

		y			
Finishes	• Ceiling finishes	• Sand • Cement • Lime • Paint • Steel sections • Cornice	• Drills • Grinder • Paint brush • Trowel • Spades • Scaffold	Dust, Metal debris, Paint.	Hardware Manufactures and general suppliers.
	• Wall finishes	• Sand • Cement • Lime • Granitto Wall tiles	• Drills • Grinder • Paint brush • Trowel • Scaffold • Tile cutter	Dust, Metal debris, Paint.	Hardware Manufactures and general suppliers.
	• Floor finishes	• Sand • Cement • Granitto Floor tiles • Pergo laminated wood Flooring • Non-Slip ceramic tiles • High Density Carpet	• Drills • Grinder • Trowel • Scaffold • Tile cutter	Dust, Metal debris, Paint.	Hardware Manufactures and general suppliers.
Roofing	• Slab casting	• Highyield steel bars to Bs 4461 • Aluminium-Zinc Galsheetmabati	• Human labour, • Concrete mixing machine, • Spades, • Poker Vibrator	Dust	• Quarry incase of stones, • Sand and Ballast, Hardware in cases of steel and Cement

Mechanical Installations	• Sanitary Fittings Installations • Internal Plumbing works • Rainwater harvesting facilities • Drainage works • Firefighting • Air-conditioning • Waste water treatment plant	• Sanitary Fittings (Water Closet, Wash Hand Basis, Kitchen Sinks, Mirrors, Urinals, Soap Dispensers etc.) • PPR and UPVC plumbing and drainage pipes and extra over. • Firefighting systems (Hose reel system, fire extinguishers) • Borehole pumps, water tanks • Air-conditioning units • Passenger lift • Moving Bed Biofilm Reactor (MBBR)	• Drills • Grinder • etc.	Dust, Metal and Plastic debris, Soil debris.	Hardware Manufactures and general suppliers.
Electrical Installations	• Lighting points, fitting and fixtures	• UPVC conduits • Copper Cables	• Drills • Grinder • Snake wire • etc.	Dust, Metal and Plastic debris, Soil debris.	Hardware Manufactures and general

	• Power points fittings and fixture • Power Supply and Distribution • Solar Installation	• Lighting and Power Fittings and Fixtures (Sockets, Switches, LED lights) • Distribution Board • Solar panels & Batteries.			suppliers.
Parking	• Site clearance and excavation • Hardcore filling • Murram blinding • Cabro paving and sanding • Roofing	• Antitermite • Murram dust • Hardcore • Cabro Blocks • Kerbs • Cement • Sand • Roof structure	• Compactor • Drills • Grinder • etc	• Excavated materials, • Steel and Cabro Debris.	Quarry, Hardware Manufactures and general suppliers.
Biodigester	• Excavation, steel fixing, Walling and waterproof plaster	• Sand, Waterproof • Cement, Natural stone walling	• Human labour, • Concrete mixer	• Dust, • Excavated materials	• Hardware • Quarry

2.10. Sub-Project Activities during Operation

There are several activities that shall be implemented during the operation of NAMARET centre that will include but not limited to; Cleaning of the buildings, repair and maintenance of the building's components and facilities, breeding the seed stocks, culturing the fish, running generators, maintaining the solar system and generator, maintaining the lawn, watering the lawn, and vegetation within the compound, ventilation and air conditioning, human waste management, solid waste management, serving clients, cooking and use of fire for different purposes at the proposed reaustrant, power consumption, using of electronic gadgets, water

consumption and interaction among the users of the building among many other activities. The domestic estimated water demand was calculated to be 36,229 litres with the Hatchery facilities having a water consumption of 13,093 litres and 23,136 litres for the resource center facilities. Domestic water supply shall be by the shallow well which will be treated through a Reverse Osmosis plant as captured in section 2.6.10. Most of the water shall be cleaned and recycled on site for use. The sea water shall have an initial abstraction of 350m^3 with subsequent periodic top up on a monthly basis of about a quarter *(8.75m^3)* of the initial abstraction. The water in the hatchery facility will be re-circulated with occasional release to the wetland particularly from the larval tanks which requires high quality water. The released water from the hatchery shall pass through the artificial wetlands and based on its quality downstream will be pumped back into the system or released to the sea. The culture of the seedling by community groups will be by 2 major technologies, land-based culture technology through ponds and sea-based culture technology utilizing sea cage farming.

To produce 1 kg of fish in a hatchery requires labour, energy, land and water resources. The effects of aquaculture activities on the environment is also dependent on the type of technology adopted, the sensitivity of the geographical location, the type of fish species grown in the hatchery, the nature and kind of other existing socio-economic activities within the marine space of production and the surrounding water characteristics. Sea water is sensitive to changes in concentration levels of critical factors affecting algal growth which is often influenced by activities such as feeds offered, chemicals, excretion, use of antibiotics and antiparasitics, dead animals and the interaction between wild and cultured species. The activities are brought about by; effects of discharge of effluent, Waste and pollutants from the hatchery or fish farms, destruction of natural habitats eg mangroves while accessing the marine water resources where the fish is grown, poor feed conversion ratio, activities related to general management of the hatchery, operational mistakes or human error, management of pest and diseases in the hatchery, competition for access and use of marine space or resources by other users or activities and during consumption of resources including energy and water.

2.11. Sub-Project Alternatives

2.11.1. Without Project Option

The **"Without project"** alternative represents the potential scenario if the construction of the proposed Three floors resource center, guard house, 2 no. hatchery blocks, an algae production building, 3 No. Hatchery office/washroom blocks, power house, a Reverse Osmosis building with Reverse Osmosis machine, a pump building, construction of artificial wetlands, constructing 2 No. sea water storage tanks, civil works *(drainage and roads)*, painting of Shimoni primary school, 100 No. 1000W 30V Mono solar panels, acquiring of 550 No. 72-cell 550W monocrystalline solar modules, purchasing 1 No. 300KVA 3 phase 415V 50Hz diesel generator and 1 No C100 D5 150KVdiseal generator are not implemented in the project area. Under this alternative, no facilities proposed under NAMARET in Shimoni will be implemented in order to influence the local physical environment, biological, socio-economic, land use patterns and no investment in enhancing Mariculture technology, skills and mariculture research information shall be disseminated. This option is suitable from an environmental and

social management perspective with no negative impacts or changes to the status quo but not good for social-economic purposes within the project area. The opportunity cost incurred will imply that the challenges affecting mariculture development in Kenya shall remain unaddressed. Of major concern is the continued communities' use of outdated technology in mariculture development, lack of quality seeds, lack of feeds for fish, inadequate capacity in mariculture husbandry, lack of sharing experience in mariculture globally, lack of access to trending and new research information in mariculture development and failure to capitalize on the potential of mariculture role under the blue economy for socio-economic development. The proposed NAMARET sub-project component is therefore anticipated to address these challenges by acting as a centre for accessing new knowledge on technologies in marine hatchery skills in seed production, exchange of skills and experience in live feeds, preparation of cheap feeds and nutrition, diseases and disease management, culture systems, species diversification, technology transfer and dissemination, exchange of information on extension services frameworks, information in policy frameworks, sharing of marketing and business planning information, site selection, value addition as well as exchanging up to date trending research information in mariculture among others.

2.11.2. Project Development Option

It is anticipated that implementing the proposed facilities under NAMARET centre will improve:

- Farmers access to good quality and quantity seed to guarantee sustainability,
- Food security and nutrition,
- Employment opportunity,
- Access to quality feeds,
- Provision of consistent technical and extension services
- Research and Training services *(Education and awareness among coastal communities on mariculture activities, pond management skills, Pest and disease management skills)*
- Enhanced mariculture project management skills.
- Adoption of new technologies by mariculture farmers.
- Farmers' skills to transform mariculture practice from small scale subsistence state to medium commercial state.
- Increased uptake of mariculture activities among coastal communities' households

Implementation of this option though not the best considering the environmental and social economic costs that shall occur compared to the "No Project Option", mitigation measures have been proposed to ensure that any negative impacts are managed. This alternative would be ideal because of the ability to provide avenue for dissemination of research information, skills and new technology to mariculture stakeholders.

2.11.3. Alternative Site Selection Option

Relocating the proposed NAMARET center from the current proposed site to a different site is another option available for consideration, but currently, the proponent does not have an alternative spacious site since the proposed point is on land earmarked for KMFRI development

of National Mariculture Resource and Training Centre (NAMARET) to boost mariculture production in Kenya. The physical plan for Kwale County, Shimoni area showed that zoning of the land has been done and the site is allotted for a government research center under KMFRI who are the title holders. Besides, the proposed facilities are just a component part of other proposed structures and relocation will mean relocating the entire center with other proposed structures. Considering the above concerns and assessment of the current proposed site, relocation of the project is not a viable option. Besides, it is not easy to find a similarly suitable site to accommodate the proposed development. This is because the site is already having a laboratory being developed and part of the hatchery is also under construction, access roads under construction, connection to most social amenities, which may not be a guarantee if an alternative plot is sought. Most of the plots around the area are either public or private plots and the process of acquiring land could take time and has a cost implication.

2.11.4. Alternative Technologies

The application of the best technology is important in reducing the impacts of the project to the environment. Therefore, the project design team took cognizance of appropriate technology existing on the market in the proposed project facilities and activities. Use of large sizes window, energy saving appliances, use of renewable energy, use of recyclable construction material for instance metallic doors instead of wood, use of water saving appliances and treating of grey water through an MBBR and a biodigester are some of the technologies that have been incorporated in the design of the project to improve green building concepts and climate change adaptations. The project has also considered artificial wetlands.

2.12. Project cost

The estimated cost for constructing the proposed NAMARET Center and Hatchery in Shimoni is about **KShs. 821,288,154.23**[6] with the resource center costing **443,093,346.00** and Hatchery costing **378,190,808.23.** This cost include preliminaries, office building works, pump house, electrical works, mechanical works, builder's work in connection to specialized works, civil works, dayworks, environmental management and social monitoring costs, taxes and a factor on inflation and contingencies for the proposed structures. The breakdown of the project cost is as shown in **Error! Reference source not found.** The proposed project shall be implemented within a period of 12 month with an addition of 6 month for defect liability period. The hatchery and the resources centre with the associated facilities are anticipated to be run concurrently as 2 separate contracts.

Table 2-9: Project Cost for Proposed NAMARET CENTRE

ITEM	DESCRIPTION	AMOUNT
NO.	**NAMARET TRAINING CENTER**	**Kshs.**
1.	Particular Preliminaries	736,000.00
2.	General Preliminaries	6,825,000.00

[6] *The estimate cost is according to the figures provided in the bill of quantities as provided by the project engineer*

3.	Builder's Works	249,298,512.00
4.	Mechanical Works	38,152,626.00
5.	Electrical Works	86,041,165.00
6.	Landscaping Works	9,634,084.00
7.	Civil Works	10,264,779.00
8.	Gate House	1,015,372.00
9.	Day Works	785,710.00
10.	ESMP Implementation and Monitoring	9,570,000.00
11.	Furnishing	10,774,098.00
12.	Contegencies and Provisional Sums	20,000,000.00
13.	**Sub Total 1**	**443,097,346.00**
	HATCHERY	
14.	General Preliminaries	10,000,000.00
15.	2 No. Hatchery Building Works	44,233,246.63
16.	Algae Production Building Works	23,689,241.75
17.	3 No. Washroom Blocks Building Works	36,279,879.00
18.	Power House Building Works	8,379,030.00
19.	Reverse Osmosis Room Building Works	1,598,815.00
20.	Pump Room Building Works	1,505,190.00
21.	2 No. Receiving Tanks Building Works	12,765,400.00
22.	Trial Tanks Building Works	18,284,900.00
23.	Wetland Building Works	24,239,953.75
24.	Battery Room	4,197,665.00
25.	Mechanical Works	29,778,080.00
26.	Electrical Works	58,186,720.00
27.	Landscaping Works	5,552,700.00
28.	Civil Works	20,130,483.75
29.	Ocean Water Intak	4,529,504.60
30.	Day Works	615,300.00
31.	ESMP Implementation and monitoring	7,790,000.00
32.	C.S.R	32,000,000.00
33.	Prime Cost and Provisional Sums	15,000,000.00
	Contegencies	17,000,000.00
	Sub Total 2	**378,190,808.23**
34.	**GRAND SUMMARY**	
35.	Resource Center	443,097,346.00
36.	Hatchery	378,190,808.23
	Grand Total	**821,288,154.23**

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1. Chapter Overview

The chapter highlights significant policy, legal framework, international best practice and project implementation and operation institutional framework.

3.2. Project Policy Framework

The proposed construction of the training and resource centre block at Shimoni, Kenya Marine fisheries and Research Institute will need to comply with various policies and regulations currently existing to safeguard the environment and the local communities. Different stakeholders' input shall be required from different institutions, nationally and at county government level as the policies and institutional interventions will be triggered at various phases of the proposed project. The main policies and institutional framework triggered are highlighted in the subsections below.

The major laws and regulations include the Constitution of Kenya 2010, the Environment Management and Coordination Act (Cap 387), The water Act 2016, Environmental Impact Assessment and Audit, 2003 (Amendment in 2019) Regulations, The Public Health Act Cap 242, Revised Edition 2012 [1986], the Physical and Land Use Planning Act 2019, The Occupational Safety and Health Act Revised Edition 2020 [2007], The County Governments Act (2012), The National Construction Authority Act, The National Environment Policy Session paper No. 10 of 2014, and the Environment and Land Court Act, among others. The proposed sub-project activities shall also be implemented in accordance with requirements under the project documents.

3.3. Policy Framework

Error! Reference source not found. highlights the policies that shall be triggered during the proposed project's implementation and operation. There will be a need to ensure the proposed project activities are in tandem with the policies' requirements as noted in the table 3-1 below.

Table 3-1: Relevant National Plans and Policies

NO.	POLICY INSTRUMENT	KEY PROVISIONS	RELEVANCE OF POLICY TO THE PROJECT
1.	Kenya Vision 2030	The vision is a government development strategy to steer Kenya to a middle-income country by the year 2030. It is based on the three pillars of political, social, and economic advancement, and it aims to transform the economy and achieve sustainable growth. The vision recognizes the significance of public sector	The construction of the proposed NAMARET centre shall enhance the objectives of the policy paper of reforming the mariculture from small-scale subsistence state to medium commercial state to play its key role in the country's socio-economic development. The sub-project shall offer the people of coastal Counties a chance to enhance capacity in mariculture skills and application of appropriate technologies for

		reform as a key enabler. The sector was to be transformed by building and implementing service delivery systems that ensure efficiency, quality, speed, convenience, and dignity in service delivery as well as being globally competitive	social economic development.
2.	Kenya Fisheries Policy 2023	The policy aim to sustainably maximize utilization of the fisheries and aquaculture resources for socio - economic development. The Policy acknowledges the low adoption of aquaculture technologies including; Recirculating Aquaculture Systems, cage culture, aquaponics, aquaparks, breeding and feed formulation, particularly among the small-scale fish farmers. And inadequate platforms for dissemination of research information and weak linkages between aquaculture research and management.	The proposed NAMARET sub-project is anticipated to contribute towards the policy objectives by: promoting and upscale sustainable aquaculture technologies, innovations and management practices. Promote availability of quality fish seed and feeds; Promote mechanisms for introductions of new farmed fish species; Promote Public, Private Partnerships in aquaculture; and promoting provision of aquaculture extension services.
3.	State Department for the Blue Economy and Fisheries Strategic Plan 2023 – 2027	The Strategy aims to facilitate sustainable management and development of fisheries, aquaculture and the blue economy resources for accelerated socio-economic development.	The strategy acknowledges the declining fish stocks and Low aquaculture development characterized by inadequate supply and high cost of certified quality fish seeds and feeds; high cost of inputs for the smallholder fish farmers; weak research and extension linkage; poor access to timely and reliable information; inadequate extension service delivery; and slow adoption of appropriate aquaculture technologies, issues anticipated to be addressed by implementation of the proposed NAMARET centre.
4.	Kwale County Integrated Development Plan 2018-2022	The CIDP recognizes the significance of fisheries to local community livelihood and the focus of the county is to develop marine fisheries, enhance support services and strengthening	The proposed training centre will be handy to disseminate research findings in Mariculture to aid the county in its commitment of investing more resources and capacity building the local communities in the following areas:

		partnerships with strategic stakeholder	Mariculture development (sea weed farming and culturing of milk fish), up scaling of capture fisheries through procurement of modern fishing vessel (provision of modern and right fishing gears to fisher folks with appropriate technology) for offshore fishing, enhance fishers livelihood through provision of value addition and post harvest handling equipment (eg cold storage facilities, cooler boxes, fish handling crates); construction of modern fish depot at all landing sites to ensure Fish and Fish products are handled in hygienic conditions. The proposed sub-project shall enhance the coordination and management of the proposed service delivery.
5.	National Climate Change Action Plan 2018-2022	The action plan aims to reduce the impact of climate change to the environment, livelihood and property, food and nutritional security, accessibility to natural resources, health, sanitation and human settlement	KEMFSED project takes deliberate measures to incorporate climate change adaptation measures into the sub-project design. The design of the project has incorporated concepts of promoting water efficiency, use of recycled construction materials, and increased use of renewable energy. The plan has been used to guide the design by providing for green building concepts, efficient waste water use *(recycling of water)* and solid waste management.
6.	The National Environment Policy Sessional paper No. 10 of 2014	The policy provides comprehensive strategies for government action regarding the quality of the environment and development.	The sub-project component has complied with the policy by integration of environmental sustainability principles during implementation, operation, and decommissions stages of the proposed training and resource building. The proposed sustainability concepts are as captured in the ESMP of this report and in the design.
7.	National Gender and Development Policy (2000)	The overall objective of the Gender and Development Policy is to facilitate the mainstreaming of the needs and concerns of men and women in all areas in the development process in the country. The construction sector plays a key role in socio-economic	Deliberate and affirmative action has been proposed under this report to encourage all genders to contribute to the proposed sub-project component activities as inculcated in the ESMP. The training and resource centre block provides an opportunity for the engendering of the construction sector as a means towards poverty reduction and

		development.	inclusive socio-economic development.
8.	National Policy for Prevention and Response to Gender Based Violence 2014.	The main objective of the policy is to accelerate the elimination of all forms of gender-based violence in Kenya.	The proposed project shall comply with the policy through the contractor workers signing a code of conduct committing not to engage in any form of GBV whether at the work place or in the community. The project shall also ensure workers sensitization and awareness on GBV and on Sexual exploitations and abuse (SEA) and formation of Community GBV committee to report any such cases to KMFRI liaison officer.
9.	National Land Policy, Sessional Paper No. 3 of 2009.	To provide an overall framework required to address the critical issues of land administration, land access, land use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management	The project shall ensure sustainable utilization of land, particularly public land which has been set aside for construction of National Mariculture Research and Training resource centre of which the training and resource centre block is just a component. The land is owned by Kenya Marine Fisheries Institute and the land title is as attached in Annex II.
10.	Kenya National Youth Policy 2019; Empowered Youth for Sustainable Developme nt	The policy recognizes the significance of the role of youth in social-economic and political development of the nation and therefore, the policy takes deliberate measures to promote youth empowerment and participation to harness their potential for productive engagement at local, county and national level.	The current development process took into consideration the objective of the policy. The consultation findings indicated that the youth in the area were willing to fully participate in the project to provide labour. The contractor will undertake to consider employment of local youth during the construction phase. KMFRI will give priority to local youth for employment during the operation phase when vacancies arise. However, there will be need for deliberate capacity building of the local youth through scholarships to be in a position to undertake the specialized tasks of running a hatchery.
11.	Aquaculture policy	Kenya's aquaculture policy, outlined in the National Aquaculture Policy and the Kenya Aquaculture Strategy, is designed to promote sustainable development in the aquaculture sector, which encompasses both freshwater and marine (mariculture) environments. These	The mariculture hatchery project is a strategic initiative that supports the objectives of Kenya's aquaculture policy by promoting sustainable mariculture practices, enhancing economic development in coastal areas, and contributing to national objectives of food security and job creation. The establishment of a mariculture hatchery in Shimoni enhances the infrastructure

		policies aim to increase fish production, improve food security, generate employment, and promote economic development while ensuring environmental sustainability. The policy promotes sustainable development of aquaculture by adopting best practices that safeguard the environment and biodiversity and to enhance the capacity and efficiency of fish farmers and stakeholders through training, research, and extension services. The policy also supports the development of aquaculture infrastructure, including hatcheries, ponds, and cages, and to facilitate access to quality seed and feed.	necessary for the growth of the sector and provides opportunities for local capacity building through training and skills development.
12.	Sessional Paper No.1 Of 2020 On Wildlife Policy	This policy seeks to conserve wildlife resources in national parks, national reserves and national sanctuaries in an effective and equitable manner, ensure maintenance and enhancement of ecological integrity of wildlife and their habitats through the integration of private and community lands into protected area systems and to harness the contribution of wildlife resources into the national economy and enhance the benefits to all.	The policy will be of help during project implementation and afterwards in ensuring that protected areas and wildlife habitats are secure. All fish are considered wildlife in Kenya. Therefore, the culturing technologies *(land based or sea-based cage farming)* adopted by aquaculture farmers need to protect the wildlife whether fisheries or the habitats.
13.	The Forest Policy, 2014	The policy provides a framework for sustainable conservation and equitable utilization of forest resources among different people of Kenya	The policy will come in handy to assist in management of the critical environmental goods and services particularly the mangrove areas for the mariculture farmers land or cage culture technologies.
14.	The National Occupational Health and Safety	This is a framework for safe working environments. it provides basic principles for assessing work related risks and hazards and ways	The design of the project has factored in the provisions of this policy, however it will also be of great value during project implementation to provide a framework for compensating work related accidents and

	Policy Of 2012	to prevent and mitigate such risks.	diseases. The proponent will need to seek compliance with the provision of the policy in ensuring that workers operate in a safe and healthy environment and that their welfare is safeguarded.

3.4. Legal Framework

During the design of the proposed Training and Resource Centre at KMFRI Shimoni, the ESIA team took cognizance of the legislations that will govern the proposed sub-project's component activities during implementation, operation and decommissioning phases. Table 3-2 highlights the general legal framework for the coordination of project activities at all phases of the sub-project component.

Table 3-2: The legal Framework

NO.	LEGAL INSTRUMENT	PROVISIONS	APPLICATION OF REGULATIONS TO THE PROJECT
1.	Constitution of Kenya, 2010	The constitution outlines principles of environmental and social sustainability. The constitution in article 42 emphasizes the need for a clean and healthy environment by managing substances that may pollute the environment or cause harm to human health. The right to a clean environment is further enforced by article 70. The constitution in article 54(c) requires ensuring people with disabilities have reasonable access to all places, public transport, and information. The CoK, 2010 , Article 10- outlines National values and principles of governance which includes meaningful/effective public participation	The construction, operation and decommissioning of the NAMARET training and Resource centre shall uphold environmental and social considerations through the implementation of the ESMP and EMoP. The focus shall be on ensuring a clean and healthy environment for all as well as taking into consideration the requirements for people with special needs. The design of the building has ensured ease of access and movement by people with special needs.
2.	The Science, Technology and Innovation Act, 2013	The Act aim to promote and regulate activities related to scientific knowledge creation, technological innovation and dissemination of the same among stakeholders for national development. The Act also promotes coordination among key stakeholders involved in scientific research, dissemination of the information and	The Act is relevant to the anticipated operation activities of the component for the purposes of the proposed dissemination of scientific research knowledge, sharing of experience and skills among the mariculture and aquaculture stakeholders in the country. The activities within the training centre

		the utilization for social economic development of the nation. The Act recognizes KMFRI as a research organization in Marine resources for sustainable utilization.	shall be regulated under the Act and where required permits/licenses will be granted before any research work whether by visiting or resident scientists is undertaken.
3.	The Fisheries Management and Development Act No. 35 of 2016	The main aim of the Act is to promote conservation, management and development of fisheries and other aquatic resources to enhance the livelihood of the communities dependent on fishing. This is to be achieved through establishment of Kenya Fisheries Service. The act also highlights the functions of the two levels of governance, of significance to this sub-project component is the function of SDBE&F to develop mariculture related infrastructure and resource mobilization for conservation management of the fisheries development. And the function of the county government to spearhead the development of mariculture at county level.	KEMFSED project is as an effort of the National government to mobilize resources partly to develop fisheries related infrastructures and KMFRI is expected to manage the infrastructure as indicated in the institutional framework of the proposed sub-project component. The development of the training and resource centre as part of enhancing mariculture development in the Country is anticipated to enhance the capacity building among the stakeholders involved in mariculture activities through dissemination of trending mariculture skills, new technology, new knowledge and sharing of experience.
	Building and Construction		
4.	The National Construction Authority Act No. 41 Revised Edition 2012 [2011]	The Act establishes the National Construction Authority (NCA) which is mandated among other functions to; Oversee the construction industry and coordinate its development; Promote and stimulate the development; improvement and expansion of the construction industry; Prescribe the qualification or other attributes required for registration of contractors; promote and ensure quality assurance in the construction industry; encourage the standardization and improvement of construction techniques and materials; Accredit and certify skilled construction workers and construction sites supervisors and development and publish a code of	The Act shall be applied in the management of the construction site of the proposed NAMARET sub-project component by ensuring qualified and accredited site personnel, site safety and construction quality standards are adhered to by the contractors and the sub-contractors engaged.

		conduct for the construction industry.	
5.	The National Construction Authority regulation 2014	The Regulations requires that any contractor or construction workers working on any construction site in Kenya be registered and accredited by the National Construction Authority. Such persons or firms shall annually renew the certificate of registration according to the provisions of the Act. Other than registration of construction workers and contractors, the Act requires that all construction works, contracts or projects either in the public or private sector be registered with the authority. The owner of such construction sites or contracts shall designate a contact person to liaise with the Authority. And that all construction workers and supervisors be accredited and certified by the Authority.	The regulations requirements shall guide on the qualification of contractor and construction workers that shall be allowed to work on site for the proposed training and Resource centre construction. NCA shall register the site as a construction site and permit issued
6.	The Draft National Building Code 2020	The main objective of the National Building Code is to promote order and safety in construction works and the health and safety of persons in or about construction works. The code provides for the design, construction, operation, inspection, and maintenance of buildings. Sets standards for building materials, products, elements, systems, and services. Provides standards for infrastructure services sets standards for the operations and works at construction sites provides for disaster management at construction sites and Provides for the safety and security of building users and occupants.	The building codes shall guide the contractor, project engineer, and KMFRI on the expectations of NCA on quality standards regarding construction, operation, and decommissioning activities of the proposed Training and resource centre building construction component.
	Environment and Natural Resources Management		
7.	Environmental Management and Coordination Act,	It sets the legal and institutional framework for the management of environmental issues in the country.	The project triggers the Act to assist in managing and coordinating potential environmental issues likely to emanate from proposed sub-

	EMCA CAP 387		project component activities during implementation, operation, and decommissioning. The Act shall guide the relationship between SDBE&F, KMFRI, Contractor and NEMA on matters regarding the environment and public concern. This ESIA Comprehensive project report is required by the Act and must be approved before works can commence
8.	The Environment (Impact Assessment and Audit) Regulations, 2003	The Environmental Regulations (2003) are ingrained under section 147 of the EMCA (Cap 387). The regulations provide for the framework for carrying out EIAs and EAs in Kenya. This EIA project report has been conducted in conformity with these regulations and EMCA, Cap 387	The Act guided the development of the ESIA report and shall also come in hand to ensure preparation of annual environmental audit reporting during operation as well as decommissioning of the project
9.	EMCA Waste Management Regulations 2006	The regulations provide for management of different forms of waste streams in the country, given that the project activities during implementation, operation, and decommissioning will result in waste generation.	An increase in waste generation is anticipated during project implementation, operation, decommissioning and the regulations will come in hand to guide its proper management and disposal. Relevant regulation requirements have been captured in the ESMP
10.	EMCA Air quality regulations of 2014	The regulation prohibits emissions of air pollutants exceeding permissible levels from controlled areas, stationery sources, mobile sources, occupational exposure, material handling, demolition areas, and waste incineration, open burning of hazardous waste, or from cross-border. The regulation also requires that all emissions be licensed.	The proposed NAMARET sub-project component is anticipated to compromise air quality within the proposed project area during construction, operation and decommissioning and therefore the regulations shall come in hand to guide air quality management standards particularly while working on site.
11.	EMCA Noise and Excessive Vibration Pollution Control Regulations, 2009	The regulations prohibit loud, unreasonable, unnecessary, or unusual noise which annoys, disturbs, injures, or endangers the comfort, repose, health, or safety of others and the environment. Occupational noise	The proposed sub-project component is anticipated to have an impact on ambient noise levels within the proposed project area during construction and decommissioning and therefore the

		and vibration need to be controlled during the project implementation process. The main sources of noise shall be due to vehicle movement that will be involved in the construction of the building, particularly during the transportation of materials to the site. The other sources shall be general construction activities and conversation on site.	regulations shall come in hand to guide noise level management standards. The relevant requirements of the regulations have been incorporated in the project ESMP
12.	EMCA Water Quality Regulations, 2006	Water quality regulations lay down the standards of domestic water and waste water discharge into the environment. The regulations are meant for pollution control and prevention and provide for the protection of water sources.	The regulations shall come in hand to ensure that water supplied to the building meet domestic water supply standards. The regulations shall also ensure that waste water produced from the building is treated and recycled for use. The quality of the water reused shall ensure that its free of pathogens. In fulfilling the requirements of these regulations, the project will have to undertake monitoring of the domestic water and waste water and ensure compliance with acceptable standards to prevent pollution of underground and surface water.
13.	The Environment and Land Court Act, 2011	This is an Act of Parliament formulated to give effect to Article 162(2) (b) of the Constitution; to establish a superior court 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, and for connected purposes. In this regard, those affected by various development ventures that are considered harmful to the environment have structures in place to seek justice, and in so doing, the environment will be safeguarded at all times.	In the event of any environmental-related dispute between NEMA and project contractor, KMFRI or SDBE&F on issues related to the training centre construction or operation activities, the Act will be triggered in resolving the issues for any aggrieved party.
14.	Forest Conservation and Management Act, 2016	The Act to provide for the development and sustainable management, conservation and	One of the critical habitats within the main fish culturing areas is mangrove forests regardless of the

	No. 34 of 2016	rational utilization of all forest resources for the socio-economic development of the country and for connected purposes. The Act recognizes mangrove forest as indigenous forests to be managed on a sustainable basis for purposes of conserving fisheries habitat.	technology. Under KEMFSED project provides an opportunity for the management of the habitats to conserve fisheries resources and KFS shall play a critical role in restoration of degraded mangrove areas. Therefore, the activities of fish culturing technologies need to put the conservation of critical habitats into consideration
15.	Wildlife Conservation and Management Act, 2013	The Act provide for the protection, conservation, sustainable use and management of wildlife in Kenya. The Act defines "wildlife" to mean any wild and indigenous animal, plant or microorganism or parts thereof within its constituent habitat or ecosystem on land or in water, as well as species that have been introduced into or established in Kenya. All species of fish are therefore recognized as wildlife and fall within the ambit of the Act. The Act has a schedule which declares certain species of fish to be critically endangered, vulnerable, nearly threatened, and protected species and prohibits any person from carrying out any activity involving the listed a species. It also provides for Marine Park /reserve to be a protected area where no fishing, construction work or any disturbance is allowed unless with written permission of the Director-General KWS. The Act also establishes the Kenya Wildlife Service (KWS) whose mandate includes conservation of all wildlife areas including protected areas. This mandate also makes the KWS another major stakeholder in the fisheries industry in Kenya.	The culturing of the fish from the hatchery could adopt land based culturing or cagefish farming technologies which utilizes the sea for the growth of the seedling. Adoption of either technology will require consultations with KWS to propagate and grow the fish stocks. The habitats being used may require closer liaison with KWS for management of the wild fish species.
16.	The Kenya Coastal Guard Act, 2018	Establishes the Kenya Coast Guard Service (KCGS) to be deployed in the territorial waters for purposes of among, others, enforcing maritime	The Service will play a critical role in enforcement compliance to fisheries resources management within caging grounds in the event

		security and safety, pollution control, and sanitation measures; prosecuting maritime offenders, port and coastal security and the protection of maritime resources including fisheries.	that cage culture technologies are adopted.
17.	Maritime Zones Act (CAP 371)	The Act consolidates the law relating to the territorial waters and the continental shelf of Kenya. It provides for the establishment and delimitation of the exclusive economic zone (EEZ) of Kenya and for the exploration, exploitation, conservation, and management of the resources of the maritime zones. The Act domesticates international law on the law of the sea as codified under UNCLOS as it relates to the delimitation of maritime zones for coastal states. The Act establishes and delimits the exclusive economic zone and grants Kenya sovereign rights with respect to the exploration and exploitation and conservation and management of the natural resources (living and non-living) of the zone. The establishment and delimitation of Kenya's EEZ is in accordance with the 1982 United Nations Convention on the Law of the Sea (UNCLOS).	Under the proposed sub-project, exploitation of near shore resources is under immense pressure and there is plan to empower the fishers to exploit aquaculture fisheries. The Act is relevant to the proposed sub-project in ensuring that fisheries activities within the near shore adhere to regulations during culturing of the fingerlings.
	Devolved Governance		
18.	County Government, Act 2012	The County Government Act provides local governance principles, guides the planning and development process, and community participation in the development process.	The Act will come in handy to reduce conflicts between project and county government physical planning priorities. The Act should be read together with the physical and land use planning Act, 2019 to guide on institutional management framework, land use planning being a devolved function. The statutory approvals for the proposed building shall be acquired from Kwale County Government before commencement of construction activities.
19.	The Physical and Land Use	The Act provides for planning and controlling for physical development	The Act shall also assist KMFRI in planning for connection to social

	Planning Act, 2019	in the country in general. The Act read together with the county government Act 2012 will assist in synchronizing the national, local, and project physical planning, controlling for any possible conflicts.	amenities such as sewerage services, power, or water services, whenever such need will arise[7] in future based on the existing physical planning of the proposed project area. The sub-project's component should also meet planning requirements of the area. The project shall be approved by the relevant County departments after meeting the requirements of the Act.
20.	Kwale County Public Participation Act, 2014.	An act of the Kwale County Assembly to provide for the establishment of legal framework for facilitating public participation in county government policy processes and service delivery and for connected purposes.	Kwale County CIDP emphasizes the critical role of mariculture activities and the training centre will come in handy to align the capacity building activities to county objectives. The Act will ensure that stakeholder consultation is a continuous process and concerns incorporated in the designs of the sub-project component and also during the operation phase by KMFRI.
	Labour Relations and Occupational Safety		
21.	Occupational Safety and Health Act, 2007	The Acts aim to ensure the safety, health, and welfare of persons at work and non-workers as well as cushion workers against loss of income or livelihood due to occupational accidents or diseases.	The Act shall be applied for the safety of workers and the general public to be ensured during project implementation, operation, and decommissioning phases. The site shall be registered under the Act as a work place at all phases of the sub-project before commencement of any activities. Relevant safety requirements of the Act have been incorporated in the ESMP
22.	Employment Act 2007	The main Objectives of the Act is to improve the working condition of employees and protecting their welfare as well as that of the employer	The Act shall be applied to protect workers against; discriminations, sexual harassment, forced labour, protection of wages, employment relations, settlement of disputes and protection of rights and duties in employment. There shall be equal employment opportunities to all, and

[7]Kwale County government is working on water supply project to Shimoni area, and though the proposed site shall have own water supply, but the same could change in the future if we shall have reliable water supply connections. The area may develop and have a sewer line in the future due to development proposals of Shimoni port by KPA

			workers through GRM will be able to freely express themselves over the working conditions and terms of engagement.
23.	Work Injury Benefits Act, (2007)	This provides compensation to employees for work-related injuries and diseases contracted in the course of employment.	Requirements of the Act will be applied to ensure that income for workers on the project is assured even where they are not able to work for some injuries or diseases related to working conditions while still under contract. The Contractor appointed will obtain and maintain WIBA compliant insurance cover throughout the project implementation period.
24.	Labour Relations Act 2012	The Act promotes sound labour relations through the protection and promotion of freedom of association, the encouragement of effective collective bargaining, and the promotion of orderly and expeditious dispute settlement, conducive to social justice and economic development and connected purposes. The Act in Section II Part 6 provides for employees' freedom to associate; section 7 provides for the protection of rights of employees; Part 9 provides for adjudication of disputes, and Part 10 provides for the employees' protection to hold strikes lockouts.	The Act shall apply to ensure that workers welfare is entrenched into the activities of the proposed NAMARET sub-project's component particularly at construction and decommissioning phases. The workers to be allowed to form/join associations to air out their grievances. Relevant requirements have been captured in the ESMP and under Annex VI. The contractor as required under the project will institute grievance redress mechanism where all grievances from workers or the general public will be promptly addressed as means to improve the NAMARET training building sub-project component implementation and operation.
	Public Health		
25.	Tobacco Control Act No 4 of 2007	Promote and protect the rights of non-smokers to live in a smoke-free environment.	Contractor to provide and label the designated smoking area. Same shall be done during operation by KMFRI
26.	Public Health Act, 1986 (Cap 242 Revised edition 2012)	The Act addresses matters of sanitation, hygiene, pollution, and general environmental health and safety, which are directly related to cases of pollution and contamination of water sources, be it ground or	The Act shall be applied to ensure that all sanitation systems for the proposed Training and resource centre construction and operation activities meet the requirements of the Act. Any food vendors at the site

		surface. The management of waste water that shall be generated should be managed in a way that shall not cause any public nuisance.	to the workers during construction will also be expected to meet the requirements of the act. Food supply to the learners and trainers to be done by certified personnel.
	Cross Cutting Issues		
27.	The National Gender and Equality Commission Act 2011	The Act seeks to promote gender equality and prohibit any form of discrimination against any; women, men, persons with disabilities, the youth, children, the elderly, minorities, and marginalized communities.	That Act shall be triggered particularly during the project construction phase to ensure equal opportunities for all gender. Some of the requirements of the Act have been captured in the ESMP and under Annex VI. The design has incorporated requirements for people with disability.
28.	Persons with disability Act No. 14 of 2003	The Act requires conducive environment to operate for persons with disability to enable such persons to have ease of access and mobility in all public spaces. The Act in section 21 stipulates that persons with disabilities are entitled to a barrier-free and disability-friendly environment to enable such persons to have access to buildings, roads, and other social amenities, and assistive devices and other equipment to promote their mobility.	The design of the proposed training and the hatchery facilities in general are compliant to the requirements of the law by ensuring ease of accessibility and mobility within the building for such persons with disabilities. A lift, sanitation facilities as well as a ramp has been proposed in the design.
29.	Public Participation Act 2016	The Act provides a general framework for effective public consultations. It gives effect to the constitutional principles of democracy and the participation of the people. The Act, therefore, gives effect to the principles of public participation as provided for in the constitution. Participation is anticipated to promote transparency and accountability in decision making, promote community ownership of public decisions and promote public participation and collaboration in project governance processes.	The Activities of the proposed sub-project component shall require participation of different stakeholders in order to ensure compliance with the principles of the Act. Stakeholder engagement shall be a continuous process throughout the project cycle in addition to the consultations that has been done so far. As indicated in annexes III and VI.
30.	Sexual Offences	This Act protects people and employees from any unwanted sexual	Any form of GBV and sexual harassment shall not be tolerated on

	Act, 2006	attention or advances by staff members. This act ensures the safety of women, children, and men from any sexual offences, including rape, defilement, and indecent acts. This law will govern the code of conduct of the Contractor's staff and provide repercussions of any wrongdoing. The sexual offense act, 2006 supports the Kenya Employment Act of 2007 that a worker should not be harassed sexually to receive preferential treatment at the workplace or detrimental treatment on present or future employment	the project site. The Act will come in hand to ensure that all matters related to GBV at workplace are managed appropriately. GRM has been incorporated under this report to ensure that such cases are reported and handled appropriately. All the contractor workers shall be required to sign a code of conduct not to engage in any form of sexual offences while working on the training and resource centre construction. Sensitization and awareness shall be created among workers
31.	HIV and AIDS Prevention and Control Act, 2006	This is an Act of Parliament providing measures for the prevention, management, and control of HIV and AIDS, to provide for the protection and promotion of public health, and for the appropriate treatment, counseling, support, and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.	Requirements of the Act will ensure that the contractor together with Kwale County public health department provide for VCT services for employees and locals where appropriate and promote public awareness. This will go a long way in ensuring stigmatization of HIV and AIDS is reduced as well as managed during the construction period. The project ESMP budget has provided for sensitization and awareness to contractor workers and the community on HIV and AIDS related issues.
32.	The Children Act, 2001	The Act protects the welfare of children within the Country. The Act identifies Children as a person below the age of 18 years old and protects them from exploitation. Of particular importance to this project is section 10, which protects the child from: • Economic exploitation. Any work that interferes with his/ her education or is harmful to the child's health or physical, mental, spiritual, moral, or social development.	The Act shall be applied to regulate any form of engaging underage to the project activities on site. Child labour in any form shall not be tolerated on the project site and the contractor shall be required under the contract not to engage in any form of child labour on site as provided for under Annex VI in this report. The same shall be enforced among suppliers and sub-contractors
33.	The Water Act 2016	The Act generally provides for the development and managing of water	The proposed NAMARET centre shall be supplied with water from

		resources, managing use of water resources, managing of water rights, development of facilities, managing the quality of water service provision, water related dispute resolution and financing of water resources development activities.	the sea and a shallow well. According to the Act a permit has be acquired for the abstraction of sea water. Domestic water quality was tested and though not found fit for human consumption, treatment has been proposed through a Reverse Osmosis plant to reduce the salt content. According to the test pumping tests, the yield is $5m^3$ per hour. And as required by the law, the well was test pumped and the findings submitted to WRA for licensing purposes to abstract by the client KMFRI.

3.5. International Conventions and Treaties

The United Nations and other international institutions have drafted several international treaties and conventions aimed at enhancing social economic development, environmental sustainability and promoting fundamental human rights. The proposed NAMARET sub-project component has incorporated some of the principles from international conventions into mitigation measures under the ESMP as indicated in**Error! Reference source not found.**

Table 3-3: International Conventions and Treaties Ratified by Kenya to be triggered under the Sub-project Component

NO	TREATY/CONVENTION	OBJECTIVE	APPLICABILITY TO THE PROJECT
1.	Convention on the right of the child	The objective of the convention is to protect the rights of a child against abuse and exploitation	The project has considered the convention by not allowing any underage persons to be employed to work at the training and resource centre construction site or during operation. The constructor's suppliers and sub-contractors of services shall be required to comply with the same requirement of not allowing child labour.
2.	Convention on the rights of people with disabilities	The intention of the convention is to protect the rights and dignity of persons with disability	The training and Resource centre design has considered the rights of people with disability by providing for ease of access and mobility within the building premise. A lift and a ramp has been provided for
3.	Constitution of the International Labour Organization and	To advance social and economic justice through setting international labour	The sub-project will be required to apply the requirements of ILO in the management of the workers working on site. The contractor and the workers shall be required to sign the

	the eight fundamental Convections	standards.	code of conduct to adhere to fundamental safety requirements at the workplace. Project ESMP in addition has proposed mitigation measures to protect the rights and safety of all workers.
4.	Kyoto protocol and Paris agreement	To mitigate against climate change impacts through climate change adaptation measures.	Climate change adaptation measures such as green energy, green building concepts and resource efficiency utilization among others have been considered in the design of the project to mitigate against the impacts.

3.6. World Bank Safeguards Policy and EHS guidelines

The proposed construction of the training and resource centre including the hatchery component under NAMARET sub-project falls under the World Bank's support to the government through investment lending towards transforming and strengthening sectors related to the blue economy as part of KEMFSED project, focusing on strengthening technological and skills capacity in mariculture in Kenya. The proposed construction of the training and resource centre block and hatchery will thus trigger the Bank's Safeguard Policies requirements *(OP/BP 4.01 Environment Assessment)* as depicted in **Error! Reference source not found.**, that requires undertaking environmental and social due diligence through sub-project screening, preparation of ESIA document and subsequent monitoring of ESMP implementation.

Table 3-4: Applicable World Bank Safeguards Policies and Guidelines Triggered under the Construction of the Raining and Resource Centre at Shimoni

CODE	NAME OF THE POLICY	OBJECTIVES	APPLICATION TO PROJECT
OP 4.01	Environmental Assessment	To ensure that environmental and social considerations are integrated into KEMFSED and construction of county office infrastructure sub-project's decision making process. The aim is to enhance positive impacts and mitigate negative impacts of the project	The policy is triggered under KEMFSED and the construction of infrastructure components under NAMARET sub-project. The policy informed ESIA preparation for the training and resource centre construction, guiding on enhancing positive impacts of the sub-project component and mitigating negative ones.
OP 4.04	Natural Habitats	World Banks Natural habitats operational procedure seeks to ensure that World Bank-supported infrastructure and other development projects take into account the	Relevant requirements of the guideline informed the consultative works with key stakeholders in regard to the culturing technologies that

		conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats. Specifically, the policy prohibits Bank support for projects which would lead to the significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are legally protected, officially proposed for protection, or unprotected but of known high conservation value.	will be adopted and how they will affect the wild fisheries which informed the project design and implementation aspects outlined in the ESMP.
	IUCN red list	refers to a comprehensive inventory of the status of animal and plant species indicating their extinction risk. The various species and sub-species are categorsed in different threat categories. Depending on the threat level, it could fall under; least concern, near threatened, vulnerable, endangered critically endangered or exitinct.	the proposed project activities at construction , operation and decommissioning phases are anticipated to interact with the natural habitats and ecosystems and the IUCN redlist was critical in determing the baseline information of existing plant and animal species within the project area by providng critical information on their threat categories.
	World Bank general Environment, Health and safety guidelines	The proposed NAMARET sub-project component under KEMFSED triggers: environment, health and safety issues, and considerations of the guidelines shall come in handy to guide on the best course of action, For the different project activities, especially during project implementation, operation decommissioning, regarding air quality issues, waste water management, construction waste management, safety and noise from the construction activities on site	Relevant requirements of the guidelines informed the mitigation measures in the ESMP of this report and the quality of water to be supplied building for use.
	Environmental Health and Safety Guidelines for Aquaculture	The objective f the guidelines is to minimizes the impacts of aquaculture systems to to the environmental, the community and hazards associated with occupational health and safety. They provide stanrds and procedures of what is	The guidelines were critical in assisting with the assessment of the impacts and determining the mitigation measures associated with aquaculture systems. Some of

		required to be done to minimize the impacts of an aquaculture system during construction, operation and decommissioning.	the proposals wer used to refine the mitigation measures proposed in the ESMP under this report.
	World Bank policy on access to information, 2010	The World Bank policy on access to information sets out the principles on public access to information in its possession. The Policy is based on five principles which include: Maximizing access to information, Setting out a clear list of exceptions, Safeguarding the deliberative process, Providing clear procedures for making information available and Recognizing requesters' right to an appeals process.	The ESIA document prepared under the sub-project shall be disclosed to the public ones approved by the bank.

3.7. Project Institutional Framework

3.7.1. Regulatory Institutional Framework

Error! Reference source not found. highlights the key regulatory institutions/agencies that shall be involved in overseeing the project activities during the implementation and operation phases to ensure that they meet regulatory standards. Therefore, coordination and consultations shall be required at different levels depending on the activities at hand.

Table 3-5: Regulatory Supervision of Training and Resource Centre During Construction and Operation Phases

NO.	INSTITUTION	RESPONSIBILITY
1.	*National Construction Authority (NCA)*	Monitor compliance to design, construction, operation, and maintenance standards of the proposed building and the associated facilities. The authority ensures that all construction workers and the contractor are accredited and licensed to carry out the construction activities. The Authority shall also monitor the safety of workers and the general public during project implementation and decommissioning. The Authority will in addition register the site during construction.
2.	*National Commission for Science, Technology and Innovation.*	The commission shall regulate mariculture research and knowledge dissemination activities during operation of the training centre, to ensure that such activities align with the requirements of the Science, Technology and Innovation Act, 2013
3.	*Kwale County Government*	The County Government Act 2012 sets the development agenda in the counties by indicating the functions of the devolved system. Land use planning, waste management, fire and disaster management services, water and sanitation services provision are devolved functions. The County government shall approve the structural and architectural design; approve construction; provide water and sanitation services where need be; ensure fire safety; issue the occupational safety certificate before operation and use of the building.

4.	*Kenya Marine Fisheries Research Institute*	KMFRI will oversee daily operation and maintenance of the proposed training and resource centre building at the operation phase. The institution shall also provide leadership in research, innovation and dissemination of new information or technology to mariculture stakeholders.
5.	*County Environment Committee*	Ensuring the project adheres to physical planning and environmental standards set by NEMA under various legislations and regulatory standards.
6.	*Kwale Water and Sanitation Company (KWAWASCO).*	Provision of water and sewerage services to the proposed training building where need be as indicated in Section 4.5..
7.	*National Environmental Management Authority*	Shall be in charge of overall management and coordination of all matters relating to the environment in the proposed development area through Kwale County Director of Environment (NEMA). The Authority shall review the ESIA license authorizing the commencement of the sub-project activities following review and approval of the ESIA variation. The officers from the Authority will conduct periodic inspections of the project site to monitor adherence with the ESMP developed during the ESIA process
8.	*National Environment Tribunal*	Resolves conflicts between NEMA and any of their clients (KEMFSED, KMFRI or SDBE&F) regarding any environment issues arising during project implementation or operation.
9.	*Environment and Land Court*	Any matter that cannot be resolved amicably between KEMFSED, KMFRI, SDBE&F and NEMA pertaining to environmental issues arising from the project shall be addressed by the court
10.	*Directorate of Occupational Health and Safety Services (DOSHS)*	The directorate shall ensure compliance with the OSH Act 2007 and promote workers' safety and health, particularly during the construction and operation of the proposed building. The work site and the training centre shall be registered as a workplace by the department for occupational health and safety as the ministry of education as a learning centre. DOSHS will assist in assessing and resolving any workers compensation claims which may arise from work related injuries or illness.
11.	*Kwale County Commissioner*	Resolve any security issues, disputes on site and maintaining public order.
12.	*Kenya Power and Lighting Company (KPLC)*	Supply electricity to the proposed building and ensure that all electrical connections comply with safety standards.

3.7.2. Project Implementation and Operation Institutional Framework

Table 3-6 highlights the key project institutional framework that shall be involved in implementation and supervision of safeguards triggered by the project activities during the implementation and operation phases to ensure that they meet regulatory standards and World

Bank requirements. Therefore, coordination and consultations shall be required at different levels depending on the activity at hand.

Table 3-6:Project Institutional Framework for construction of Training and Resource Centre

NO.	INSTITUTION	RESPONSIBILITY
1.	SDBE&F	The state department shall contract the works and oversee the implementation and supervision of sub-project related activities in consultation with NPC KEMFSED and KMFRI.
2.	National Project Coordinator KEMFSED	Provide the linkage, supervision guidance between the NPCU and KMFRI.
3.	Sub-project Supervising Engineer	The client procured a supervising consultatnt who shall act as the supervising engineer on site. The consultant will link the construction team and KEMFSED National project coordinator unit (NPCU). Representing the client, supervising contractor at the site in consultation with Joint Project Supervision Committee (JPSC), works Engineer and general contract management of the contractor. The consultants safeguards officer will guide the contractor in preparation of the C-ESMP.
4.	NPCU- Safeguards Specialists (ESS & SSS)	Ensure the environmental and social requirements are prescribed in contractors bidding documents Take overall responsibility of ensuring that the mitigation measures proposed in the ESIA/ ESMP and C-ESMP are implemented. Ensure construction activities are carried out in line with national laws, World Bank safeguards operational policies and safeguards instruments prepared under the project (ESIA). Undertake environmental and social audits, EHS audits, capacity building of the contractors team on safeguards issues and Joint Project Supervision Committee (JPSC) Periodic monitoring and surveillance of all project's investment to ensure compliance with the mitigation measures as set out in the ESMMP and other contractual requirements, Ensure a functioning grievance redress mechanism and follow-up all environment and social issues raised, Share the monthly and quarterly monitoring reports with the Bank. Report immediately to the World Bank upon occurrence of any significant environmental, social, or health and safety incidents Develop and fully implement including the necessary resources, all operational phase EHS plans
5.	Joint Project Supervision Committee (JPSC)	Joint Project Supervision Committee will be composed of the NPCU Project Engineer, KMFRI-DG, NAMARET centre Management team (Director NAMARET) and NPCU Safeguards team. The JPSC will ensure supervision of works for the proposed infrastructure and safeguards compliance. The project engineer will sign works certificate for contractor's payment.
6.	Contractor	Implement the proposed sub-project according to contractual obligations and observe all safeguards requirement

		Contractor will have an EHS officer on day to day guidance on project matters on environment, social, health and safety issues Prepare contractor specific ESMP including OHS plans, waste management plans among other plans Obtain the required licenses and permits such as the work place registration Provide information to KEMSFED NPCT related to HSE (Health, Safety and Environment) performance, and immediately report any significant environmental incident or worker accident.
7.	Contractor ESHS safeguards/ Site Agent	Ensure implementation of environmental and social safeguards and occupational health and safety requirements during project implementation Maintain log on grievances, accidents and incidents on site. Report on E&S issues in the project progress reports.

3.8. Construction Supervision, Monitoring and Reporting

The technical clauses attached in here under Annex VI and the C-ESMP to be prepared by the contractor shall serve to ensure that the contractor observes his obligations of implementing the requirements of the ESMoP and ESMP as per National laws and World Bank requirements. Reporting on training centre/hatchery construction activities shall be done by the supervising consultant and contractor. The consultant and the contractor shall be in charge of the monthly reporting on site to project engineer under Joint Works Supervision Committee.

The sub-project implementation progress reports prepared shall be on monthly and quarterly basis. The client (SDBE&F) through KEMFSED and KMFRI shall review the reports and submit to the World Bank for comments and approvals through NPC. The Joint Project Supervision Committee (JPSC) shall join the consultant and the contractor for site meeting on a monthly basis. NPCU safeguards team shall also conduct quarterly monitoring visits to advice on the progress of the project. The World Bank team on the other hand shall be conducting semi-annual monitoring mission to advice on the implementation progress. The contractor's site agent/EHS officer shall on a daily basis supervise the implementation of the C-ESMP, ESMP and EMoP. The NPCU safeguards team shall also conduct regular and impromptu monitoring to ensure that all the requirements of the World Bank and National laws are adhered to as captured in the C-ESMP and EMoP are fully implemented. The safeguards team shall also through KEMFSED M&E develop GEMS tool for data collection, remote supervision and monitoring safeguards requirement implementation activities.

3.9. Contract Management, Administration and Conflict Resolution

The sub-project supervising consultant overseeing the works shall be in charge of managing the project contract on behalf of the client (SDBE&F) and KMFRI. Before the commencement of the construction activities, there shall be clarification of supervision and monitoring procedures and responsibilities, once the contractor is procured. The requisite instruments including the monitoring indicator checklist as *attached* in Annex VII shall be refined in alignment to site-specific C-ESMP that shall be prepared by the contractor. The sub-project construction

supervising consultant shall also be responsible of resolving any conflicts that arises between the client (SDBE&F) and the contractor. The consultant shall on aregular basis advice the client on the necessary actions from time to time for purposes of critical decision making. The consultant shall settle all disputes amicably through a mutual engagement process that shall be specified in the contract. However, if any dispute arises related to the contract which cannot be resolved amicably among the aggrieved parties, the matter maybe referred to a competent adjudication/arbitration person or institutions in accordance to national laws related to contract management. The identification of an institution or person or procedure agreed upon by the aggrieved party shall be guided by dispute settlement clauses in the contract.

4. ENVIRONMENTAL AND SOCIAL BASELINE CONDITION

4.1. Chapter Overview

The chapter describes existing environmental and social baseline conditions within the proposed project Area of Interest (AOI). The conditions described include physical environment, biological environment and socio-economic setting within the AOI.

4.2. Project Location and Area of Influence

The proposed NAMARET centre is located on a piece of land measuring (6 hectares) owned by the Kenya Marine Fisheries Research Institute, the land ownership documents are as attached in Annex II. The proposed project is located in Kwale County, Lunga Lunga Sub- County, Pongwe Kikoneniward, Shimoni location and in Shimoni Sub-location. The Training and Resource centreis located at Shimoni,west ofShimoni market as shown **Error! Reference source not found.** from a Google image. The area has an elevation of 14m above sea level with GPS coordinate of the project site being Latitude 4°38'34.27"S and Longitude 39° 22'30.60"E.

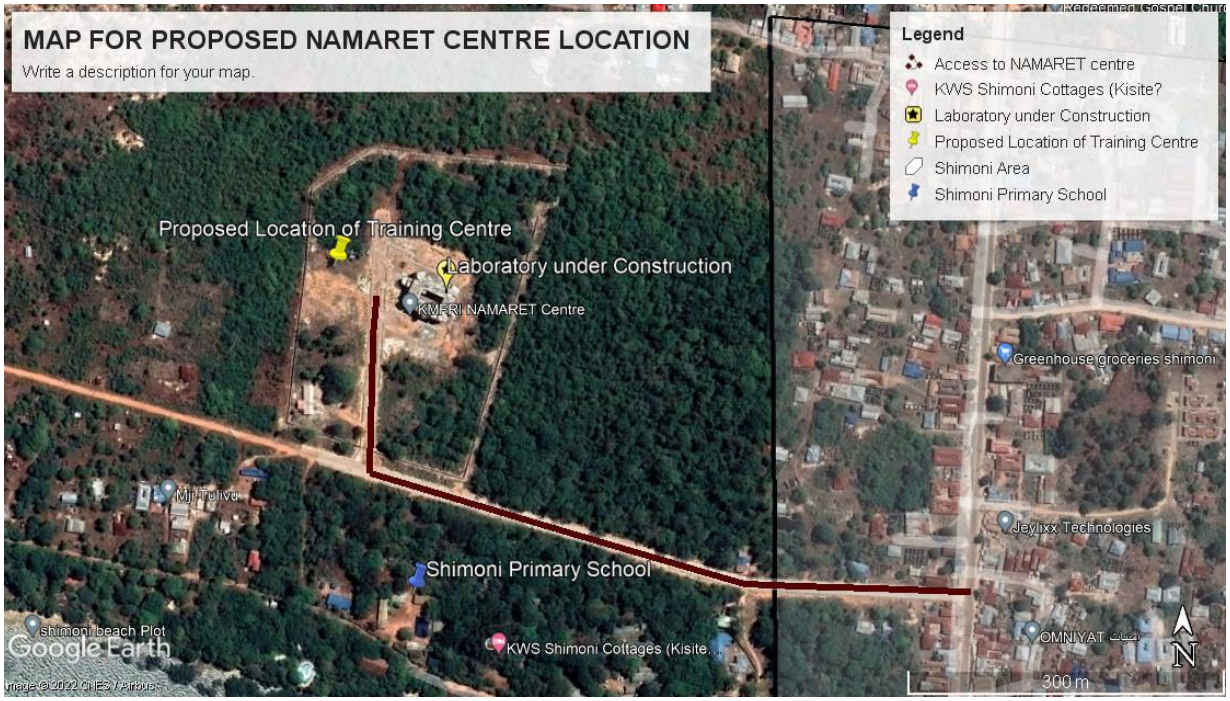


Figure 4-1: Google Image showing the location of proposed sub-project site

4.3. Physical Environmental Conditions

4.3.1. Climate and Weather Parameters

Satellite derived spatial data for the proposed project area was used for the description of climate and weather patterns of the project area. The study team acquired weather and climatic satellite spatial data at Mombasa Port rezi weather station using the coordinates of the proposed project area. The station was considered to be nearest to Shimoni Market centre. The data accessed were for rainfall, temperature, wind speed, relative humidity and radiation from FAO CLIMWAT data base accessed (March 2022).

4.3.1.1. Rainfall

Kwale County generally experiences semi-arid climatic conditions, with other areas receiving relief rainfalls especially in high areas. However, satellite derived precipitation from Mombasa Port rezi weather station *(FAO CLIMWAT data base)*for the past 42 years spanning between the years 1980-2022, showed that the area receives coastal rainfall which is relatively high. The project area coordinate points were used to assist in determining the general monthly average rainfall distribution and annual rainfall amount in the proposed project area. The project area usually experiences a bi-modal rainfall pattern with relatively high rainfalls under the long rains being experienced between Match and June compared to the short rains received between September and December as indicated on **Error! Reference source not found.**. The figure also shows that February is the driest months with less than 14mm while the month of May seems to be the wettest month of the year, within the proposed project area. The average annual rainfall within the project area was noted to be about 1162mm.

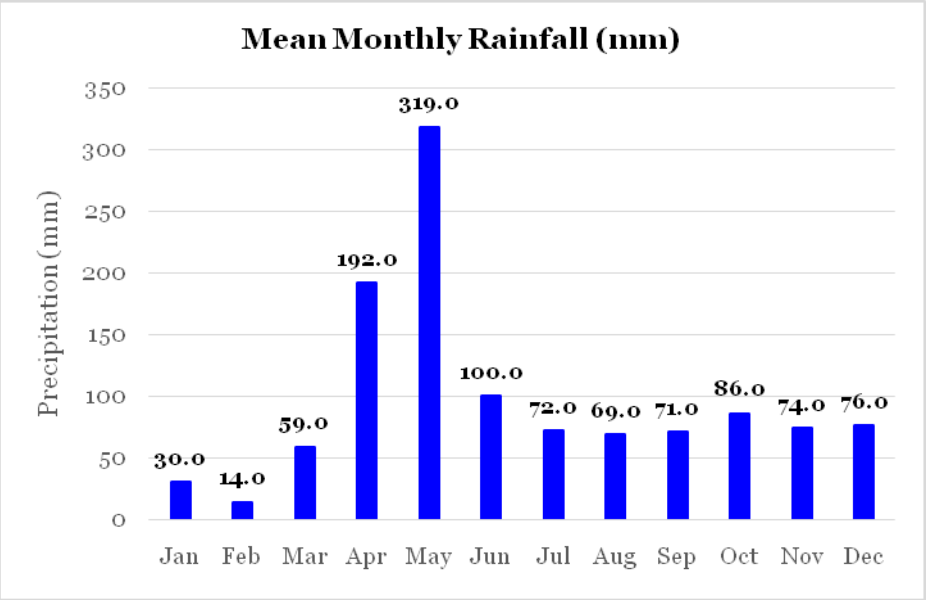


Figure 4-2: Mean Monthly Rainfall source (FAO CLIMWAT data base March 2022)

4.3.1.2. Temperature

Satellite derived temperature data for the same point and over the same period as indicated in the previous section (4.3.1.1) above was used to compute the air temperature within the project site. The temperature data analysis in the area as indicated in **Error! Reference source not found.**shows that March is the warmest months with an average temperature of 28.5˚C while July with an average temperature of 24˚C was the coldest. However, the average annual temperature in the project area was noted to be 26.29˚C.

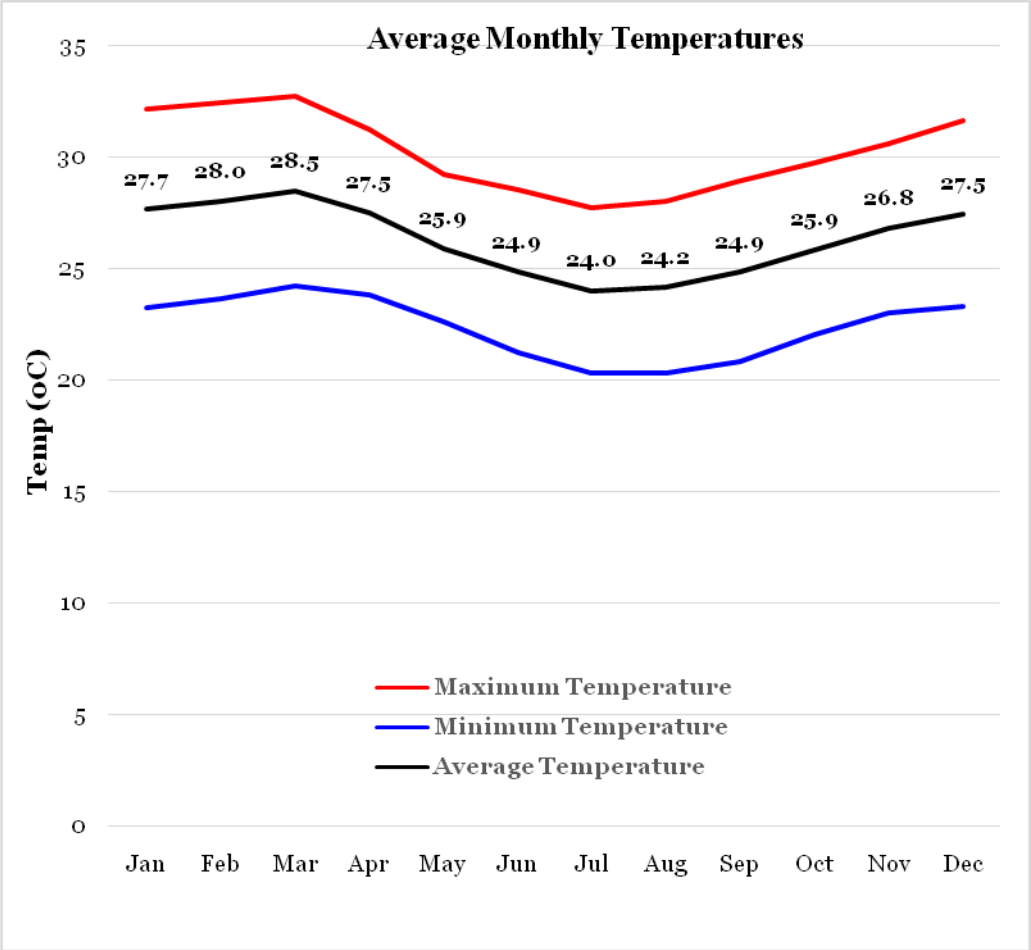


Figure 4-3: Mean Monthly Temperatures

4.3.1.3. Relative Humidity

The average monthly relative humidity within the project Area of Interest (AOI) is about 78%, which is relatively high if compared with most parts in the country. Seasonal mean monthly values fluctuate between 73% in January and February to 83% in May as shown on **Error! Reference source not found.**. The highlight on relative humidity within the project area is significant given the high solar radiation within the proposed project area that shall lead to increased heat loading among the workers on site. Relative humidity (RH) directly influences the amount of moisture that is evaporated from the skin of workers to the atmosphere. The proposed project area also experiences relatively high winds that shall increase the rate of moisture being carried from the skin.

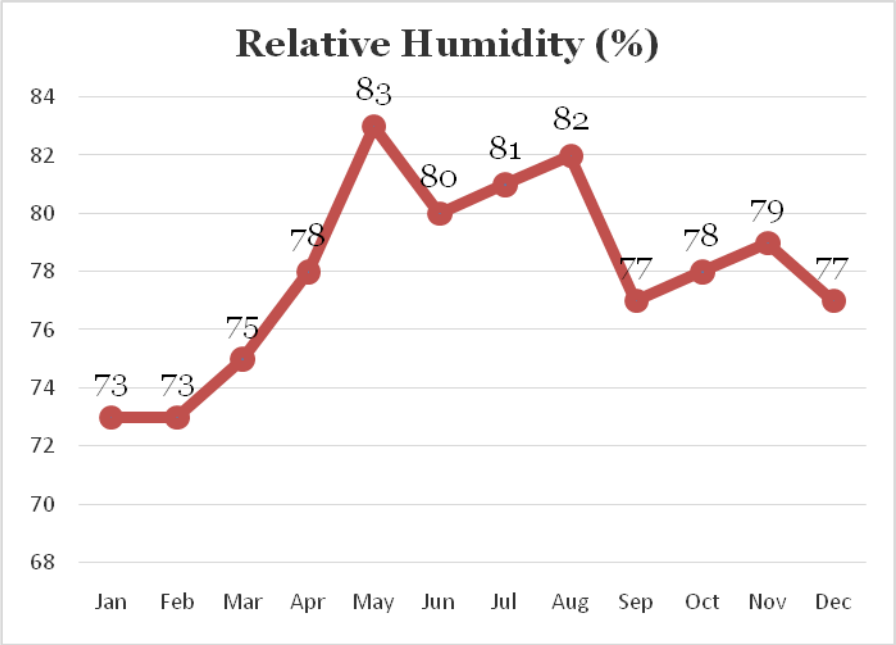


Figure 4-4: Average Monthly Relative Humidity

4.3.1.4. Wind Speed

The satellite data for wind speed indicated that average monthly wind velocity experienced in the project area is about 4.58m/s with the lowest wind speed of about 3.90m/s being experienced in November while the highest is 5.10m/s occurring in May and June as indicated in **Error! Reference source not found.**. Wind speeds influence the subsequent changes in the rate of heating, evaporation and the microclimate within the working area. The wind speed in addition may cause air pollution and aid in pollutant dispersion by carrying cement, dust particles or sand particles affecting air quality status on site for the workers and the general community health. The proposed construction of the training and resource centre is not anticipated to contribute significantly to air pollution due to the scope of the expected works.

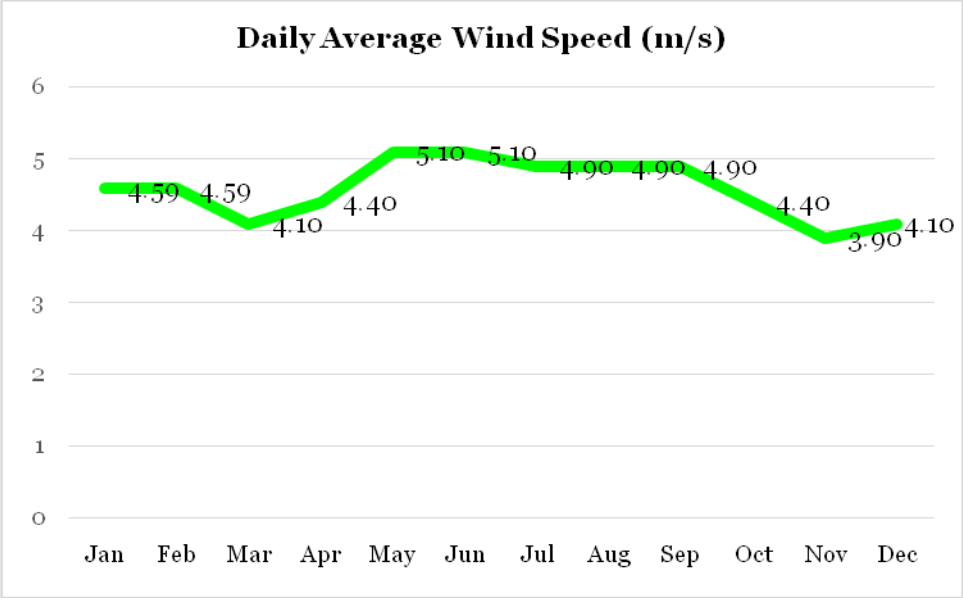


Figure 4-5: Daily Average Wind Speed

4.3.1.5. Radiation

The proposed project area experiences an average monthly radiation of about 21.34 Rad (MJ/m^2/day) with the maximum radiation of 24.1 Rad (MJ/m^2/day) occurring in the month of Februaryand a minimum of 17.7 Rad (MJ/m^2/day) being experienced in the month of May and July as indicated in **Error! Reference source not found.**. The average monthly sunshine hours on the other hand was noted to be 8.2hrs. Solar radiation consists of different light frequencies that can pose a health hazard especially to workers exposed to the sun for long hours with the eyes and the skin being the most affected. There will be need therefore for the project implementing team to take this into consideration during the construction period to ensure adequate protection of the construction workers is attained. However, the general high radiation is significant for the solar system that has been proposed under the sub-project. The solar system shall act as back up for the power fluctuation within the project area. The hatchery system being put in place at the resource centre is power dependent and will require multiple sources of power to hinder any power interruption.

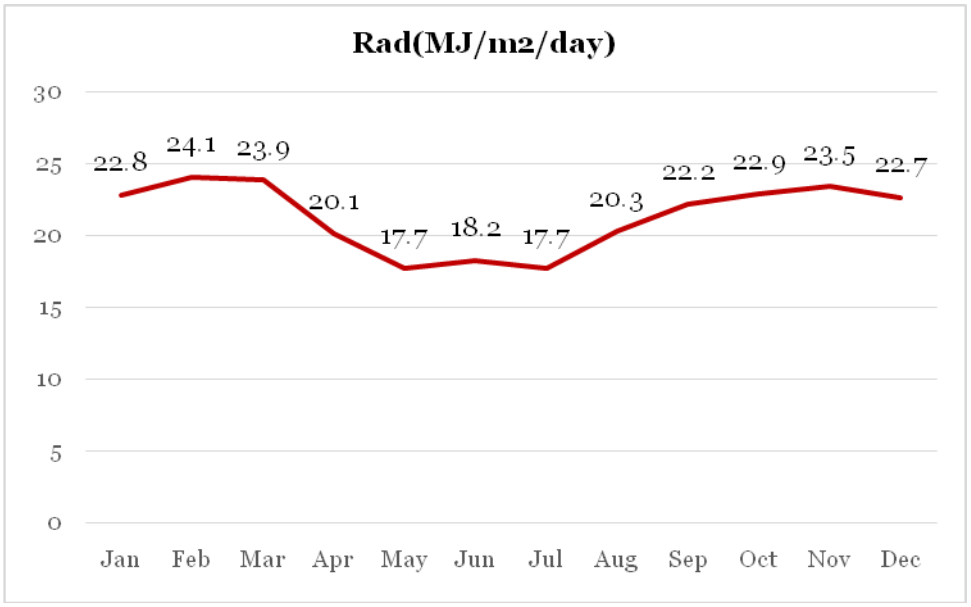


Figure 4-6: Average daily Radiation

4.3.2. Waste Generation and Management

The main source of litter noted in the project area during field survey was solid waste from residential areas, shops and hotels operating within Shimoni market. Though Kwale County Government provide waste management services to the locals through skips as indicated in Plate 4-1which are strategically placed through the market, waste management at household level remains inadequately. During field survey it was observed that there was indiscriminate and illegal damping of solid waste behind the shops as shown in Plate 4-2within the market, beside the roads and at residential areas as highlighted inPlate 4-3. Waste management whether liquid, solid or in gaseous form is critical in maintaining environmental integrity of an area. The main type of waste observed was organic and inorganic materials, including plastics, pieces of glass bottles, paper, wood wastes, food remains, soil, plant remains, among others.

Plate 4-1 : A County skip at Shimoni Market for waste collection

Plate 4-2: Indiscriminate waste disposal behind the Shops at Shimoni

Plate 4-3: Illegal damping along the road at Shimoni Market

It was noted during field survey that some of the residents in the area cope with the inadequate waste collection challenge through burning of waste in compounds or along the streets as indicated in Plate 4-4 and Plate 4-5. However, waste burning enhances pollutant dispersal to the environment and if not well handled, can be a cause of environmental degradation to the air, biological diversity, water sources and the soils. Waste is anticipated during construction activities, at the contractor's camp if any, operation phase of the proposed building, waste from the economic activities associated with the building and littering by the users, and debris waste at decommissioning. Due to inadequate waste disposal habit within the project site, the contractor shall be required to recycle most of the waste generated on site and where possible adopt safe disposal of any waste that cannot be reused. The contractor shall be required to enter into an understanding with the county government of Kwale to assist in collecting and safe disposal of the waste at approved county waste disposal sites.

Plate 4-4: Burning of paper and plant remains waste at the proposed Project site

Plate 4-5: Burning of Waste at one of the shops at the Market

Relative to 2019 population and housing census, the field survey findings were found to be consistent with the general data for waste management within Lunga Lunga sub-county as indicated in Plate 4-1.

Table 4-1: Solid Waste Management in Lunga Lunga Sub-county:

Means of Solid Waste Management	Percentage (%)
Waste Burning	46.30
Dumping in the compound	22.70
Dumped in pits or bury	27.30
Dumped in streets	2.40
Collected by County	0.90

4.3.3. Ambient Noise and Vibrations

The ambient noise levels within the proposed project area are mainly from birds, Wildlife (Baboons) and some human activities. The existing main source of noise at the proposed project area is the flow of traffic on Kidimu-Shimoni access road which passes through the market and at about 150m away from the proposed site. The proposed training centre site is at about 750m away from the existing Shimoni market and about 300m from Shimoni primary school. Shimoni market is associated with transport economic activities with use of engine boats, motorcycles and autorick Shaw as the main mode of local transport. However as one moves away from the market the noise level reduces as the anthropogenic activities also reduces. Noise pollution possesses both auditory and non-auditory effects on the exposed population if in excess of allowable limits. The noise and vibrations levels at the proposed project site is anticipated to change slightly during the project cycle from foundation excavation, movement of construction vehicles, general construction activities and vehicles moving in and out of the proposed building site at the operation as well as from demolition activities during the decommissioning phase of the project. The main noise receptors noted were existing KMFRI administration office on site, Shimoni primary school which is about 300m away and the local

residential areas with the closest being 120m away from the proposed site. The perimeter wall is anticipated to reduce the noise level reaching the nearest homestead.

4.3.4. Ambient Air quality

Air pollution at Shimoni market was noted to be mainly associated with emission pollutants generated from engine boat activities, automobile, autorick shaws, motorcycle, haphazard burning of waste at residential areas and particulates from wind action on unimproved access roads. The gaseous and particulates pollutants are anticipated to increase with the proposed NAMARET sub-project construction works particularly from use of cement and movement of construction vehicles. Though the access to the proposed site is improved by cabro with hardly any traffic flows, the mud on construction vehicles tyres is anticipated to generate temporal dusts as it passes over the cabro but with proper mitigation measures the pollution effect is not anticipated to be a challenge.

4.3.5. Hydrography, Water Quality and Productivity of the Shimoni-Vanga Seascape

Water circulation and quality influences the abundance, richness and diversity of fish and planktonic groups. Wasini Channel and Estuarine zones are most important areas with reference to the distribution of fish eggs while the fish larvae were abundant in the riverine mangrove areas. Wasini channel has also found to be the preferred area for the crabs, the prawns and the cephalopods larvae. Bacteriological contamination was low and within EEC and WHO recommended guidelines for recreational waters and aquaculture. Oceanographic assessments reveal patchiness of low salinity and hyper-saline conditions. Currents are mainly tidal with reef-induced circulation. Residence time has been estimated to be approximately 3-days. Currents near Wasini channel, mangrove creeks and near headlands currents tend to be strong due to constrictions, whereas in open and shallow basins the currents tended to be weaker. Observations of cold ocean water in the inner part of the Wasini Channel suggest that tidal pumping occurs at the entrance to the channel as possible mechanism that influences the fishery in the area. Fast currents were also observed in areas associated with deep channels. Shirazi Creek showed peak ebb currents of about 39.2cm/s as opposed to Ramisi estuary 9 cm/s.

Water salinity and temperature is higher in Feb-March (18-36, 29-30^{o}C) but lower in June (1-34, 27-30^{o}C) the later was the effect of rainfall in April-May. During flood low salinity water was confined in the upper reaches of the estuary and mangroves. During flood mixed low salinity water extended farther into nearshore areas beyond the creek and estuary entrances. Water visibility is often less than 1 m in estuarine and creek areas but it increased in nearshore areas to about 1.5 m and was greatest in lagoon and Wasini. Primary productivity has been observed to be high in riverine areas which could be attributed to high levels of phosphates recorded within the river systems. Water quality in these areas is fit for recreation and aquaculture.

Fish eggs are abundant in estuarine and near-shore areas while low numbers were found in the riverine areas and were associated with low salinity habitats. Fish eggs are particularly high

around Mkwiro, Jetty, Mwamba Mkuu and Masulini sites (30,000-60,000 eggs per m^3). Fish, caridian and brachyuran larvae were predominantly found in the riverine and Wasini channel areas. The fish larvae were observed in small densities (up to 60 individuals per m^3). Wasini channel seems to be an important ecosystem most probably due to its circulations. During the dry season, zooplankton densities are high in River Ramisi compared to the other Rivers and were also high in the Jetty area at Shimoni (about 23,000 individuals per m^3). Some zooplankton larvae were observed even in deeper areas of the river an indication that the area is rich for the larvae to survive. Prawn and shrimp larvae were in high abundances at Shimoni Jetty, Kibuyuni, Mwarembo and Mpunguti ya chini (885-5000 individuals per m^3). However, these were also found in the other areas but in smaller numbers.

4.4. Biological Environmental Baseline Conditions

Both the landscape and seascape adjacent to the proposed marine hatchery hosts rich floral and faunal biodiversity. The seascape is particularly dominated by corals, mangroves, and seagrasses, as well as a variety of marine mammals, crustaceans (shrimps, lobsters, and crabs), pelagic and demersal fishes, cephalopods (octopus, squids, and cuttlefish) and echinoderms (e.g. sea cucumbers), birds, and reptiles. Sandy beaches and estuaries are also found in the area with one permanent river (Ramisi) draining into the ocean. The importance of the seascape is underscored by a Marine Protected Area (MPA), situated within the Kisite-Mpunguti Marine National Park and Reserve about 20km from the proposed site, that demonstrates the highest coral diversity of Kenya's MPAs, with 203 species and a 50% coral cover (Obura 2012).

4.4.1. Flora

The location of the proposed marine hatchery and the associated components is covered by habitats hosting different types of terrestrial flora and fauna. The vegetation at this location consists of 32% tree cover, 14% climbers, 30% herbs and 24% shrubs which extend on slightly over a 6 hectare piece of land (Gwada et al. 2018). Gwada et al. 2018 recorded the following vegetation species, here ordered from the most abundant to the least abundant species: *Synaptolepiskirkii*(Thymelaeaceae), *Mallotusoppositifolius* (Euphorbiaceae), *Salacia elegans* (Celastraceae), *Ludiamauritiana* (Flacourtiaceae), *Coffea pseudozanguebariae* (Rubiaceae), *Uvaria acuminate* (Annonaceae), *Ochna thomasiana* (Ochnaceae), *Millettiausaramensis* (Papilionaceae), *Markhamiazanzibarica* (Bignoniaceae) and *Lanneawelwitschii*(Anacardiaceae). Euphorbiaceae and Poaceaefamilies represented 6 % of the entire species recorded at this location and arethe most diverse with 27 and 26 species respectively. Other families that occur in this area but not in as much abundance include: Papilionacea, Apocynaceae, Rubiaceae, Annonaceae, Lamiaceae. Although some of the colonizing vegetation shall be cleared for the proposed sub-project components' siting, it's proposed that similar tree species shall be planted within the reserved part of the plot that shall serve as nature walk trail, as highlighted in the master plan of the plot.

4.4.2. Fauna

The findings from baseline surveys conducted during this study show that small mammal, birds, reptiles, amphibians and invertebrates are present within the project site. The most dominant

small mammals reported were rodent species including; *Rattus norvegicus, Stochomyslongicaudatus, Beamyshendei, Paraxeruscfpaliatus, Mastomysnatalensis*. *Rattus norvegicus* and *M. natalensis.* Bat species including; *Rhinolophus clivosus, Hipposiderosvittatas, H. caffer, Coleuraafra, Triaenopsafra*and *Rousettus aegyptiacus.* Previous studies have recorded bird species at this site includingthe near threatened Fischer's Turaco, Palm-nut Vulture and Silvery-cheeked Hornbill. Palm-nut Vulture and Silvery-cheeked Hornbill are classified as species of regional concern. Reptiles and amphibians found in this area include: Changamwe Caecilian (*Boulengerula*cf. *changamwensis*), Coral rag skink (*Crytoblepharusboutonii*), amaniscreaching frog (*Arthroleptiscf.stendactylus),* flap-necked chamaeleon (*Chamaeleodilepis*) and the invertabrates reported in the report was the Coconut crab (*Birgus latro*).

The adjacent marine environment also hosts an array of marine fauna hosted in critical marine habitats. Mangroves, seagrass and coral reef ecosystems in this area are among the critical habitats that provide habitats for fish, invertebrates, marine mammals and other forms of marine species. The diversity of fauna within the mangroves is high due to ample food resources and a wide range of micro habitats in the system. Fish assemblage in the mangroves of Vanga is relatively similar to the one in Gazi (Huxhamet al., 2004, Cronaet al., 2007, KMFRI, 2010). The most common families of fish in the area include, Lutjaninae, Gerreidae, Siganidae, Lethrinidae, Coryphaenidae, Sphyraenidae, Carangidae, Acanthuridae in the seagrass beds. Within the coral reefs, there are more than15 families of reef fish. Damsel fishes (Pomacentrids) dominatethe fish populations followed by rabbitfishes (Siganids). Damselfishes are both planktivores and herbivores while Siganids are herbivores. High densities of planktivores could be attributed by high water column productivity and turbidity conditions largely due to inputs from river Umba effluents and mangrove deposits from the nearby mangrove ecosystem. High herbivore densities could be as a result of low predation level due to overfishing of top predators. For example, Lutjanids and Labrids (wrasses) are found in very low densities in this area. High damselfish numbers are also an indication of reef degradation.

The area is an important nesting ground for two marine turtles i.e. Green turtles (Cheloniamydas) 10 and Hawksbill turtles (Eretmochelys imbricate). These species are categorized as endangered or critically endangered on the IUCN red list. There have been confirmed sightings of the endangered dugong (Dugong dugon), Bottlenose (Tursiopsaduncus) and Humpback dolphins (Sousa chinensis) have also been spotted in the clear water along the Shimoni channel (GVI Kenya 2011).

4.4.3. Population demography of selected priority species:

The monthly and the overall sex ratio for the rabbitfish population shows that females dominate landings with a size class distribution from 15cm - 39cm. The minimum size at maturation ranges from 20-25cm. Most of the emperors (Lethrinidae) landed in Shimoni-Vanga are notably below the size of first maturity, giving substantial evidence of the declining state of the fisheries. Recruitment patterns of some lethrinus species shows peaks between May- July,

although recruitment occurs throughout the year. Ripe and running fish are recorded in high abundance suggesting that spawning aggregations are sometimes targeted.

4.4.4. Hatchery associated risks to wild fish Populations

Captive breeding and grow out of key commercial species can provide an income diversification strategy in the face of declining fisheries and environmental changes. Hatcheries provide a critical link in the production of marketable fish as fingerlings/juveniles for grow-out or fattening. There are however some risks of genetic dilution whereby the original genetic character of the wild population is diluted by hatchery reared individuals. However, since broodstock will be obtained from local stocks, this risk is rated low. It will also be important to ensure that the cultured stocks are free from diseases and parasites to minimize introduction to wild stocks. Sites near fish farms/cages are reported to be associated with a much higher density and diversity of wild fish. Multiple studies suggest that fish may aggregate near aquaculture/cage sites to feed on spilled feed and or waste which is likely to be the cue driving the aggregations. This may cause some localized changes in the assemblage structure and trophic composition of the fish communities due to attraction of certain species. An increase in the abundance of predatory fish may cause some environmental disturbance of prey species.

4.4.5. The Risk of Parasite Transmission between Wild and Farmed Stocks

Previous interventions have contributed valuable experience in the capture of wild prawn broodstock, training in prawn seed-stock production and in prawn and tilapia grow-out, harvesting and marketing. For the first time ever, Kenyan prawn wild broodstock (*P. monodon* and *F. indicus*) were screened the presence of 13 prawn pathogens of commercial concern using Prawn Multipath technology (https://www.genics.com.au/). The results revealed that the wild broodstock were free from the pathogens of most concern to prawn farmers, including; White Spot Syndrome (WSSV), Infectious hypodermal and hematopoietic necrosis (IHHNV), Yellow Head Virus (YHV), *Enterocytozoon hepatopenaei* (EHP) and Acute Hepatopancreatic Necrosis Disease (AHPND). This has positive implications for future Kenyan prawn domestication, selective breeding and hatchery production enterprises

Kenya has an abundant source of wild *F. indicus* that, albeit with limited pathogen screening, appear to be relatively disease free. This presents a significant opportunity to establish genetically diverse, specific pathogen free (SPF) *F. indicus* founder stocks at Shimoni. This would enable domestication and selective breeding of elite genetic stocks optimally adapted to local grow-out conditions. Given the known susceptibility of F. *indicus* to *WSSV*, it will be clearly important to maintain high standards of biosecurity at the hatchery facility plus pathogen surveillance at all grow-out sites. In this context, it is a significant advantage that potential grow-out sites are distributed along Kenya's entire coastline. If a WSSV or other disease outbreak were to occur there is a good chance that it could be restricted to a single locality and managed via appropriate biosecurity protocols. This was how Australia managed a WSSV outbreak in 2016. As soon as WSSV was detected on *P. monodon* farms in S.E. Queensland the farms were closed and disinfected. This prevented the spread of WSSV to other farms and,

following a quarantine period of one or two production seasons, the farms were back in operation.

4.4.6. Health Status of Aquatic species (including disease prevalence).

Healthy aquatic ecosystems are home to a diversity of plants, invertebrates, and fish. Aquatic animal populations face unprecedented threats to their health and survival from climate change, water shortages, habitat alteration, invasive species, and environmental contaminants. The environmental stressors can directly impact the prevalence and severity of disease in aquatic populations. Over the years occurrences of infectious diseases inflicted by pathogenic viruses, bacteria, fungi and parasites in cultured fish and shrimps have resorted in significant economic losses. Some fundamental information on viral bacterial fungal and parasitic diseases of economically important fish such as groupers (*Epinephelus* spp.), seabass (Lates calcarifer), Rabbit fish (*Siganus* spp.) milkfish (*Chanos chanos*), catfish, (*Clarias* spp.) mullet (*Mugil cephalus*) and penaeid shrimps are known. Its significance cannot be ignored as their occurrences have resulted in heavy mortalities over the years.

Common diseases in prawns, tilapia and rabbitfish, pathogen detection methods include Shrimp Multipath, monitoring and prevention, quarantine, biosecurity, generic selection for pathogen tolerance and resistance. For NAMARET, principles of recirculating aquaculture systems (RAS) will be employed to ensure biosecurity, automation and bio-treatment (wetland system of the cultured organisms. For this to be achieved access to clean seawater, selection of target species via analysis of their probability of success will be key.

Aquatic viruses are transmitted from fish/shrimp to other fish/shrimp, from water to fish/shrimp or from reservoir to fish/shrimp by horizontal transmission. Disease transmission can also result from brooder to eggs/fry via vertical transmission. Known reservoirs of viral pathogens are farmed fish/crustacean, imported fish/crustacean, wild fish/crustacean, other aquatic animals/plants and survivors of viral epizooties.(Lio-Po 1998) There are no treatments for viral infections in fish or shrimps. Hence, preventive measures must be adapted to keep the viral pathogens away. The basic consideration in preventing the occurrence of viral diseases is avoidance, and the use of virus-free fry for stocking in ponds is highly recommended. It should also be borne in mind that semi-intensive and intensive culture systems promote conditions conducive for disease development(Lio-Po 1998).

4.4.7. Potential Bio-Risks Associated with Hatchery and Mariculture Operations.

Adjusting the current RAS system to get it working effectively requires an understanding of the functions of each of the RAS components and the order in which they need to be placed. The function of the RAS system is to clean and sterilize the water once it leaves the broodstock and larval rearing tanks. Once all the solid and suspended and dissolved waste components have been removed any residual organisms need to be killed via sterilisation. The clean, sterile seawater can then be stored and re-used in the broodstock and larval rearing tanks. The components are key to identification of potential bio-risks associated with hatchery and mariculture operations. The key functions and components of RAS system are:

i. **Removal of suspended solids**: Once the water leaves the broodstock or larval tanks, the

first step is to remove the suspended solids. Most prawn hatcheries use drum filters or sand filters and/or cartridge filters. The water should be gravity fed through the drum or sand filters because pumping breaks up the organic suspended solids making them harderto subsequently filter out. The waste for the drum or sand filters can then be treated in the on-site bio-treatment system (yet to be installed).

ii. **Removal of dissolved organic waste and aeration:** The next step is to remove small suspended plus dissolved organic impurities using a protein skimmer. Protein skimmers compliment the sand or drum filters and rely on the process of "foam fractionization" to remove small organic waste products (< 30 microns) before they are broken down by bacteria and other microbes. Protein skimmers also facilitate gas exchange, oxygenating the water.

iii. **Conversion of toxic ammonia to non-toxic nitrite and nitrate.** The next step is to use a bio-filter to bio-convert toxic forms of nitrogenous waste to non-toxic forms. Bio-filters contain porous, high surface area beads, or other media. The media provide a substrate for aerobic nitrifying bacteria that bio-covert toxic ammonia to non-toxic nitrite and nitrate.

iv. **Sterilizing the water.** The final step for the water to pass through a fine cartridge filter (1 or 2 microns) to remove any residual suspended solids, then to sterilize the water using ultraviolet light or ozone. Ultraviolet light irradiates and kills microorganisms including: viruses, bacteria, fungi, protists and microalgae. Ozone disinfects the water by oxidising microorganisms, it is equally effective as UV in sterilizing hatchery water.

The design and operation of RAS systems can vary from hatchery to hatchery but the basic principles are the same. Some hatcheries may also use additional components including activated charcoal filters, to remove specific impurities, or degassing columns to enhance oxygenation and remove carbon dioxide and nitrogen.

The configuration that we recommend for the NAMARET prawn hatchery RAS is illustrated in Figure 1.

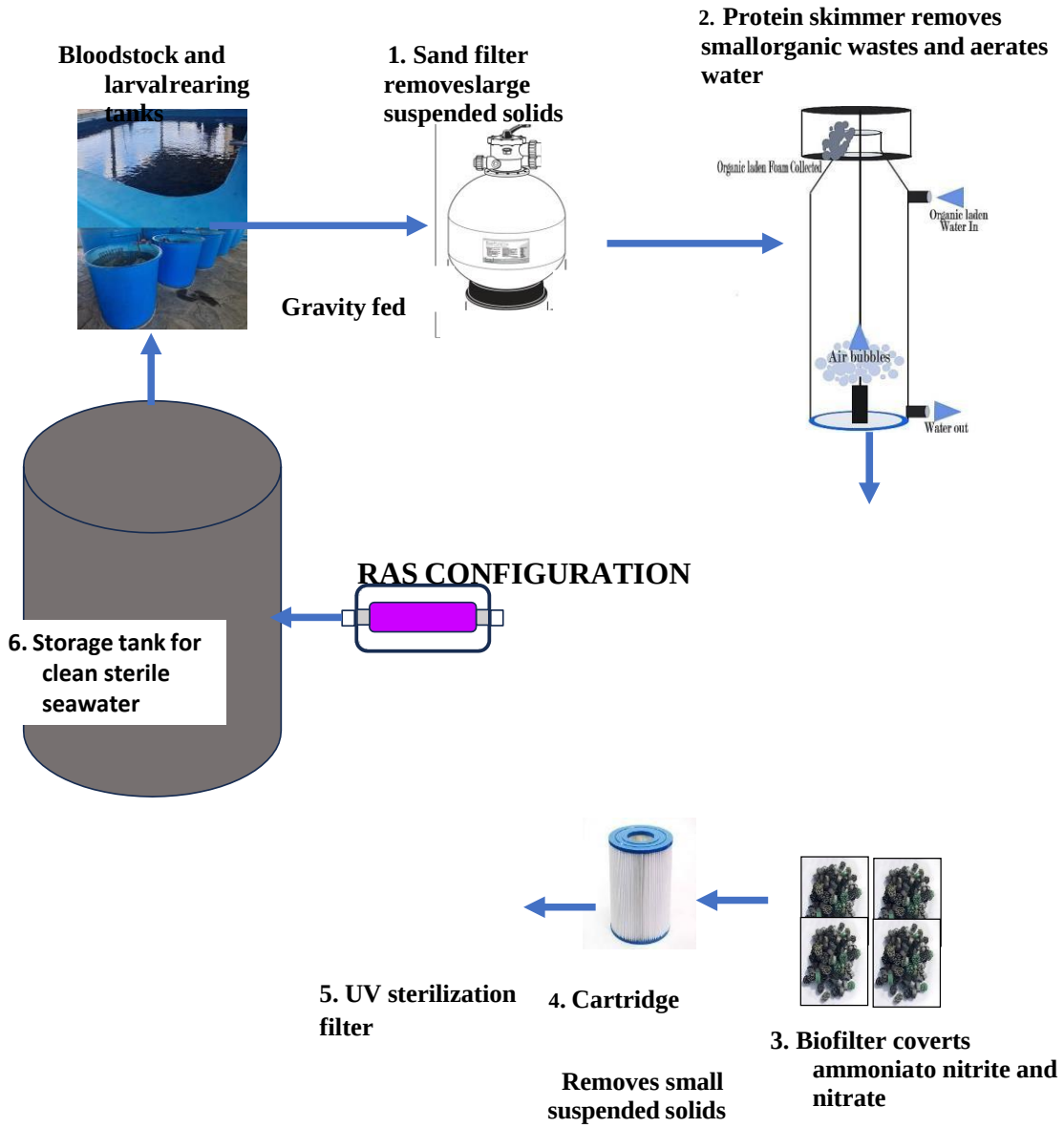


Figure 1. Configuration of a recirculating aquaculture system (RAS). 1. Water from the broodstock and larval rearing tanks flows by gravity into a sand or drum filter to remove suspend solids. 2. The water flows or is pumped into a protein skimmer to remove small suspended or dissolved organic waste. 3. The water flows through a biological filter system that bio-converts toxic ammonia to non-toxic nitrite and nitrate. 4 & 5 The water flows through a fine cartridge filter (1 or 2 microns) into an ultra violet (UV) or Ozone sterilisation unit. 6. The clean, sterile water can then be stored in the storage tank for subsequent use in the hatchery.

4.4.8. Modified Habitats

The general area around the proposed project site is a modified habitat due to anthropogenic activities as shown in Figure 4-7. The adjacent area has been developed with the presence of human settlements, land for national institutions (KWS, KMFRI, Shimoni primary school, Shimoni secondary, KFS, KeFS, KPA and KRA among others), and commercial areas (shops, eatery areas and accommodation areas). As a result, the development of the proposed NAMARET center is anticipated to have very minimal impact on the vegetation existing in the area. The proposed NAMARET center occurs in an area with an already modified habitat due to the ongoing constructions of other infrastructure including: a hatchery, laboratory and an existing administration block. Consequently, the proposed project provides an opportunity through landscaping to introduce native plants and other tree species within the area to improve biodiversity conditions and micro-climate of the site, bring back bees, butterflies, birds and other flora and fauna that had disappeared from the area. Greening of the compound in addition shall augment carbon sequestration within the immediate site areas.

Figure 4-7: A Google image capturing the Anthropogenic activities in the area

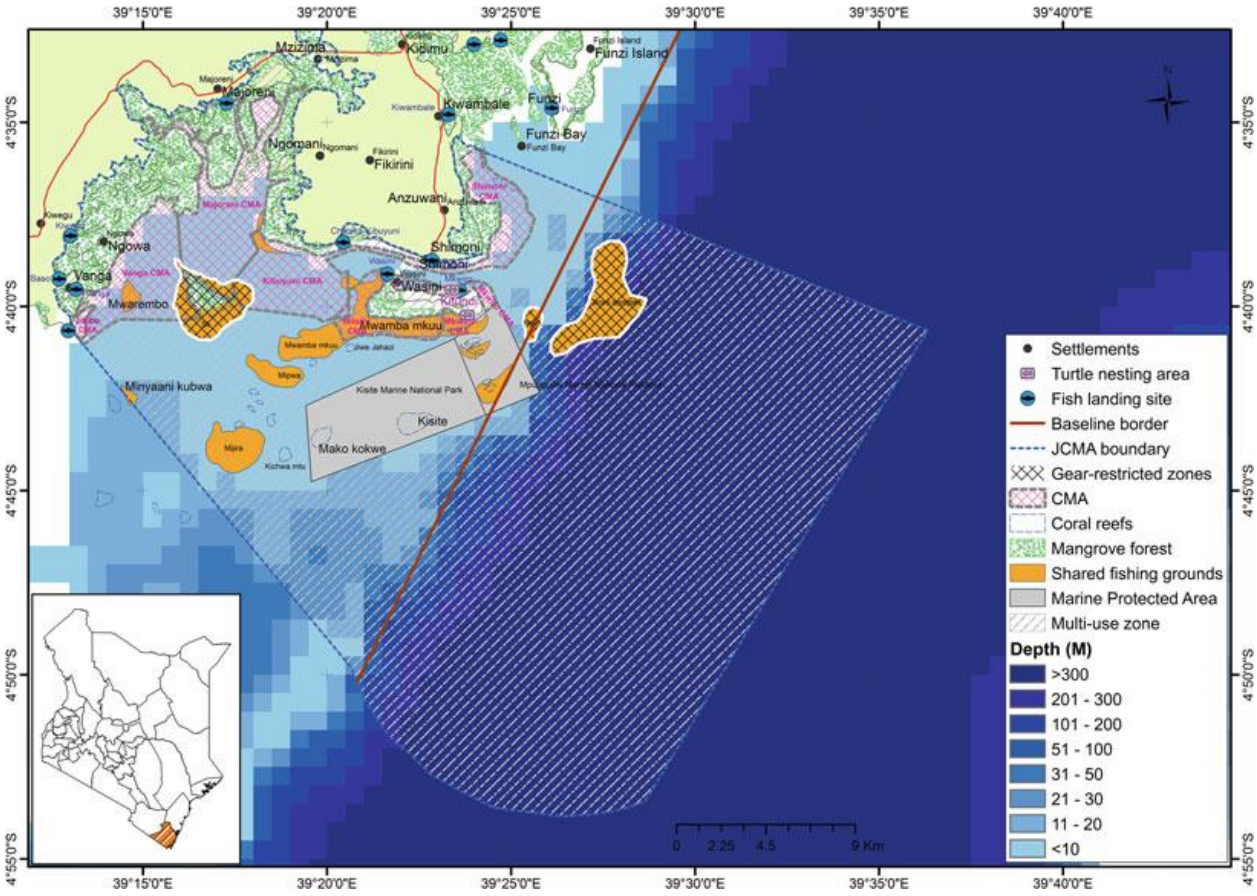


Figure 4-8: The Shimoni-Vanga Seascape(source: The Coastal and Marine Resource Development (COMRED) and Naturecom Group and the Regional Centre

4.4.9. Status of Critical Fish Habitats (Mangroves, Seagrasses and Coral reefs)

Surveys of the mangroves in the Shiomoni -Vanga seascape reveal that six mangrove species; *Avicennia marina, Bruguiera gymnorrhiza, Ceriops tagal, Rhizophora mucronata, Sonneratia alba* and *Xylocarpus granatum* occur in the area, with *R. mucronata* being dominant. There is a relatively low abundance and diversity of meiofauna with total densities ranging from 427 to 1833 ind/10cm^2 while diversity varied between 9 to 16 taxa per site with a total of 21 different taxa recorded. There is a dominance of nematodes in all the sites sampled. Other main groups represented included Copepoda, Polychaeta, Amphipoda, Turbellaria and Oligochaeta. Amongst the seagrass species, *Thalassodendron ciliatum* beds had higher concentrations of macroinvertebrete and fish fauna. Surface macrobenthos were dominated by sea-urchins and molluscs while fish trophic structure (pyramid of numbers) were inverted in favour of carnivores, indicating the degraded conditions of the area due to selective removal of herbivores.

A total of 11 seagrass species were encountered and their spatial cover is shown in Table 3.2. Most sites were multi-species but some sites (10) had monospecies beds of *Thalassodendron*

ciliutum, Thalassia hemprichii or *Enhalus acroides* (Figure 3.2). 4 sites were highly species rich (>4 sp). Within seagrass beds were bare sites and other seagrass associated substratum structures that formed an integral part of the structural forms of the different seagrass study sites (Table 3.2). Bare sites in 7 site locations (KRA beach, Majoreni STN 2, Majoreni/Fikirini, Mijira 1, Shimoni Jetty, Sii island north, and Wasini Kwa masudi), while seaweeds/corals or sponge dominated (over 50% cover) at two locations (Mpunguti mlangoni and Mwazaro-Anziwani).

Most of the coral reef sites within the Shimoni-Vanga area are dominated by live coral with an average cover of 24 %. The other important benthic categories are macroalgae (22 %), turf algae (17 %) and rubble (11 %). Other benthic categories cover less than 5 %. The taxonomic composition of coral community in this area comprises of about 20 genera. The genus *Porites* has the highest overall cover with the massive forms covering aboyt 6 % of benthic space as compared to the branching forms which cover 4 %. Other genera that show high cover include *Platygyra, Acropora, Galaxea, Montipora and Echinopora*. Differences in coral taxonomic composition at the different sites could largely be influenced by factors that influence water quality. For example, the high abundance of *Porites* genus is because this taxon is normally associated with its resilience to bleaching and is not easily affected by mechanical damage.

The composition and abundance data for sediment macrofauna shows high variability within and between sites. Density values can range from 11 ind/32 cm2 to 444 ind/32 cm2. A general observed trend was higher densities and diversity at sites located on reef flats compared to the sandy beaches and Wasini channel, with the latter having least densities and diversity except. Amphipoda dominate in many places. The other dominant groups include; Polychaeta, Oligochaeta and Nematoda. Other taxa which were relatively common in most places were; Copepoda, Bivalvia, Cumacea, Gastropoda, Ostracoda and Tubellaria. Some groups occurred in low numbers or were absent from many sites. These are referred to as rare taxa and include; Bryzoa, Halacaroidea, Holothureans, Lorycifera, Nemertina, Priaprida, Pycnognada, star fish and a species Y (SppY yet to be identified).

4.4.10. Visual Impacts

The proposed training and resource centre to be build is among the few buildings that shall exist within the project site neighborhood that shall be relatively high including the laboratory under construction. Though the project site seem to have been in an area covered by coastal rainforest, due to settlement at Shomini area most of the original vegetation has been cleared. In spite of this, there are mature trees on the project site that have been conserved and shall not be interfered with. Implementation of the proposed project is anticipated to have visual impacts to the proposed site since the area has few story buildings. Management of solid waste piles on site will also be a potential source of visual impact but with proper disposal and landscaping, the aesthetic value of the area is anticipated to be enhanced.

4.5. Socio-Economic Baseline Conditions

4.5.1. Administrative units

The proposed project is located in Kwale County, Lunga Lunga Sub- County, Pongwe Kikoneni ward, Shimoni location and in Shimoni Sub-location. The Kenya Marine Fisheries Research Institute where the training and resource centre shall be constructed is located at Shimoni village,West of Shimoni market as shown **Error! Reference source not found.**courtesy of Google image. The area has an elevation of 14m above sea level with GPS coordinate of the project site being Latitude 4°38'34.27"S and Longitude 39° 22'30.60"E.

4.5.2. Demographic Characteristic of the Project site

4.5.2.1. Population Levels

According to housing and population census of 2019, the population for Shimoni location indicated that the male population is slightly higher at 4,333(51.34%) than female population which was 4,107(48.66%)[8] consistent with Shimoni sub-locations with 3,370(51.69%) and 3,150(48.31%) respectively. The population and housing census further indicated that Shimoni sub-location has a total of 1945 households with an average household size of 4.03 persons per household.

4.5.2.2. Literacy Levels

Literacy levels within the general Lunga LungaSub-County is the second lowest compared to the rest of the County with the highest being Matuga, followed byMsambweni sub-county, Samburu and Kinango being the lowest respectively. The national average was noted to be about 82.8% based on the 2019 housing and population census, Kwale County was 67.58% and Lunga Lunga Sub-county account for at least 20.86% of the population having attained a form of formal education in the county. It was noted that males in the sub-county had a slightly higher literacy levels than females at 52.31% and 47.69% respectively. About 37.08% of the population does not have any form of formal education in Lunga Lunga Sub-county, with majority observed to be women at 50.94% compared to men at 49.06%. The majority of those with formal education have a form of primary education at 66.95%, pre-primary levels at 16.89%, 12.56% for secondary, 2.31% for tertiary, 0.63% university and 0.66% had other form of literacy either adult basic literacy or madras. There was high gender disparity among those who have attained university level of education with males consisting 72.42% compared to 27.58% who were women. The literacy level figures at national, Kwale County and Lunga Lunga Sub-county were as shown on **Error! Reference source not found.**[9].

[8] *Kenya Population and Housing Census 2019: Volume II: Population by County and Sub-County*

[9] *The data shown on the table was extracted from 2019 Kenya population and housing census Volume IV specifically table 2.4*

Table 4-2: Literacy Level Attained in Lunga Lunga Sub-county

	Level of Literacy	Male	Female
National	82.8%	50.06%	49.96%
Kwale County	67.58%	51.92%	48.08%
Lunga Lunga Sub-County	62.92%	52.31 %	47.69%
Pre-Primary level attained in Lunga Lunga Sub-county	16.89%	51.17%	48.83%
Primary level attained in Lunga Lunga Sub-county	66.95%	51.14%	48.86%
Secondary level attained in Lunga Lunga Sub-county	12.56%	57.66%	42.34%
Tertiary College level attained in Lunga LungaSub-county	2.31%	58.66%	41.34%
University College level attained in Lunga Lunga Sub-county	0.63%	72.42%	27.58%
Other form of literacy level attained in Lunga Lunga Sub-county	0.66%	56.66%	43.34%

The existence of such a relatively high literate population (including females) implies the potential availability of human capital (labour force), for effective participation in the construction activities as well as during the operation of the proposed facility.

4.5.3. Community Engagement in Maricuture Activities in Kenya

Currently, mariculture in Kenya can be defined as a small-scale, mainly community-based activity that at this stage contributes little to food security and the creation of employment and wealth. The sector faces several challenges to progress from one characterized by primarily small-scale subsistence activities to one comprising small to medium scale commercial enterprises. However, with good planning, these challenges can be overcome to attain the goal of establishing a private-sector led, commercial mariculture sector. The slow pace of progress of milkfish and prawn farming was found to be a function of the farmers relying on wild milkfish and prawn recruitment into the creeks (Hectch et al 2019). Production volumes from the community-based prawn and fish operations are low and estimated to be <50 tonnes per annum (tpa) and comprised principally (>90%) of milkfish and prawns. Soft-shell crab production is in the region of 1.65 tpa, while hard shell crab fattening production is in the region of 2 tpa. Around 250 kg of Artemia cysts are produced annually. Seaweed production in 2017 amounted to around 47 dry tonnes. Prices for fish, prawns, crabs and Artemia are high and are economically viable. The price of Spinosum seaweed at KES 30/dry kg is low hence the renewed interest in the production of *Kappaphycus alvarezii* (Cottonii). In a finfish and shellfish survey conducted in October 2023, revealed that culture candidates mostly cultured include prawns, milkfish, tilapia, rabbitfish, mud crabs and grey mullet mostly in semi-intensive systems in intertidal ponds (behind the mangroves). The fish species were either cultured together in polyculture or

separately in monoculture systems. Generally, three species were most farmed with milkfish being the most preferred followed by prawns and marine tilapia (Figure 4-9). The farming is conducted by around 66 groups in the five counties along the coast.

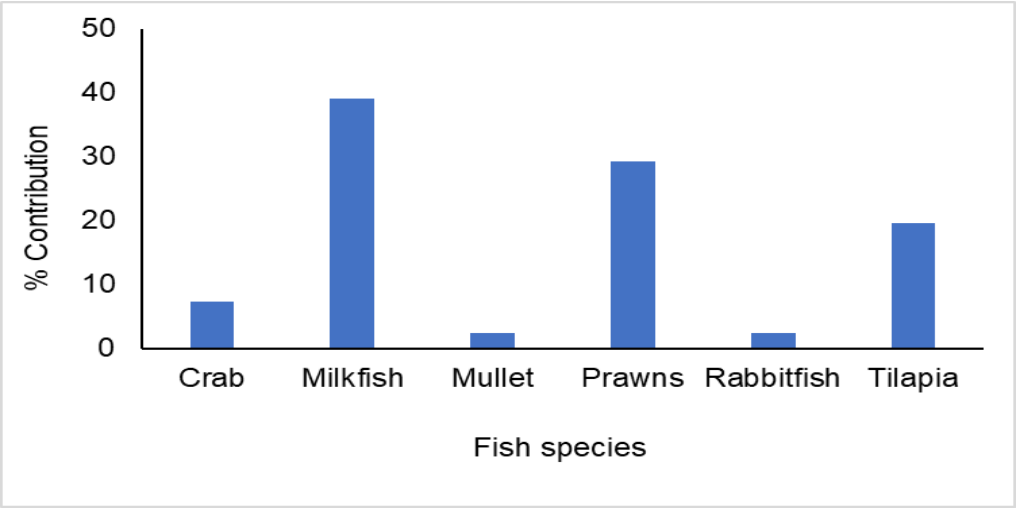


Figure 4-9: Contribution of Species cultured by the groups visited during survey

In the 2023 survey, total of 28 groups were visited as indicated in Figure 4-10. The results of the survey showed that few groups have posted production in the last 12 months. Out of the 14 groups visited in Mombasa County, only 4 groups reported production and they were Madzombani, Brain youth, Amani Jipange and Green marine. In Kwale County, only one (Tsunza mangrove restoration group) out of the five groups visited had harvested in the last 1 year. In addition, the production volumes reported by the groups were generally very low compared to the huge potential that existed in each group. In Mtepeni mariculture ponds for instance, a pond with surface area of 7000m2 which in normal stocking rates of prawns could hold at least 35,000 postlarvae (PL) at a stocking rate of 5 PL/m2, was only stocked with 4000 pieces. In Tsunza integrated mariculture SHG, all their 8 ponds were not stocked. It is also important to note that most of the groups have most of their ponds inactive because of damages caused by extreme high tides that cause erosion of dykes.

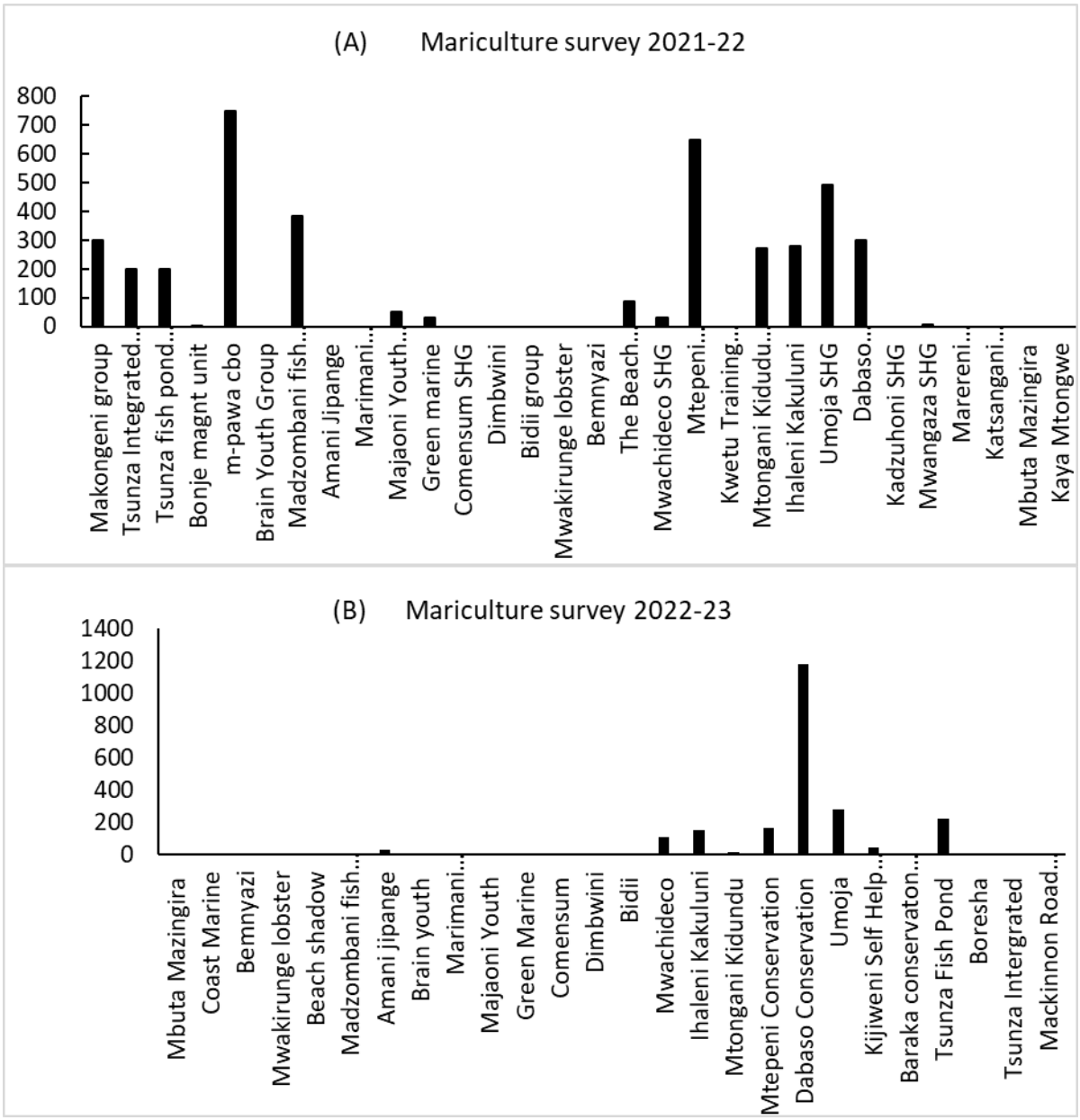


Figure 4-10: Mariculture Production volumes in (A)2021-2022 and B (2022-2023)

Total production for 2021-2022 was 4.030 mt/yr while in this survey 2022-23 it was 2.209mt/yr. This was a significant drop from the previous year. The evidence on the ground showed under-utilisation of the pond infrastructure as characterized by fewer ponds being stocked and very low stocking rates in most actively utilized ponds.

Socio-economically a few groups have benefitted from selling prawns, crabs milkfish and marine tilapia. These groups are located mainly in Kilifi county (Figure 4-10). The groups being Kibokoni, Ihaleni, Mtepeni and Mtongani. Dabaso creek conservation group has so far been the most successful group with their "crab shack restaurant" selling upto 1,200 kg (Figure 4-10) of crabs worth 1,800,000 ksh. The group has managed to employ about 100 youth directly and

another 300 indirectly Otherwise average price for milkfish was 250-300 ksh, tilapia 300 and prawns 1,000 at gate price. Umoja self help group in Kibokoni has been the group that has sold the most amount of prawns. They have produced about 500 kg of finfish and shell fish. However the potential is yet to be fully realized. Total annual seaweed production therefore stands at an estimated 106,439 kgs or just about 106mt/dry seaweed/year

4.5.4. Social Amenities and physical infrastructure

4.5.4.1. Project Area Accessibility

There are limited options regarding the modes of transport to access the proposed project site. Generally Shimoni market is connected to other areas through road network as highlighted in Figure 4-11. The main roads are the main tarmac road from Ukunda to Lunga Lunga branching off at Kidimu to shimoni. The road from Kidimu to shimoni is tarmac as shown in Plate 4-6 and that from shimoni market to the site is cabro finished as indicated in Plate 4-7.The area was also noted to be accessed through light aircrafts especially the helicopter which do not need specialized infrastructure.

Figure 4-11: Map showing Access to the Proposed training and resource centre

Plate 4-6: Tarmac Road Connecting Shimoni Market to Ramisi-Lunga Lunga highway at Kidimu

Plate 4-7: Access Road from Shimoni Market to NAMARET centre with cabro finishing

4.5.4.2. Communication Network

Shimoni market centre and its immediate environs were generally noted to have adequate communication network relative to other areas particularly as one move away from the market area to the interior. Development in communication network in an area has an influence on the level of awareness among the local population. Findings from observations, key informant interview and stakeholder consultation meeting indicated that wireless communication is the main mode of communication in the proposed project area as highlighted in Plate 4-8. The major mobile network coverage for three communication companies Safaricom, Airtel and telecom were reported to receive signals within the project area, but due to the strong Safaricom signal reception, it was reported to be the most popular among the locals. Pay television decoders for Zuku, Azam, Go-TV, DSTV and startimes were noted to be the main signal receivers in the area as per indicated sample in Plate 4-9. The audio media reported were Kaya FM, Bahari FM in addition to the national radio stations such as KBC, Kiss, Nation, Citizen, Radio maisha and Pwani FM among others. The 2019 population and housing census data indicate that about 30.5% of the population in Lunga Lunga sub-county uses mobile phones, and it appears like more men own phones compared to women at 33.5% to 27.7%. Access to communication services particularly to mobile phones is critical for communication, access to mobile internet and also money transfer during training centre component construction. The findings further show that only 7.2% of the population use internet with men accessing at 9.4% and women 5.1% but interesting is that only 2.4% of the population own a computer or a laptop. More men at 3.1% own computers compared to women at 1.7%. This indicates that of the 7.2% who use internet majority could be accessing the internet using the mobile devices which further shows the significance of communication through mobile phones. The available communication channels can be used in the event of need for community awareness and sensitizations requirements.

Plate 4-8: One of The communication masts located on your way to Shimoni Market

Plate 4-9: A pay TV dish for Zuku as one of the Communication Channels

4.5.4.3. The Main Water Sources and Reliability

Residents of Shimoni market rely on shallow wells for water supply however community consultations and key informant interviews indicated that the ground water source has high salt content as was depicted from the water quality report conducted on the proposed shallow well to supply NAMARET centre as indicated in Annex IX. The locals reported using the water majorly for cleaning and cooking purposes. Community consultation findings indicated that most residents buy water from vendors who source from Kidimu area at Kshs. 50 per 20 litre container. During field survey, the village administrator indicated that there are plans by first the county government and Kenya ports authority under the proposed Shimoni port project to supply the market with water from Kidimu area. Kidimu area was reported to have potable ground water with high borehole yields that can meet the demand in the area. The other plan is an ongoing project where the county government is sourcing water from Kiwambale area to shimoni. The first phase of the project has connected the water up to Mukuyuni which is about 3-4km from shimoni as indicated in Plate 4-11.

Plate 4-10: Water Pump to storage from a shallow well at Shimoni Market.

Plate 4-11: One of the Storage at Mukuyini area for water supplied from Kiwambale

The information on sources of water seems to be slightly different compared to 2019 housing and population census for Lunga Lunga Sub-county as indicated in Table 4-3.

Table 4-3: Sources of Drinking Water in Lunga Lunga Sub-county

Sources of Drinking Water	Percentage (%)
Surface Water	46.90
Ground Water	42.30
Rain water	3.90
Tapped water/Stand Pipes	2.5
Water Vendors	1.6

The proposed NAMARET centre facilities shall be supplied by ground water shallow well. Test pumping results indicated that the shallow well has a capacity to yield 40m^3 per 8 hours, translating to about 5m^3 per hour. The shallow well is currently being used in KEMFRI administrative office that is the operation building on the plot. However, water quality tests results showed that the water has high salt content as highlighted in Annex IX. Reverse osmosis plant has been proposed under the sub-project to clean the water for supply to the buildings and the hatchery. The total water demand for the proposed facilities under NAMARET is about 20m^3 per day. In spite of the effort in investment it is anticipated that the constructed buildings shall be supplied with water by KWAWASCO in the future whether under Kiwambale-Shimoni water project or Kidimu Shimoni water project under KPA. The design of the project has considered a water storage capacity of 20m^3 to supply the proposed NAMARET centre components. The storage is considered sufficient given a water demand of 20m^3 per day for the proposed facilities under the sub-project. There are further proposals to harvest rain water to supplement the existing supply given the availability of rainfalls throughout the year as was noted in the area and the capacity of rain water harvesting tank shall be 10m^3. A separate storage tank of 20m^3 has

been proposed in the design in Annex I to serve the water hydrants on the building for fire emergency purposes.

4.5.4.4. Sanitation Coverage

Human waste management is critical for the proposed training centre users and the workers who shall be working at the construction site. Pit latrine is generally the main means of human waste management noted within the proposed project area as shown in Plate 4-12 and Plate 4-13. The findings were found to be consistent with 2019 population and Housing Census data as indicated in Table 1-1Table 4-4.

Table 4-4: Human Waste Management in Lunga Lunga Sub-county

Means of Human Waste Disposal	Percentage (%)
Using a form of pit latrine	56.10
Lacking toilet (Use of Bush)	40.00
Septic Tank	3.0
Sewerage	0.5

The existing KMFRI administration office block was observed to have water closet type of toilets connected to aseptic tank as indicated in Plate 4-14 and Plate 4-15. According to KWAWASCO key informant consulted, the entire of Shimoni market does not have a sewer system and relies on pit latrines and septic tanks. However, the officer observed that there are proposals for designing of a sewerage system to serve the proposed Shimoni port. The proposed design of NAMARET centre and the associated facilities were informed by the existing information. The proposed design for the building proposes use of a Moving Bed Biofilm Reactor (MBBR) for treatment of waste water from the centre. The choice of MBBR was informed by the need to recycle the waste water for reuse for landscaping and the high-water table in the area coupled with the community reliance on ground water shallow wells. The MMBR also requires less space, cost effective, provides good effluent water quality, has less energy consumption, easy to operate, has high resistance to corrosion, influent heat, P.H and grease leaks compared to other waste water treatment systems.

Plate 4-12; Pit latrine at Fisheries office Shimoni

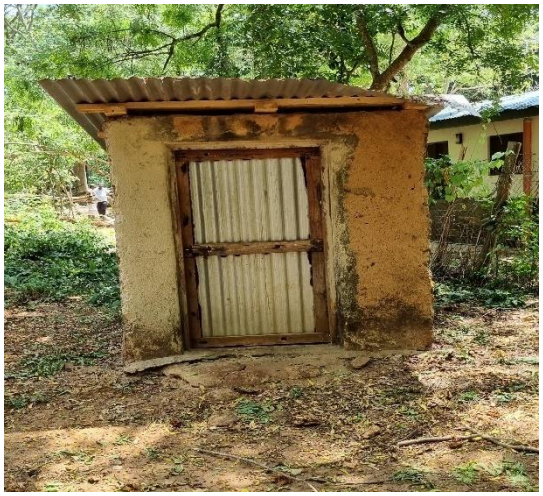


Plate 4-13: A pit Latrine at Shimoni Primary

Plate 4-14: Water Closet Type of Toilet at KMFRI Administration Block

Plate 4-15: The septic Tank Serving the Administration blockat KMFRI Shimoni NAMARET site

4.5.4.5. Main Power supply

The businesses and households within Shimoni market are connected to the national power grid through the Kenya Power and Lighting Company (KPLC) as highlighted in Plate 4-16. The main street at Shimoni market was also noted to be lit by solar streetlights as highlighted in Plate 4-17. Similarly the proposed NAMARET centre is connected to the national grid through KPLC and the proposed to be constructed shall be connected to the same electricity grid system. However, it was reported by key informants on the need to have alternative source of power due to unreliability of electric supply. It was reported that sometimes the area can be in darkness for over a day. There were suggestions among the design team to include solar panels and Generator as alternative sources of power in the event of a black out. This is necessitated by the high dependence of hatcheries process to power and to mitigate against any eventualities. The proposed design of the training centre has therefore considered power saving measures by

capitalizing on natural lighting, use of renewable energy-solar and use of energy saving bulbs LED.

Plate 4-16: Shimoni Market connected to National Power Grid

Plate 4-17: The market Centre is lit by Solar street lights

4.5.5. Land Use and Ownership

4.5.5.1. Land use Pattern

According to Lunga Lunga sub-county physical planning officer, the spatial plan for the general county has been prepared and is awaiting county Assembly ratification. The proposed land zoning as per the plan for Shimoni area was reported to be as indicated in Table 4-5.

Table 4-5: The existing and proposed main Land Use within Shimoni Area

No.	LAND USE PROPOSALS	MAIN LAND USE
1.	Residential spaces	Existing high density, proposed medium density, existing low density and government staff housing.
2.	Agricultural land	This is land set aside for household farming areas
3.	Educational spaces	Existing Kenya Marine institute, secondary school, primary school and proposed nursery school.
4.	Recreational spaces	proposed public parks and recreational park spaces
5.	public purpose	The public spaces include existing; Kenya Navy, Kenya Wildlife Service, Kenya Marine Research Institute, Fisheries Department, Kenya Revenue Authority and Kenya Ports Authority.
6.	Commercial purpose	proposed commercial centre and open market
7.	transportation	Proposed site for bus park, parking and a yard
8.	Industrial development	Proposed light industries and petrol station.

Shimoni area is relatively new and is a fast growing area being a tourist passage corridor to Marine Park at Kisite-Mpunguni, a business hub and a proposed fishing port site. The area is strategically located along Wasini channel which is one of the accesses to the proposed port area owing to its deep waters with the ability to connect to other areas at any time. The general Shimoni area was initially a coastal forested area but due to faster settlement of the people and unplanned growth of the area, there was a necessity for proper planning. Land use information is significant in providing a view of the main economic activities within the proposed project area and it also provides an indication of whether the proposed project activities are in tandem with the general land use. The proposed training centre shall be located on land set aside for development of a marine hatchery research centre under KMFRI according to the area physical plan as indicated in Figure 4-12 and Figure 4-13. The Proposed National Mariculture Resource and Training centre shall be located under zone 2_1.

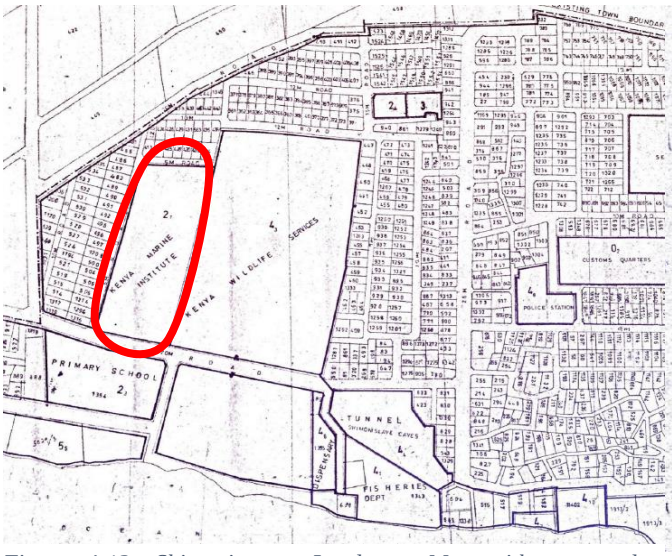


Figure 4-12: Shimoni area Land use Map with proposed NAMARET Site as marked in the image

Figure 4-13: Highlighted proposed Land use Proposals for Shimoni area

4.5.5.2. Land Tenure Status

The main land tenure within the proposed project area was reported to be private individual land ownership. The information on land ownership in Shimoni was noted to be consistent with 2019 census data for Lunga Lunga sub-county, which showed that 89.3% of the households live in owned houses with only 10.7% living in rented houses. And even those who live in rented houses 92% are owned by individuals. The census data further indicated that for those owning the houses 97.1% constructed while 1.6% inherited and 1.3% purchased the dwelling, the low percentage of inherited dwelling is also a pointer of how new the area is. The proposed implementation of NAMARET centre shall be located on public land owned by KMFRI as indicated in Annex II. The training centre is located on a land parcel that is allotted for the development of a National Mariculture Research and Training Centre (NAMARET). NAMARET centre shall be an integrated facility consisting of several components including; a

marine hatchery, a laboratory block, training centre with auditorium, an administration block, an accommodation block and resource centre. The proposed marine research centre shall be constructed on a land measuring about 6 Ha. The general area around Shimoni has been surveyed and the proposed land for the sub-project is also surveyed and issued with title as indicated in Annex II. Land in Kenya is generally classified as public, private or community land. Community land is held by the County Government in trust for the people resident in the County but administered by the National Land Commission. However, the land for the proposed structure is a public land held by KMFRI.

4.5.6. Livelihood and Economic Activities

Livelihood comprises of the capabilities, assets and activities required for a means of a living[10]. Through observations, key informant interviews and community stakeholders meeting discussions, it was apparent that households in the proposed project area depend on a diverse range of sources of livelihood. These were basically categorized into; fisheries, employment, trade and commerce, livestock production and crop farming as discussed in this subsection.

4.5.6.1. Fisheries Economic Activities

The fishery sector is one of the most important economic activities at the proposed Shimoni project area. The Shimoni – Vanga area (Figure 4-14) in the south coast of Kenya is endowed with abundant and diverse resources that are of great socio-economic significance to the resident communities and the national economy. The natural resources which are predominantly exploited from this area include fisheries and mangrove harvesting. Ecotourism has also emerged as one of the important economic activity especially in the Kisite-Mpunguti Marine Park and Reserve. Economic activities in the area include artisanal fishing, recreation, and tourism. The local communities living in this area rely heavily on marine resources for their food and livelihoods. The dominant fishery at the south coast is artisanal, concentrated within the coral reefs and lagoons extending to the outer reef edge because the local fishermen lack the capacity in terms of suitable fishing vessels and gears to venture offshore to the open ocean.

[10]UNISDR Guidance note on Recovery: Livelihood.
https://www.unisdr.org/files/16771_16771guidancenoteonrecoveryliveliho.pdf

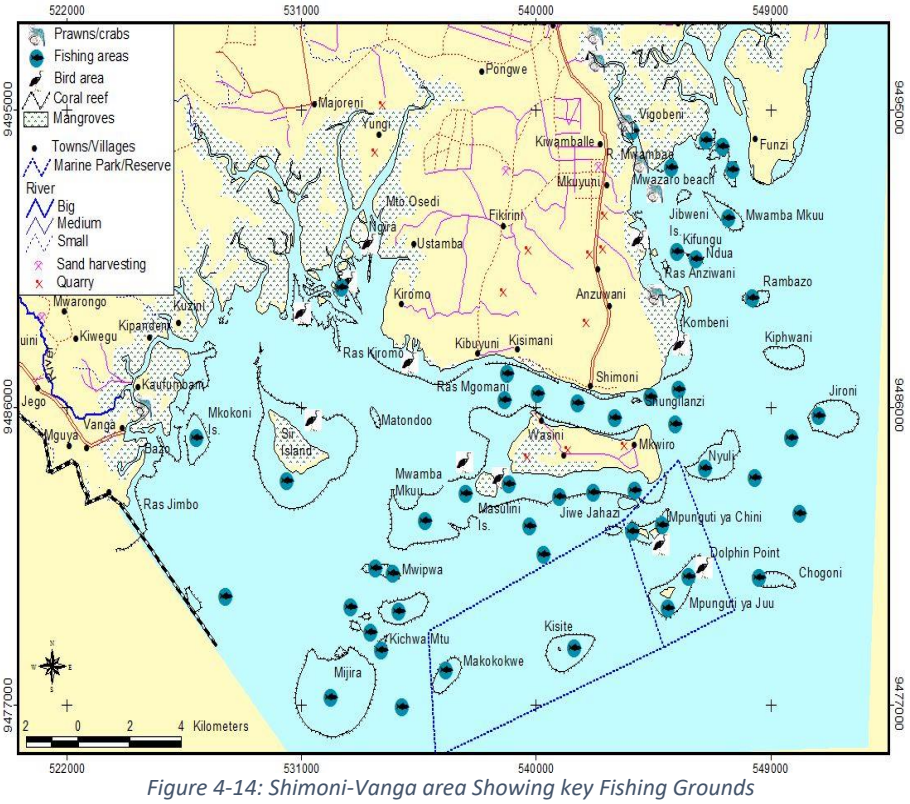


Figure 4-14: Shimoni-Vanga area Showing key Fishing Grounds

There are 12 types of fishing gears used in the area, with the most prevalent being handlines (40.7%), basket traps (22.5%), ring nets (10.6%) and beach seines (8.8%). Other gears used in the area include gillnets of various mesh (3.4%), handlines (4.8%), scoop nets (3.8%), and spear guns (1.5%). Shark nets, harpoons, troll lines each make up less than 1% of the total number of gears used in the study area. Canoes are the dominant fishing vessels used by fishers in the Shimoni-Vanga seascape, making up over 60% of vessels. Fishing activities and gear use varies seasonally. The contribution of gear types to landed catches also varies by gear type. Basket traps and ringnets provide the bulk of landings in the seascape (Figure 2).

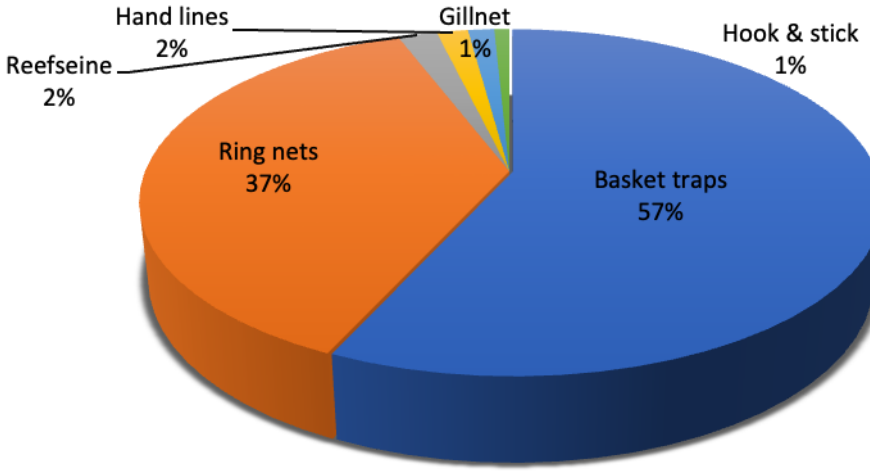


Figure 2. Relative abundance of fish caught by gear type during the 2017-2023 catch assessment survey period. (Source: KMFRI data)

Eight key fisheries occur in the Shimoni-Vanga seascape: Reef demersals (e.g. rabbitfishes, wrasses, rock cod, parrotfishes, eels); Pelagics (e.g. barracuda, mullets, kingfishes, tuna, sailfish); Crustaceans (shrimps, lobsters and crabs); Cephalopods (octopus, squids, cuttlefishes); Sea cucumbers, marine aquarium; marine shells and sea weeds. The demersal reef fishery is dominant in the Shimoni-Vanga seascape, with the shoemaker spinefoot, *Siganus sutor* and the parrotfish *Leptoscarus vaigiensis* being among the most harvested species. Over 250 fish species belonging to 43 families are harvested in artisanal fishing gears during. Four fish families dominate sixty percent of the catch, namely Lethrinidae (29%), Siganidae (37%), Scaridae (9%) and Lutjanidae (8%). The dominant species during the 2016 -2023 included *Siganus sutor* (37%), *Sphyraena obtusata* (8%), *Rastrelliger kanagurta* (6%), *Sphyraena flavicauda* (4%) and *Leptoscarus vaigiensis* (4%) representing of total sampled fish, respectively (Figure 3).

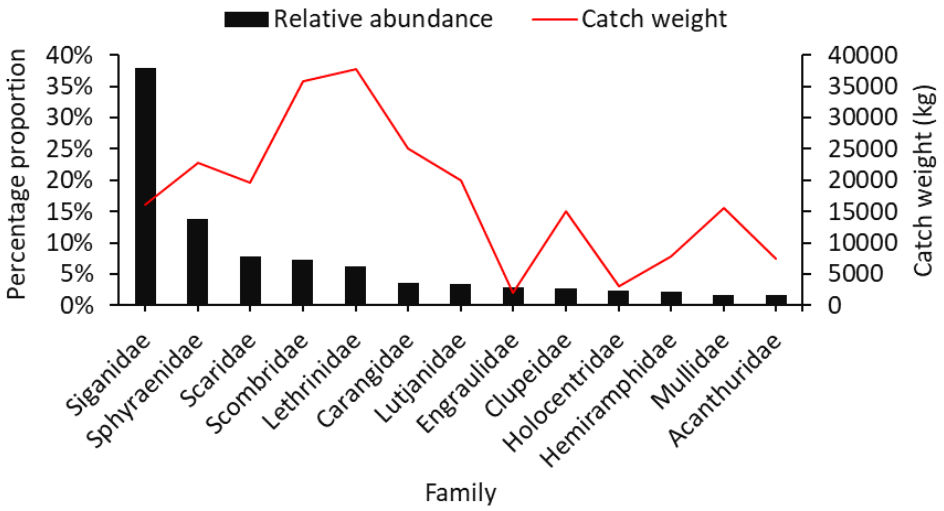


Figure 3: Relative abundance (number) and catch weight (kg) of the priority fish landed during the 2016 – 2023 catch assessment survey period by family (Source: KMFRI data)

The most preferred fishing grounds are located within the Mpunguti Reserve. A decline of artisanal fish catches, use of destructive fishing gears resulting in habitat modification and degradation, and proliferation of sea urchins are among the key issues of concern. Fluctuations in catch volume and composition are occasioned by differences on gear-vessel combinations, seasonal variations, fishing-ground specific factors and fishing effort employed. The use of illegal gears such as spearguns, sticks, metal bars and scoopnets contribute towards unsustainable exploitation. Additionally, a decrease in the mean sizes of key species such as *S. sutor and L.variegatus* indicates declining fisheries and increased use of unregulated fishing practices. Underlying causes of the situation, as is generally the case in the Western Indian Ocean region,

are associated with population pressure along the coastal area, poverty, unemployment, insufficient knowledge regarding the status of the fisheries and relevant environmental issues, weak enforcement of fisheries regulations and lack of alternative economic opportunities.

4.5.6.2. Household Employment Levels

There are many sources of either formal or informal employment within the project area where the local people derive their livelihood. Private enterprises and public institutions provide employment opportunities to the local people. The casual labour is usually in farms, construction sites, as motorbike riders and working as vendors. The public institutions within the project site which is Shimoni include KWS, Shimoni primary school, Kenya revenue Authority, KMFRI, Kenya fisheries services, Kenya Ports Authority, health centre, Kenya navy and the offices for interior and coordination of national government. The proposed construction of a NAMARET centre is anticipated to add to temporal during construction and permanent employment of the locals at operation phase of the sub-project. The 2019 population and housing census data for Kwale County population indicated that about 48.38% of the population in Lunga LungaSub-County was employed while 4.66% were unemployed and seeking for employment.

The data further shows that of the employed, 53.63% were women whereas 46.36% were men. The findings further showed that about 58.19% of the unemployed in the sub-county were men and 41.81% were women. This is the population that can potentially supply the labour market. The economically inactive population was about 46.96% which was noted to be higher than employed population and of whom men were 50.21% and women were about 49.79%. The economically inactive population indicates that most men in Lunga Lunga sub-county were economically inactive hence dependent on someone in away compared to women. This indicates that most men could bemore idle in the area or dependent so much on fishing activity which may not be perceived as a form of employment. The proposed project is anticipated to provide temporal employment to various groups of people at construction phase.

4.5.6.3. Tourism and Hospitality

The most outstanding feature of the Shimoni seascape, is the pristine and well-developed coral barrier reef that extends all the way from Shimoni in the South to Wasini, without significant break, The coral reefs referred to as the rainforests of the sea, are one of the most fascinating ecosystems, sheltering nearly one million types of marine life. The Shimoni coral gardens, has wheeling seabirds and sparklingly clear waters, which promise an underwater world of unbelievable color and vibrancy and thereby attracting a lot of visitors. The reef provides food and shelter for an entire marine community. Some of the marine biodiversity in the area are: the shifting rainbow of small fish, octopus and clams, butterfly fish, angel fish and scorpion fish shimmer, hunting rays, turtles, sea cucumbers, brittle stars and numerous species of mollusk also feed on algae of these warm coastal waters. Kisite-Mpunguti Marine protected area features 252 species of reef fish, about 56 genera of hard corals, 2 common species of sea grass and numerous

sponges. The park is famous for its population of turtles: Green and Hawksbill turtles normally spotted in their hang out. The site is also a sanctuary to over 200 dolphins (spinner, humpback and bottle-nosed), which can be encountered as single individuals or mostly in pods of 2-25 individuals breaking above the waves.

Due to its warm shallow waters, exceptional clarity, pristine coral and extraordinary breadth of marine life, the park and the reserve offer an excellent dive sites for beginners and professionals visiting the area. The warm clear waters, spectacular soft corals and kaleidoscopic marine life make this park one of the finest snorkeling sites in East Africa coast. The most popular areas lying in the main coral garden towards the outer edge of the Kisite anchorage area are clearly marked with mooring buoys.

Shimoni caves are also reputed to extend 5 km inland connecting to the 3 sisters caves. These caves served for centuries as 'Kayas' or sacred sites of worship and sanctuary for the local community. Later in the 18th and 19th century, the caves are also believed to have served as the holding areas for the thousands of captured slaves who were in transit to the infamous Arabian slave markets of Zanzibar. The caves, which are run as a community project, are an attraction to tourists with a small entrance fee is payable at the gate.

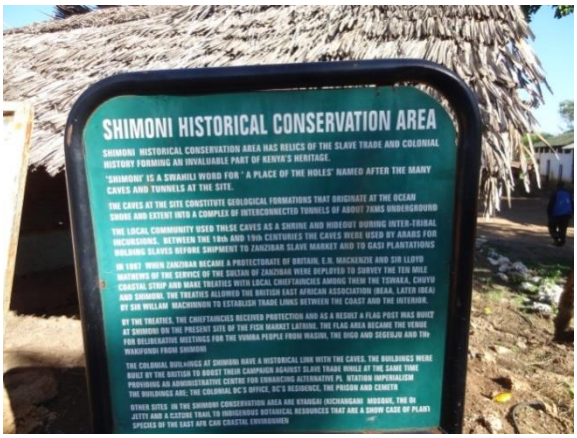
4A: Shimoni coral reefs and varied species of fish that attract tourists

4B: Shimoni Dolphins at Kisite – Mpunguti Marine park site.

4C: Wasini islands for tourists' accommodation. 3 kms from the site

4D: Refurbished KeFS-jetty for loading and offloading for tourist visits

5A-Right side from the frontage: historic sites such as Colonial DC residence built by the Imperial British East Africa Company in the south coast in 1885



5B-Conservation areas and sites for eco-tourism and touristic facilities

5C-Touristic facilities such as accommodation sites for eco-tourism and Sign at Shimoni jetty on standards and protocols to prevent harm or disruption to the natural processes for marine wildlife

5D- Other heritage issues of concern are (clockwise): Kenya's first colonial prison in Shimoni, Shimoni Slave Caves Office, Shimoni Post Office, and Shimoni rich heritage and culture expressed through wares

4.5.6.4. Trade and Commerce

The main occupation among most residents of Shimoniare small-scale business which account for 45% of the occupations in the project area. The small-scale businesses consist of sale of food stuffs particularly fish. Occupational diversification was also evident in the project area with people engaging in more than one economic activity. The diversification of economic activities is aimed at bringing household economic stability on income generation. It was established that alternative livelihoods were undertaken by spouses and children in the family and they included fishing (26%), small scale business (22%), subsistence farming (22%), casual labor (13%), employment (13%), and tourism (4%). The diversification of economic activities in the project area indicates the residents of Shimoni are striving to maximize their livelihoods and incomes from various livelihood options. Mariculture will therefore come in as an alternative livelihood for the local communities.

Table 4.3.4-6: Distribution of Occupations in the Project Area

Occupation	Proportion of respondents (%)
Fishing	10
Small scale business	45
Formal employment	15
Casual labour	20
Tourism industry	10
Total	100

The ocean resource is also the backbone of the Shimoni economy and most of the socio-economic activities in the area depend on the sea, either directly or indirectly. Fishing is practiced by both men and women; men use boats and gear to do their fishing, while women are mostly foot fishers who walk in shallow waters during low tide collecting octopus and other marine fisheries products.

Most economic assets owned were mostly fishing gear: the fish trap ("malema") and most commonly owned fishing vessel was the canoe which is locally known as "dau", 27% of the locals reported either owning a bicycle or a motor cycle, while only 5% of the locals reported that they owned a vehicle. 68% of the households reported to own chairs/sofas in their houses, while 90% reported to have beds in their houses. Televisions were owned by 40% of the respondents, while Radios were owned by 55% of the respondents;

4.5.6.5. Livestock Production

Livestock keeping is one of the economic activities practiced by households within Lunga Lunga Sub-County. 2019 population and housing census data indicates that in the general sub-county,households keep cattle for both dairy and beef, sheep for beef, goats for meat and dairy, poultry both layers and indigenous. The households keeping various types of livestock within the sub-county was as indicated in Table 4-7below. Based on the information obtained for Lunga Lunga sub-county, it'sapparent that most households keep indigenous chicken at 49.85% followed by goats at 41.35% and the least kept are beef cattle rearing.

Table 4-7: Levels of Household Participation in Livestock Rearing

Type of Livestock	Percentage (%)
Indigenous Cattle	37.32
Dairy Cow	1.67
Beef Cattle	0.66
Goats	41.35
Sheep	11.34
Indigenous chicken	49.85

A larger percentage of free range livestock as indicated in Plate 4-18 and Plate 4-19were noted during field survey within proposed Shimoni project area at the time of this study. Selling of livestock and livestock products is one of the key sources of household incomeas was reported during stakeholder consultations.

Plate 4-18: Indigenous Cattle breed grazing along Kidimu-Shimoni road

Plate 4-19: Goats Grazing along the Street at Shimoni

4.5.6.6. Crop Farming

Crop farming is one of the main economic activities within the proposed project area mainly as a source of household food security and household income. The agricultural sector plays a critical role as a source of household sustenance and income in Shimoni and the larger Lunga Lunga Sub-county particularly in Pongwe Kidimu ward. According to 2019 population and housing census data for Lunga Lunga which gives an impression of the same at the project area (Shimoni), crop farming is practiced by 73.63% of the households in the area together with other farming activities as indicated in Table 4-8.

Table 4-8: Households engaged in Farming Activities in Lunga Lunga Sub-county

Type of Agricultural Activities	Percentage (%) of Households practicing
Households Practicing Farming	78.41
Crop production	73.63
Rearing Livestock	52.41
Practicing Aquaculture	0.25
Practicing Fishing	5.03
Practicing Irrigation	1.99

Key informant interview indicating that crop farming is mainly at subsistence level and the information was noted to be consistent with sub-county data where 96.24% of households engaged in farming are subsistence and only 1.72% practice commercial farming. Maize, bananas and horticultural crops being the main crops produced in the area. Some of the products including green maize, kales, spinach, cassava, tomatoes, bananas, and fruits which were noted

on the market as indicated in Plate 4-20 and Plate 4-21. It was noted that both adult women and men were the ones doing most of the selling of the produce.

Plate 4-20: A grocery Kiosk at Shimoni Market

Plate 4-21: Green gram farm at Shimoni

4.5.7. Ecotourism in Shimoni area

The proposed Shimoni NAMARET Centre is situated in a large, sparsely populated area on the south coast of Kenya, near to Wasini Island by way of the Shimoni-Wasini canal. Shimoni area has a lot tourist attractions such as the prehistoric Shimoni caves (well beyond 800m from the proposed project site), Wasini Island (3 km from the proposed project site), Kisite Marine Park & Reserve (approximately 3 km from the proposed project site), and the coastline with its mangrove ecosystems and remnants of the Eastern African Coastal forest system. Plate photos (Plate 1.2) illustrate the specifics of the KMFRI site's near surroundings. The Shimoni caves take you through the caves' geologic beginnings and human history; you can see the rusting iron rings where slaves were bound to the cave walls. In addition, you have wonderful up-close views of the local bat population. The Shimoni Community Slave Cave Committee utilizes the caves for the benefit of their respective local communities. The revenues from the tourists' visits to the caves are used to pay for secondary school scholarships, and medicines for the local dispensary. The Community has also capitalized on the forest in the area for economic benefits by guiding tourists through biodiversity hotspots in Shimoni area, which are home to what is possibly Kenya's second largest population of Angolan black and white colobus monkeys, which no one else gets to view.

Importantly, there is Shimoni's seascape, view of the sea, or view of an expanse of the sea that has been broadened to include the entire coastal environment and nearby open water areas in the area, as well as vistas from land to sea, sea to land, and along the coast. The seascape improvement in Shimoni was sponsored by GEF and is mostly protected by Beach Management Units under Community Conserved Areas (BMUs). These locations attract tourists and increase

revenue for community. The community is aiming to improve these eco-tourism goods by enhancing their capacity to attract more tourists. In addition, they protect Locally Managed Marine Areas (LMMAs) - the Shimoni-Vanga Co-management Area, which is one of the twenty-one seascapes in the Eastern African Marine Ecoregion (EAME) with a high level of biodiversity that require special consideration. The seascape in Shimoni is also home to indigenous coastal communities with deep cultural ties to the ocean and coastal marine resources. However, the seascape is threatened by varying degrees of biodiversity loss and land degradation, which endanger livelihoods and promote conflict over the use of diminishing resources.

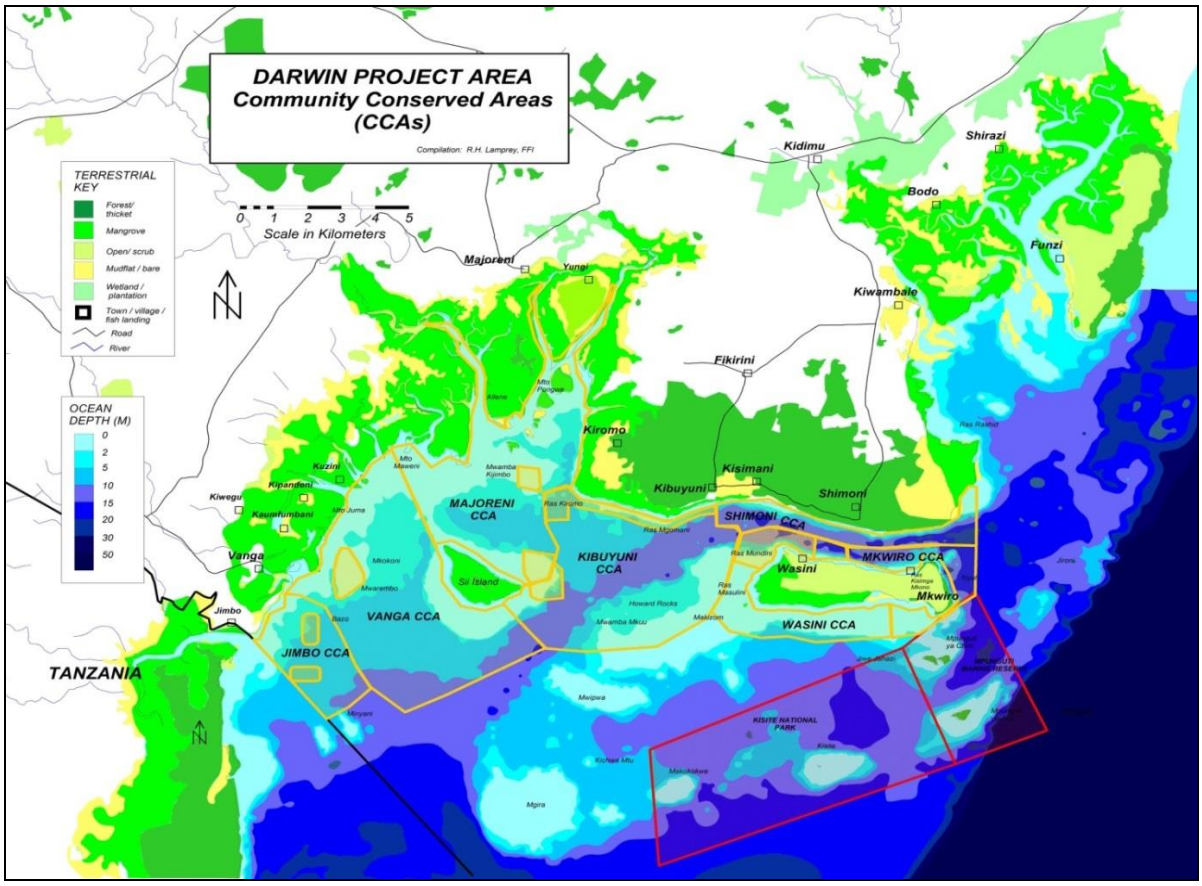
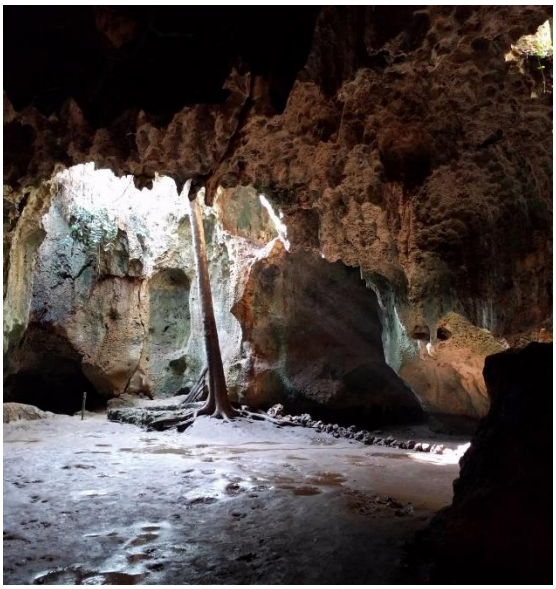


Figure 1.2: Map showing KMFRI Site location at Shimoni Town in relation to Community Conservation Areas (From Darwinian Project Initiative, SDF © 2008). Plot site is shown in call-out mark and sits on terrestrial forest zone. (Based on consultations with KFS, KWS, WWF and Museums during field works on which trees to be cut and which ones deserve conservation so that the guidelines can be complied by contractor and monitored by supervision consultant).

3A: Shimoni KWS facility for conservation of Kisite-Mpunguti MPA and tourism development

3B: Part of Kaya forest that enables Eco-tourism attractions.

3D: Private ecotourism players (top) and Local homesteads (bottom) co-exist



3C: Shimoni Caves for tourist attraction.

4.5.8. Cultural Heritage and Properties.

The project area,is located (Changai Village) in Pongwe Kidimo Location of Kwale County. Kwale County has four sub-counties namely: Msambweni, Kwale, Lunga Lunga and Kinango which make up the four political unit/ constituencies: Msambweni, Matuga, Lunga Lunga and Kinango and six administrative divisions namely: Msambweni, Matuga, Kubo, Samburu, Kinango and Shimba hills. It is further subdivided into 37 locations. Among this is Pongwe Kidimo Location in which is the project site. It has four sub-locations namely: Wasini/Mkwiro and Shimoni(this two have been gazette to form a location, Mzizima and Majoreni. Shimoni sub location covers an area of 20Km^2 with current population estimation projection being 7400 people. The area is relatively diverse in ethnic groups, with majority (80.9%) of the inhabitants being natives of the Digo ethnic group (47.6%) followed by Shirazi and Wakifundi (33.3%). The other ethnic groups that were present in the project area include the Pokomo (4.8%), Taita (4.8%), Kikuyu (4.8%) and Luo (4.8%). The Digo are small scale farmers and also do small scale livestock rearing mainly for subsistence. The Shirazi and Wakifundi are mainly ethnic minorities and do small fishing and small businesses. The other resident communities from other parts of the country also engage in small business, subsistence crop and livestock farming and in both formal and informal employment. Cultural practices shaped through religious beliefs are still operational where women are expected to dress in full body covering attire and at times women are not allowed to directly engage with men in social and public activities. The predominant religion is Islam (60% and Christianity (39%). Such cultural factors may hinder women from participating as unskilled laborers. In spite of this, the construction project through the contractor shall be required to take deliberate measures for any female workers and the youth who will be willing to work at the construction site. Stakeholder consultation and key informant

interviews indicated that there were no any known archeological artifacts or properties at the proposed project site.

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4.5.9. Child Labour Prevalence in the area

Key informant interview findings indicated that cases of child labour in Kwale are difficult to detect unless the complaint is coming directly from a family member or from schools. According to County Director State Department of labour, the cases usually occur in households where teenagers are employed as herdsmen, and it's not easy to tell whether they are still young, belong to the family or are employed. The other area is where teenagers are hired and involved in hawking of curio items at the beach or in fishing activities during high fishing seasons. Due to the high poverty levels among the locals, some offer their children for house help work to relatives who live in urban areas and it's not easy to track the cases. In spite of the observations, the cases are rarely reported and there is hardly any data on such incidences as it is considered part of family life and setup. The officer observed that residents of Shimoni area could be beneficiaries of child labour from the rural forks who work as house helps.

The director Pride of Shimoni girls also observed that child labour is rampant in nearby quarries at Kichakamkwaju, Changai and Mwazaro villages. This is an indication that the project contractor shall be required to assess the sources of material so that the quarries supplying the project to commit not to allow any children to work in their sites. Other forms of child labour reported was in the form of children working as crew members on snorkeling boats, taking tourist to coral sites at Kite Mpunguti area

4.5.10. Prevalence of HIV and AIDS

HIV prevalence for Kwale County is at 3.0% while Lunga Lunga Sub-County is estimated to be at 2.3% with an estimated population of 198,423people. According to HIV estimates 2020 data, the prevalence is higher among women at 3.0% compared to men at 1.6%. In spite of the figures, the proposed construction of Shimoni NAMARET Resource Training centre is not anticipated to significantly contribute to the cases of HIV in the area. Being a semi-urban area, its anticipated that awareness levels are high and that most of the workers on site shall be from the neighborhoods. In terms of treatment, the locals are heavily reliant on one dispensary that was established by the government although there are also three other clinics that are privately operated. The dispensary is managed by one public health officer, two nurses, one laboratory technician and two HIV and AIDS technicians. The dispensary offers outpatient services only where critical cases are referred to Msambweni or Lunga Lunga sub-county hospitals. Results from the dispensary indicate that the most prevalent ailment in the area were, upper tract respiratory chest infections, urinary tract infections, malaria, skin infections and hypertension among those over five years of age. Other diseases mentioned during the survey were, asthma, tetanus, malnutrition, flu, swelling of the body parts, HIV &AIDs, anemia, bilharzia and overweight among the adults. The HIV/AIDS Prevention Act requires provision of basic information and instruction on HIV and AIDs prevention and control to; employees of private

and informal sectors and therefore the measures will be put in place to require contractor to provide this information.

4.5.11. Gender Based Violence (GBV) Prevalence

According to the director, Pride of Shimoni girls, a CBO championing gender rights in the area, GBV cases are high around Shimoni area, a trend generally consistent within Kwale County. The main forms of GBV reported were early marriage, sex exploitation of children, sex tourism, child neglect, divorce cases, violence against spouses and violence against children among others. The main cause reported were economic status, neglect and drug use within the area. According to Kwale county director state department for gender, cases of GBV within Lunga LungaSub County are slightly higher than those reported consistent with other parts of the county. The most reported cases were domestic violence followed by teenage pregnancies, early marriage, defilement and rape respectively. Though cases of violence affect all genders, men rarely come forward to discuss the issues openly due to cultural barriers. However, there is need during project implementation to provide forums through community awareness and sensitization meetings for the community openly discuss the issue and how to get assistance.

The officer further observed that most local people prefer resolving GBV issues at community level. Cases involving defilement by family members are rarely reported. She also noted that it's challenging to collect GBV data which is reported at multiple points including at school, police, at hospitals and at the chief's office yet the data collection process is hitherto not streamlined. Double accounting in some cases are reported where reporting is done at the hospital and the police station. And in some cases it's not reported anywhere. Culturally issues of GBV such as sexual harassment cannot be disclosed and discussed in the open and women are never present in such forums. It was also reported that sex exploitation of children occur due to luring by provision of food benefits, sanitary towels, uniform or money by the perpetrators as was reported by the director pride of Shimoni girls. And due to anticipated cash flow in the area owing to project implementation and operation, there will be need for sensitization and awareness among the project stakeholders. Cases of sex tourism among children was reported however most of the cases occur outside the area at Ukunda where they engage in commercial sex for monetary purposes. This should act as an indicator of what could occur during operation of NAMARET centre by the students or visiting scientists, and the need to have a mitigation plan in place.

During project implementation, the contractor workers will be required to sign a code of conduct with zero tolerance to GBV and sexual harassment at the work place or in the community. The contractor shall assess all activities that may trigger cases of GBV, SEA and SH and prepare a risk management plan before the commencement of the assignment. The community will be sensitized to form grievance redress committees with aliasing person to the project in order to address promptly any arising cases.

4.5.12. Wayleave Acquisition for NAMARET Hatchery Pipeline

This hatchery will feature several tanks designed for breeding diverse species of fish in a closed circulatory system. In this innovative system, water will be continuously recirculated for an estimated period of 5 months, after which, it will be responsibly discharged back into the ocean through a specialized pipeline. A critical component of the NAMARET Centre's operational framework involves the sourcing of seawater from the ocean as demonstrated in *Annex X - Topographical survey map for the sea water intake*. This necessitates the establishment of a wayleave - a legal right of way that permits the construction of infrastructure on another's land. In this context, the wayleave will facilitate the installation of a pipeline to draw seawater necessary for the hatchery's operation.

The process of acquiring this wayleave adheres to the KEMFSED Resettlement Policy Framework and land easement regulations prevalent in Kenya. In a mutually beneficial arrangement, the Shimoni Primary School has consented to provide the land required for the sea water intake pipeline *Annex XI–Wayleave Negotiation Minutes*. This agreement is a quintessential example of a land easement, where a property owner grants rights to use their property for a specific purpose.

4.5.12.1. Wayleave Acquisition and Land Easement Framework in Kenya

Easement in Kenya are governed by Land Act, 2012 and the Land Registration Act 2012. These acts form the cornerstone of the legal framework for the creation, registration, transfer, and termination of easements. Easements are primarily classified into two categories: positive and negative. Positive easements grant rights to the grantee, allowing them to engage in specific activities on the grantor's land, such as laying pipes or accessing a road. Conversely, negative easements restrict the grantor from undertaking certain actions on their own land that might adversely affect the adjacent land owned by the grantee, like constructing buildings that obstruct light or views. The establishment of easements can occur in several ways: through express written grants, implicitly from established land usage, by necessity, or via long-term customary usage known as prescriptive easements. Typically, these are formalized in a legal document, such as a deed. In Kenya, registering an easement against the land title is a critical step to ensure its enforceability against third parties. This registration process entails submitting the necessary documents to the appropriate land registry. Easements can be indefinite or for a fixed duration, and they are attached to the land rather than to an individual, meaning they generally transfer with the land unless specified otherwise. The responsibilities and rights associated with easements are clear-cut. The grantee is obliged to use the easement in a way that minimizes disruption to the grantor, and they usually bear the responsibility for maintaining the easement area, unless an alternate arrangement has been agreed upon. Easements may be terminated by mutual agreement, if they are no longer necessary, or if the properties involved come under the ownership of a single individual. In situations where easements are mandated, such as for government infrastructure projects, the Land Acquisition Act offers guidelines on compensating the landowner. Should disputes arise regarding easements, they are generally resolved through

negotiation or legal proceedings in Kenyan courts, which have the authority to enforce easement agreements and define their usage scope and terms.

4.5.12.2. Wayleave Arrangement for the Hatchery Sea Water Pipeline

In exchange for the wayleave, the Kenya Marine Fisheries Research Institute (KMFRI) has committed to several initiatives aimed at enhancing the Shimoni Primary School's infrastructure and educational resources as per negotiation minutes in the *Annex XI – Wayleave Negotiation Minutes.* These commitments include:

- **Boundary Verification:** KMFRI will financially support the verification of the school's boundaries to confirm the precise locations of school beacons. This initiative is crucial in ensuring the clarity and legality of the land use agreement.
- **Renovation of Educational Facilities:** The agreement includes substantial renovations to the school's physical infrastructure. Specifically, KMFRI will oversee: Repair works on the flooring of five classrooms; Replacement of windows in these classrooms to provide a conducive learning environment; Repainting of the classrooms to ensure a refreshed and vibrant educational setting.
- **Provision of Educational Resources:** Demonstrating a commitment to enhancing the educational experience, KMFRI will also facilitate the acquisition of 300 desks. This significant contribution is aimed at improving the learning conditions for the pupils of Shimoni Primary School.

These negotiation underscores a symbiotic relationship that not only furthers marine research and aquaculture development but also significantly contributes to local educational enhancement while KMFRI get space to undertake mariculture activities.

5. PUBLIC PARTICIPATION AND CONSULTATIONS

5.1. Overview

The chapter highlights the need for stakeholder participation and the consultative process adopted during the study and summary results of the process. In implementation of KEMFSED supported county infrastructures, there is need to satisfy multiple stakeholders benefiting or affected by project. In light of this, the diversity of knowledge and values of beneficiary or impacted community has to be taken into consideration. Therefore, it's necessary to ensure that there is public participation in decision making process of project design, operations and decommissioning. Public participation is a process where individual groups, organizations and local residents choose to take an active role influencing decision making process over developments which might affect them directly or indirectly. Chapter 5 of the constitution of Kenya part 2 under land and environment provides the need for public participation in the management protection and conservation of the environment. In addition, Section 17-1 of The Environmental-Impact Assessment and Audit Regulations, 2003 requires that an EIA should "seek the views of any person who may be affected by the project". In line with this, consultant involved key stakeholders and held public forums to capture the views and concerns of the people within the project area. It was aimed at informing decision making process during project implementation period.

5.2. The Consultative Process Adopted

The environmental survey team understood the importance of seeking key informant viewpoints and community stakeholders' inputs for the successful implementation of the project. In this regard, the team actively sought views from all prospective project stakeholders, on the opportunities and negative challenges of the NAMARET Resource Training Centre project. The ESIA survey team used a participatory approach to determine environmental and social impacts linked to the project cycle. In order to gather information on stakeholders' opinions, problems, and concerns about the planned project, a variety of strategies were employed. These included one on one key informant interviews and public meetings were organized.

5.3. Key Informant Interviews

KEMFSED National Project Coordination Unit safeguards team conducted a number of technical assessment consultations with Kenya Marine Fisheries Research Institute personnel, a number of Kenya Fisheries Service staff, county fisheries staff, and Beach Management Units officials and community leaders in Shimoni where the project is located. This was done so that the NAMARET infrastructure development interventions could be adequately appraised from all the concerned and relevant stakeholders. These technical assessments were conducted between the 28th through to 31st of October in 2022. The table 5-1 contains their complete submission, word for word, just as it was written. Plate 5-1 and Plate 5 - 2 provide pictorial presentation of the assessment.

The Director of the NAMARET research facility, stated that the center will support in the production of high-quality marine seeds and broodstock, promote scientific collaboration between the institute's various stations and other relevant institutions, and generate mariculture technologies suitable for Kenya and the East African region. In addition, he indicated that the center will assist in the development of managerial and technical skills for the aquatic industry in Kenya and the dissemination of mariculture technologies to local populations. He explained that the Government of Kenya had already constructed the laboratory portion in the section of land and that the World Bank, through its credit to the Government of Kenya, had agreed to finance the completion of the other structures mentioned on the site plan. He confirmed that the site had a land title. He also observed that the possible threats and risks for projects were manageable and resolvable and ESMP emergent from the consultation or ESIA would be implemented to the word. A senior scientist at the Kenya Marine Fisheries Research Institute, remarked that NAMARET provides an excellent platform for local and visiting scientists to conduct demand-driven and outcome-focused research to fulfill the demands of the many stakeholders. In addition to promoting the transfer of technology and innovation to stakeholders, the center will make an assortment of services available that will positively impact the ability of stakeholders to earn a living. According to him, NAMARET will greatly improve both the physical infrastructure and the human capacity, both of which are crucial for the national expansion of mariculture.

The County Fisheries officer indicated that the proposed NAMARET Resource Centre would provide local fishermen with economic and social benefits. The center will foster an improvement in the community's knowledge and skills on cage farming to minimize near-shore overfishing and boost Shimoni's local economy. He also noted that the center will foster an improvement in the community's knowledge and skills in cage farming to minimize near-shore overfishing and boost Shimoni's local economy. The Fisheries Officer based in Shimoni remarked that it will be easier for fishermen to learn more advanced techniques for fish cage farming, such as lobster farming, and allow them to supply the large demand for meat from these crustaceans. In addition to protecting species of wild fish that are threatened with extinction, the NAMARET center offers a fresh opportunity for a new socioeconomic frontier with significant opportunities for financial gain in the coastal marine livelihood.

The BMU Chairman Shimoni welcomed the project and appreciated that the centre as an opportunity for BMU members to learn a lot about mariculture and fish cage farming which makes the concept offishing with certainty- you know the exact location and number of your fish you are farming, and if you feed and care for them properly, you will acquire a specified number of fish and earn money. Nevertheless, he lamented that the returns from cage farming may take up to seven or eight months. In contrast, when it comes to normal wild fishing, if I catch one fish and sell it, I may earn quick cash and even support our cages with it. As a result, cage farming and fishing are two enterprises that may coexist together. Due to unsustainable fishing practices, the quantity of large fish in the ocean has declined substantially in recent years.

In general, the construction of National Mariculture Centre was supported by cross section of leaders. Their view is that the production of wild fish can be complemented and supported by marine aquaculture, which offers a domestic source of seafood that is both economically and environmentally viable. The centre will enhance skills in mariculture and aquaculture in general and in the country. The skills acquired from the centre will lead to the growth of mariculture in the country and has the potential to lessen the impact that normal traditional fishing have on the wild. Aquaculture, often known as fish farming, is something that Kenya needs in order to assist meet the ever-increasing demand for seafood while simultaneously lessening the strain that is placed on wild fish. So they generally supported the project.

Pictorial presentation of the Key informants interviews

Plate 5-1: NPCU infrastructure Team with KMFRI senior staff during technical consultations.

Plate 5-2: NPCU team and one of the KMFRI scientist during technical consultations

Plate 5-3: NPCU infrastructure Team with County Village Administrator

Plate 5-4: The infrastructure team with BMU Chair,

Table 5-1: Summary of Key Observation made by Purposively selected officers consulted during the study

No.	KEY INFORMANT INTERVIEWED	SUMMARY OF REMARKS
1.	Village Administrator	The proposed NAMARET Resource Centre will provide economic and social benefits to local fishers. The advantages will fundamentally transform Shimoni. Locals must be consulted publicly in order for them to embrace the project. Through the training mechanism, women and youth can be directly integrated into the project, in our opinion. As part of the gratitude and good team for the project, the project should also offer training to local Shimoni students.
2.	Fisheries Officer, Kenya Fisheries Service	The NAMARET centre will promote and enhance community's mariculture knowledge and skills in order to prevent near-shore overfishing and boost the local economy of Shimoni. It will also provide drug-addicted youths in Shimoni with the opportunity to acquire new skills in aquaculture and mariculture. The Beach Management Units (BMU) will now acquire knowledge of latest technology associated with mariculture. The sole drawback is the threat to local culture

		created by the surge of foreign researchers in the community brought by the centre.
3.	Fisheries Officer, Kwale County Government	The proposed training center will assist local fishermen in learning new techniques for fish brooding, hence reducing pressure on the oceans. It will help fishermen acquire more expertise in fish cage farming techniques, such as lobster farming, and enable them to satisfy the enormous appetite for meat from these crustaceans. In addition to safeguarding dwindling wild fish species, the NAMARET center presents a new chance for fish cage farming, a new socioeconomic frontier with strong possibilities for revenue in the coastal marine fishing. A basic understanding of the cage farming industry can help change livelihoods in the coastal region.
4.	Senior Warden KWS	The resource center will not harm marine life, but rather provide a chance for locals to improve their own lives. Adult learning, however, should be a central component of the pedagogical approach at the training centre. The facility ought to make use of experiential learning strategies to make instruction for adults a delight. Learning by doing is especially effective for adults. Role-playing, simulations, and other similar activities should be used extensively by the center. Teachers should have their pupils do more active learning by having them watch lectures and presentations outside of class. Discussion is a great way to get students interested in the material and improve the centers' overall effectiveness. Students in a flipped classroom watch videos of lectures or read other materials outside of class in order to be better prepared for classroom activities.
5.	Senior Scientist, KMFRI	NAMARET presents a good opportunity for local and visiting scientists to carry out demand driven and result oriented research to address the needs of the various stakeholders. The Centre will further promote technology and innovations transfer to stakeholders in addition to availing various products to stakeholders that will positively impact on their livelihood. NAMARET will greatly improve the infrastructural and human capacity that is key in the development of mariculture nationally.
6.	Board Chair, Shimoni	Since its inception four years ago, the development of the

	Primary School.	facility is moving at an unacceptably slow pace. We are interested in beginning mariculture and marine farming at Shimoni, where we can both learn and implement the techniques locally. The community has a strong desire for cage learning, and its members have a sense of ownership over the facility. The facility will function as an educational platform, which may result in an increase in available job opportunities. In the event that the pipeline bursts, the sole danger is that seawater infiltrating people's farm. In addition, the workers at the center ought to have a friendlier demeanor in order to make engagement with locals easier. The capability will also make fingerlings easier to obtain in a straightforward manner.
7.	Assistant Chief – Shimoni	The NAMARET Centre will be a training center for sustainable practices that will help to improve the protection of fish species, particularly those that are endangered along the Indian Ocean. The centre will build the capacity of fishermen to participate in activities related to caged fish farming. Because the institutions will teach both locals and non-locals, the local community will be able to improve their level of knowledge and increase their investment in Shimoni's ecosystems. The local community will be better able to improve fish breeding systems, as well as marketing and the development of economic activities, using the knowledge that they have gained. Nevertheless, those who are not native to the area are expected to show respect for the local cultures.
8.	Mariculture specialist (KMFRI)	NAMARET research facility will help generate quantity and quality marine seeds and broodstock; promote collaborative scientific research within the different stations of the institute as well as other relevant institutions and generate mariculture technologies appropriate for Kenya and the East African region; develop managerial, technical skills for aquatic sector and transfer mariculture technologies to communities. The training opportunities offered at the facility will be geared towards developing managerial, technical and skilled manpower for the mariculture sector where skills are most lacking. The courses will be tailored towards community groups and farmers, extension officers, technicians, researchers, academicians and private companies. The establishment of a marine hatchery will help solve this and also

		ensure production of quality broodstock and seed in good quantities all year round. Currently, there is no marine hatchery in operation in the Western Indian Ocean (WIO) region where farmers can source their seeds apart from the shrimp hatchery in Mafia island Tanzania and the proposed milkfish hatchery in Zanzibar.
9.	Research Scientist 1	I would want to express my gratitude to the government of Kenya as well as the World Bank for erecting this building, which will help to ensure the nation's continued access to safe and nutritious food. At this time, farmers rely on seeds that were captured in the wild, despite the fact that these seeds are of low quality and their supply is unpredictable. Not only will the center make helpful information available, but it will also make high-quality seeds available to farmers. The center has various benefits, the first of which is the dissemination of information to farmers; as a result, more farmers will engage in fish farming, which will result in an increased supply of food. If we want to prevent the destruction of the environment or the loss of biodiversity, the only thing we need to do is make sure the fish can't get back into the ocean.
10.	BMU Network Chair	When you leave your house to go fishing in the ocean, you never know what will happen; you could come back with fish or you could come back empty handed, you could lose your net because of poor weather, you could drown in the water, or you could be attacked by pirates. We as Beach Management Units (BMU) will be able to learn a lot about mariculture and fish caging thanks to Kenya Marine Fisheries Research Institute's National Mariculture Resource Training Centre. Through the centre, we will receive training support to begin a venture of our own. On the other hand, fish caging makes the majority of things appear to be certain; you are aware of the location of your fish and the precise number of them; and if you feed and care for them properly, you will obtain a particular quantity of fish and generate money. When it comes to getting returns from cage farming, it can take up to seven to eight months, but when it comes to my fishing, if I catch one fish and sell it, I can earn immediate revenue and even support our cages with it. Fishing and cage farming can go hand in hand because of this. Because of unsustainable fishing tactics, the lake has seen

		a significant decrease in the amount of large fish.
11.	Vice Secretary, Shimoni BMU	Through these pilot mariculture programs, the NAMARET Centre will provide locals with the opportunity to learn. This project will illustrate how organized groups surrounding Shimoni can construct and install marine fish cages, buy fingerlings of a high quality, manage the fish through correct feeding and care up until harvest, and possibly generate a profit from the endeavor. However, it is difficult for cage mariculture to be an alternative means of livelihood for individual artisanal fishers due to the high costs of maintenance and the intensive management requirements, and he looked forward to the support of the government and the operationalisation of the same through groups. The center will serve as an excellent capacity development for other organizations, allowing them to make a business out of fishing and share information about mariculture.

5.4. Shimoni NAMARET training Centre Community Consultations

The NPCU safeguards team organized community consultation on 6th November 2022 (Minutes attached in AnnexIII).The purpose of the community consultation was to gather the opinions of community members regarding the idea of establishing a National Mariculture Resource Training Centre. The consultation was also an opportunity to give the Shimoni communities a voice to get to know how they felt about the proposed project and to garner their support, as an essential process for any big project as NAMARET in their locality.KMFRI staff and the Shimoni area Chief were the ones tasked to plan and organize the consultation meetings. The NPCU safeguards teams, KMFRI and the KEMFSED project engineer were in charge of facilitating the meeting. During the consultation, community members were given the opportunity to voice their opinions and perspectives regarding the proposed project, and the verbatim transcripts of these discussions can be found in Table 5-1.The attendance list of those who were present at the meeting can be found in Annex IVas well. In attendance at the meetings were men and women of all ages, as well as persons with a wide range of knowledge in mariculture and cage farming.

The concerns and views from meeting have beenconsidered in this ESIA project report, during implementation and operation of the office facility. From the findings of the discussions in the meeting, it was evident that the project was highly welcome in the community. The idea of mariculture and transfer of skills to the communities, Kenyans and other researchers was very appreciated. Photos for the meeting are detailed in Plate 5-5 to Plate 5-6.

Plate 5-5: A section of participants during the proposed public participation meeting at Shimoni KMFRI resource centre

Plate 5-4: Participant for the proposed NAMARET training resource centre..

- Participants expressed their gratitude for choosing their location in Shimoni area to construct the National Mariculture Training Resource centre opportunities.
- The centre will be a training centre for different technologies in mariculture and be a source of knowledge on emerging technologies in the field, such as breeding and nutrition improvements for fish broodstock. This center will stimulate the growth of mariculture by providing a "one-stop shop" for all mariculture-related needs.
- The project has garnered significant support from the community and is undeniably valuable. However, there is a concern regarding the potential oversight of community issues by the KMFRI administration or management during both the construction and operational phases of the NAMARET centre. To ensure that community perspectives are respectfully considered and integrated, it would be beneficial for the NAMARET centre to appoint a Community Liaison Officer. This role would facilitate effective communication and collaboration between the centre and the community, fostering a harmonious relationship throughout the project's lifecycle.
- The stakeholders suggested that there should be proper measures in waste management from the centre so that it does not affect the community or lead to spread of disease.
- The stakeholder thought that the project is likely to result in an increase in foreign tourists and scholars, which could result in sexual tourism, child sex exploitation, and the commercialization of sex among our 18 to 20-year-old teenagers. They suggested that the project should lessen the risk of gender-based violence, sexual exploitation and probably sexual harassment by having stringent policies on the above. Requested that Gender

Based Violence prevention program be initiated in Shimoni area alongside the project to save young girls and women.

- They also requested that KMFRI supports a mariculture club in Shimoni Primary School, who are their neighbour as Corporate Social Responsibility. The institutions of KMFRI and KWS might work well together to inspire young kids to mariculture interest and wildlife conservation.
- They participants requested that the project should ensure it preserves "Mikoko" Mangrove trees in the project area and that the project does not lead to their destruction.
- The project should have a component for the youth and women especially during the award of tenders or some works during construction and operational phase.
- The participant requested KMFRI to put in place program to address fish disease and diseased fishes
- The members of the Vulnerable Marginalized Persons group expressed an interest in understanding how they would benefit from the project and inquired if there was a specific program designed for them within the KEMFSED project. They were reassured that the project has allocated a segment of the project funds specifically to support the Vulnerable Marginalized Persons.
- The participants expressed a profound concern regarding the potential impact of the project on their cherished cultural heritage and traditional values. They harbored a sincere hope that visitors and foreign individuals would exhibit the utmost respect towards their local customs and traditions.
- Stakeholders meeting participants also agreed that the contractor should involve all the relevant stakeholders for the community to embrace the project. To foster this, majority of labour workforce should be sourced from Shimoni area.
- The community members requested to be considered for job opportunities and transfer of skill sets during construction, they also expected a local business boom particularly food vending at the site and the growth and expansion.
- Generally, the community welcomed the project to the area and noted improved service delivery from the fisheries department.

5.5. Summary of Issues Raised during public participation meeting and the responses

There were several issues that were raised by the community during public participation meeting and the NPCU and KMFRI team gracing the community meeting discussions gave responses to the concerns of the community as captured in Table 5-2.

Table 5-2: Summary of Stakeholders Issues raised and the Responses

Names	Issues	Responses
Village Elder	The project is worthwhile, and the community	KMFRI will employ a Community Liaison Person to link the community with KMFRI and ensure that

	supports it. But there is a really risk that an KMFRI administration or management won't pay attention to community issues both throughout the construction and operational phases of the NAMARET centre? Now that we have given you our approval, how can you possibly avoid becoming condescending?	community issues/concerns are well addressed.
Snr. Village Elder	In your Masterplan presentation, I did not see where you will plan to deposit the waste generated by the persons that will be staying and operating from NAMARET Resource Centre.	We'll employ the MBBR system. The Moving Bed Biofilm Reactor is known as the MBBR system (MBBR). A fill-and-draw activated sludge system for wastewater treatment. This approach involves adding wastewater to a single "batch" reactor, treating it to get rid of unwanted materials, and then releasing it. Using a single batch reactor, normalization, oxygenation, and purification can all be accomplished. SBRs have the benefit of allowing for the simultaneous completion of equalization, primary clarification, biological treatment, and secondary clarification in a similar heat exchanger. These benefits can lower the cost and treatment area.
Shimoni Development Org,	Do you have land for the NAMARET Training Resource Centre? And has the community approved it for this development project	The project will be done on KMFRI's 6 hectares of land - Plot Number: PDP No. 141.KWL.4.94 at Shimoni, Kwale County. The land was approved by the community to be a KMFRI Shimoni Center in previous meetings.
Human Right Activist, Shimoni Child Care	The project is likely to result in an increase in foreign tourists and scholars, which could result in sexual tourism, child sex exploitation, and the commercialization of sex among our 18 to 20-year-old teenagers. How does the project intend to	We anticipate that the Contractor will ensure that every one of his employees signs a code of conduct(CoC) throughout the construction period, pledging to refrain from gender-based violence, sexual exploitation of minors, and any conduct that could be interpreted as sexual harassment. We also anticipate that KMFRI will develop a sexual harassment policy in accordance with the Employment Act 2020 requirements and compel all of her staff/visitors to sign a code of conduct that permits avoidance of sexual harassment, exploitation,

	lessen the potential for gender-based violence, sexual exploitation and probably sexual harassment? Can we educate more women and young people so they won't be exploited by the scholars likely to influx Shimoni?	and actions that may result in GBV.
Children Rights protection Activists.	How will the project benefit the Shimoni community, which is hosting it? Instead of our local members, we're likely to see a rise in the number of non-locals hired here.	All Kenyans are expected to profit from the project, which is supported by the Kenyan government and the World Bank. However, employment that doesn't require a lot of specialization will be reserved for Shimoni residents during the construction and operational phases. The competitive hiring process will be followed for additional specialist jobs.
Teacher, Shimoni Primary School	This idea of a mariculture research training institute in Shimoni is really ingenious and profound, especially for Shimoni Primary School, who are your neighbours. Is there a way the school may be inspired further, perhaps by starting a club for aquaculture or mariculture? The institutions of KMFRI and KWS might work well together to inspire young kids to mariculture interest and wildlife conservation.	This is possible and the school could initiate this idea with KMFRI. I am sure KMFRI is open to such interesting ideas that help inspire next generation of leaders.
Youth Representative	What happen to "Mikoko" (Mangrove trees" that may be brought down during clearance of the site and laying of the extraction pipeline.	We are all aware the role mangrove trees play in providing natural infrastructure and protection to nearby populated areas by preventing erosion and absorbing storm surge impacts during extreme weather events such as hurricanes and we must protect Mikokoat all costs. They are also important to the ecosystem too and the local ecosystem in Shimoni. Their dense roots help bind

		and build soils. During the laying of the Shimoni water pipeline from the sea, we may lose Mangroove trees along the Right of Away. However, the design has tried as much as possible to avoid destruction of Mangrove trees (Mikoko).
Patron of Christian Churches Shimoni	Will the project have a component for youth and women especially during the award of tenders or some works.	Young people and women who could be interested in aquaculture or mariculture will likely receive training at the center. Youths who perform manual labor or non-specialized services will be given consideration for employment prospects throughout the construction period of the centre by the contractor.
Fisheries Officer	How do you intend to use indigenous knowledge to address fish disease? The fishermen here have a lot of indigenous knowledge that could be tapped to support the research centre	We acknowledge that fact that fisheries resources have existed on earth for centuries and their management has depended on the knowledge available to those that were, and are, entrusted with management responsibilities. Formal technical and traditional knowledge have formed the basis for the formulation of fisheries management approaches in Kenya and we cannot ignore the indigenous knowledge. In the midst of fisheries crises, such as fish stock over-exploitation and effects of climate change on fisheries, there has been great interest in fostering sustainable fisheries management as a means to improve the capacity of fishing communities to adapt to the changes. We have not adequately involved local people who have acquired traditional knowledge through their direct experience with nature and especially fishing. The NAMARET centre will document indigenous knowledge used in fisheries management within the wider context of livelihood systems and indigenous technologies that offer insights of its value to biological scientists of international repute and fisheries managers in Kenya; second, to demonstrate the value of indigenous knowledge as a lens through which biological scientists can look when managing fishery resources. We believe that fisherfolk have a better understanding of the wide range of fishing systems and we will also learn from them.
Wakifundi Initiative, VMGs	How will this project of constructing NAMARET centre benefit the VMGs in Shimoni. Is there a 10% that goes to the	We are much aware that Shimoni has Wakifundi, Watshwaka, Wavumba, Washiratzi indigenous minorities. The larger project KEMFSED has a much larger component and budget that mainstreams aspects of VMGs. In fact we will be coming to talk to you on

	community for this support of the VMGs?	how the project can be of assistance to you.
Imam-Shimoni	We support the project but we are also keen not to lose our culture and traditional values. We hope the visit will be as respect to our cultural norms as much as possible.	No matter their personal opinions, we will expect that the visitors to the NAMARET will willingly step into the cultures and traditions of Shimoni area. They are the guests in Shimoni's community and the rules and traditions of Shimoni should hold of significance way of doing things — they must willingly respect the community and relate respectfully to people in the locality of Shimoni. Being culturally responsive requires openness to the viewpoints, thoughts, and experiences of others. This is not about changing others to be more like you. It is about respect and we will expect them to show you respect. On the other hand, we also expect you to develop understanding for other cultures. Developing your understanding of other cultures, or 'cultural awareness', lets you have more meaningful interactions with those around you by celebrating their differences as well as your similarities. We hope this will dispel negative stereotypes and personal biases about different groups. In addition, cultural diversity helps us recognize and respect "ways of being" that are not necessarily our own. So that as we interact with others we can build bridges to trust, respect, and understanding across cultures.
Chairman BMU Network	Does the project also have intention to improve for us the Beach Landing Sites?	The bigger project KEMFSED has a budget of KES 800M to improve fish landing sites and not beach landing site. However, we need to first ascertain the land ownership document of the proposed fish landing site.

6. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

6.1. Overview

This chapter covers the following highlights on the proposed development: positive impacts and negative environmental and social impacts of the proposed project and mitigation measures (at implementation/construction, operation and decommissioning).

6.2. The Positive Impacts of the Proposed Project

The implementation of the proposed NAMARET centre sub-project in Shimoni is anticipated to have an overall positive impact as captured in Table 6-1, particularly in enhancing dissemination of research information, skills and new technology to mariculture stakeholders in order to strengthen technological and skills in mariculture capacity development in Kenya.

Table 6-1: The positive Impacts of the Project

NO.	IMPACT	DESCRIPTION
1.	Enhance general economic development	The blue economy is being targeted under government policy to contribute towards the GDP of the country. The implementation of the proposed NAMARET centre for production of the seeds and dissemination of new knowledge will be a contributing factor towards transforming mariculture from small scale subsistence state to a medium commercial state for business purposes. Capacity development in market information, better technology of production and improved cage/pond/line husbandry is anticipated to spare the sector to capitalize on improvement of the centre to disseminate improved seeds and technology in mariculture production.
2.	Enhancing Food security among the coastal communities	The growing population is consuming more and more sea foods while the amount caught in the wild is ever reducing. Aquaculture if developed has potential to be a major contributor to food security by providing an opportunity to grow fish where they could not grow in the past. There is a deficit in fish supply due to reduction in fish stock in the wild, occasioned by high pressure to the near shore resources. NAMARET centre will therefore contribute to increased food security when more farmers engage in mariculture activities because of the sustainability in producing quality seeds and dissemination of improved technology among farmers in fish culturing.
3.	Sustainable availability of high quality seed supply for farmers	The mariculture farmers currently rely on seeds from the wild which are seasonal and whose quantities are not sustainable. However, implementation of the proposed project is anticipated to sustainably produce quality and high quantity seeds for farmers. The innovation research and extension services provided by the centre is anticipated immensely contribute to availability of quality seeds.
4.	Improved access	Access to well balanced, affordable and quality fish feeds remains a

	to quality and quantity fish feeds.	key challenge to most aquaculture farmer in Kenya. However, as part of the proposed project, NAMARET centre will spearhead research and extension services in innovative technologies to assist farmers access affordable and quality fish feeds.
5.	Contribution to policy framework development	Research generates information that informs policy and management decisions. One of the key strength of the proposed NAMARET centre shall be the driving of technological innovation through research and extension services. Knowledge acquired under NAMARET centre will greatly inform the aquaculture and fisheries policy formulation processes in Kenya, regionally and globally.
6.	supporting local employment opportunities	Development of the infrastructure shall motivate the national government and KMFRI to employ more mariculture personnel and associated support staff. The construction works shall also provide for temporal employment opportunities for workers who shall provide the service at the construction site. During operation phase of the sub-project, it is anticipated that the culturing of the fish will drive employment of farm hands to assist with husbandry activities as well as along the fish value chain.
7.	Business opportunities	The business opportunities are anticipated during the construction phase of the sub-project. Provision of construction materials shall be a source of business opportunity to the local people. However, for the positive impact to be realized there shall be need for local sourcing of the construction materials, labour as well as having open and competitive tendering for the goods and services associated with the proposed works. Food vendor particularly by women providing the service to the construction workers shall create more business for eatery businesses. Business opportunities are also anticipated during operation of the facility especially for the suppliers of various items that shall be consumed at the centre, the fish feeds, visiting students for training and selling of fish from the culturing farms.
8.	Enhance Education and awareness among coastal communities on mariculture activities	Few local coastal households participate in mariculture activities due to lack of education and awareness in spite of the high economic potential it offers. Implementation of the proposed NAMARET centre will be a point of skills and knowledge dissemination which is anticipated to increase awareness among the local communities about the significance of mariculture activities in transforming livelihoods. The centre will also be a source of new technological innovation among the mariculture field in Kenya.
9.	Improve Pond management skills among the local	Poor pond management skills have affected the growth of Mariculture ventures among the coastal communities. However, with the construction of the proposed centre, more improved methods and knowledge of pond management shall be exchanged among the

	communities practicing mariculture	mariculture stakeholders. Experiential knowledge from demonstration ponds shall be shared among training participants in order to practically learn how to manage ponds by the farmers
10.	Improve Knowledge and skills of managing mariculture pest and disease	The centre shall be a point of research as far as mariculture pest and diseases are concerned. The research work shall also focus on pest and diseases resistant species whose knowledge shall be shared among mariculture stakeholders.
11.	Provision of consistent technical and extension services	The training centre shall have resident and visiting scientist working together with the community whether at research level or dissemination of research findings at community level. It is anticipated that technical and extension services shall be provided to the local farmers in the process
12.	Enhanced mariculture project management skills among the farmers	Project management was noted to be inadequate in most communities and households practicing mariculture activities. It is therefore expected that the training centre shall be appoint of sharing such vital information among the local communities. This shall be at practical level or through farmers exchanging information
13.	Adoption of new technologies by mariculture farmers	Most mariculture farmers at the coast use rudimentary technologies that limit the growth of the sector. However the NAMARET centre in general shall be a hub of research and development of new technologies in the sector of mariculture or that which is trending globally. The new technologies shall be shared with farmers to enhance the sector growth and upscaling to meet the government policy of improving the blue economy sector and its role in social economic development.
14.	Farmers' skills to transform mariculture practice from small scale subsistence state to medium commercial state.	It is anticipated that with new innovations in the management of mariculture and adoption of the same among the mariculture stakeholders shall stimulate the up-scaling of the sector from subsistence to commercial state. The local people will also benefit from scientific exchange visits from the visiting scientists so as to adopt appropriate technology that will drive the transformation of the sector in the country. Its further anticipated that with exchange of knowledge among farmers on challenges and opportunities, more and more farmers will be motivated to upscale their ventures for maximum benefits.

15.	Increased uptake of mariculture activities among coastal communities' households	Sensitization and awareness creation among the local communities from the proposed training Resource centre is anticipated to change the attitude of local communities' households. Most of the stakeholders with the new knowledge on the significance of mariculture are expected to engage more in mariculture activities

6.3. The Negative Environmental and Social Impacts of the Proposed Project

The proposed project will comprise of a 3 floor-storied building and connected facilities. Construction of such a structure is anticipated to have some negative impacts as indicated in Table 6-2 below:

Table 6-2: The Negative Impacts of the Sub-project Component

NO.	IMPACT	DESCRIPTION
1.	Occupational Health and Safety (*accidents and Injuries*)	Working on a construction site comes with risks and accidents to the workers. The risk could be associated with fire, material and manual handling, dehydrations, electrical shocks, exposure to chemicals, drowning, Slip, trips and falls, noise and vibration, dust, moving objects, falling objects, working at heights and collapsing trenches among others. The occupation health and safety risks are mainly anticipated at construction and decommissioning phases. But that does not rule out the operation phase, especially the workers conducting routine maintenance, repair and cleaning on the training centre building, the MBBR or the landscape on the compound.
2.	Public health and safety (*accidents and Injuries*)	The public on access roads to site and any persons who visit the construction site can be at risk of injury from falling objects, accident involving construction vehicles, personal falls, or sharp objects on the ground. The risk is anticipated to be low during the construction since the project site is out of bound to the public. But that does not rule out the hazards associated with the operation of the project such as drowning, contaminated food, However, at decommissioning phase of the project the risk could be high due to the users of the building. Though we shall have public safety issues during the operation of the building, it is anticipated to be low due to the nature of activities that shall be at the site.
3.	Deposition of organic matter	Sea-based culture technology through fish cage farming is associated with deposition of organic matter from fish feeds below the cages resulting in changes to the benthic community and the sediments. The changes on the water column and the benthic environmental

		impact on the diversity of the ecological communities and the increase in the oxygen demand. It may also lead to changes to primary productivity due to the decaying and fecal matter leading to eutrophication a precursor of blooms.
4.	Inorganic discharges from excretory products	The source of the discharge is dependent on the type of culture technology being referred to. It could be from detergents, anti-foulants, fish processing waste, silage, veterinary medicine or excretory products in the form of ammonium, traces of bicarbonates, phosphates or urea. This could have effects to non-target organisms, development of resistance to compounds by pathogenic organisms or induce drug resistance caused by the antibiotics in fish feeds.
5.	entanglement by marine mammals in fish cages	Operation of the cage culture system is sometimes associated with entanglement in cage gear by the marine mammals causing injury and drowning.
6.	Risk to genetic Diversity of the wild fish from escapes	Cultured fish can escape to the wild posing substantial risk of genetic diversity to adapt to the environmental changes, productivity, and fitness of wild fish leading to extinction.
7.	spread of parasites viruses, bacterial infection	Fish culture is associated with parasites and diseases. There is a potential of spreading parasites, viruses, and bacterial infection between caged and wild fish production.
8.	Visual/ aesthetic Impacts	The excavation activities and stockpile shall be the main source of visual/aesthetic value impact at the project site. Landscaping of the compound after completion of the building is anticipated to enhance the aesthetic value of the areas.
9.	Leakages and spills	The main source of leakages and spills anticipated are from vehicles with mechanical issues at project construction, operation, and decommissioning phase. At construction and decommission, the leakage shall be from contractor's equipment/vehicles, and during operation, it could be from vehicles using the proposed parking on site and operation of the generator. The design to take into consideration of such during operation through paving of parking area.
10.	Noise and vibrations	The movement of construction vehicles to and from the site, general construction activities on-site, and noise from conversation on site are anticipated to be the main sources of noise. Noise in addition is anticipated to be generated during the project operation phase when repairing and maintaining, conversation or from activities by users or vehicle movement in and out of the training premises. Noise is also anticipated to be generated during decommissioning activities of the project. Measures have been proposed to mitigate against the amount of noise generated during construction.

11.	Air pollution	Air quality is anticipated to be affected by exhaust fumes on site from operating of machines and moving of construction vehicles transporting materials from the site or to the site, from dust particles on-site during foundation excavation activities and during mixing of cement on site. Decommissioning activities, notably demolition and transportation of the waste, could be sources of particulate matter on site in addition to the movement of the contractor's vehicles and machines undertaking the demolition activities.
12.	Solid Waste generation	The main sources of waste shall be debris from construction or decommissioning *activities (Wood debris, paper waste, dust, soil, wastewater, concrete wastes and steel debris, metal debris, paint, plastic debris, cabro debris, electrical cable debris),* and at operation phase domestic waste, waste water, biological aste from dead fish, empty containers from parasite nad desease management products among others) , shall be from general consumption of materials by the occupants of the training centre building or the guests that shall be visiting the centre for training, research or seeking any other services.
13.	Wastewater generation	The main source of wastewater shall be during the operation phase of the project, with grey and black water being anticipated. Although the black water could be used for landscaping purposes on site, it was noted that cultural perception towards black water could be an impediment. However, with proper functioning of the proposed SBR through adequate maintenance and operation, the perceptions shall be changed over time.
14.	Fire Hazards	Fire hazard is anticipated mainly at the operation phase of the project, with electrical faults and arson being the main anticipated sources. The design of the proposed training centre building has provided for fire management measures in the design *(provision of fire extinguishers, fire Assembly point, provision of fire hydrants, and signage of fire exits, fire alarm system and fire drills among others*). And additional measures have also been proposed in the ESMP. The design of the building has considered a separate water storage facility for fire with a capacity of $10m^3$ in line with the Local regulations
15.	Increased Water Consumption	The water on the building will be used in washrooms, for landscaping, cleaning and frequent personal cleaning due to the covid-19 impacts. The design has provided for the treatment of waste water through an MBBR and biodigester systems that shall be

		used for landscaping purpose. However, in the event that the MBBR is not able to meet the landscaping water demand, other sources of water may be considered for watering the lawn hence increasing the demand for water. Despite this, additional measures in the project's design have been proposed to ensure efficient utilization of the resources on site such as push delay taps in washrooms, rain water harvesting and reduced indoor potable water use. This shall reduce pressures on the resources to ensure sustainability. Rain water harvesting has been considered in the design of the building with storage of $10m^3$. The brine water from the RO plant will be connected to the wetland. The civil works to consider vertical drains of surface water run-off as a means of replenishing ground water table.
16.	Increased Energy consumption	Energy shall be critical for the users of the proposed training centre building either to run machines and equipment or for lighting purposes. The demand for energy resources will increase, and several measures have been provided for in the project's design to ensure efficient utilization of the resource including having a solar system, using large windows, using energy saving bulbs LED and allowing adequate air circulation. Additional measures have also been proposed in the mitigation measures
17.	Risk of Spread of HIV/AIDS and STIs	During construction, the project will employ a lot of youth. This particular category are risk takers and as they engage in cheap liquor or drugs, there could be cases of transactional sex exposing them to the risk of HIV/AIDS as well as other sexually transmitted diseases. The contractor will be expected to sensitize the work force on HIV/AIDS/STIs, provide condoms (Male and female) and ensure condom dispensers are easily accessible on site. Stakeholder consultation findings further indicated that the area is rife with transactional sex activities and the anticipated increase in cash flow in the area arising from project activities may increase sexual activities.
18.	Increase in Grievances	The local community members, contractor, contractor workers, client (SDBE&F and KMFRI) or any other interested parties may be aggrieved due to project activities and need to be aware that there is mechanism that allows for a fair, transparent, expeditious and easily accessible structure for grievance resolutions. Grievances are anticipated to increase due to limited resources competing against multiple interests/needs.

19.	Risks of Child Labour	Child labor is often cheap as they do not have bargaining power and are easily exploited. Child labour was reported to be ongoing in the area as beach boys or at the quarries in the area and such cases could occur on site and therefore the need to be alert.
20.	Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	Gender Equity (access to positions at the work place and the positions they hold), SH (Being forced or threatened with loss of employment if they don't exchange sexual favors, especially in instances where there is a power imbalance), SEA (often occurs between the project and the community) Due to vulnerability of women, they could be taken advantage of in order to receive what is due to them or favour. This could occur owing to differentiation in power or economic status of the perpetrators.
21.	Gender-based violence at community level	This may occur due to the cash flow within the community and among the locals creating differentiation in economic power. Culturally within the proposed project area women are homemakers and any who may seek manual work at the site may not be treated or perceived well by some of the community or family members creating some violence against such. The transactional sex in the area may also lead to increased domestic violence to households with economic challenges.
22.	GBV: Sexual exploitation and abuse (SEA)	Under the working environment, women may be taken advantage off and forced to offer sexual favour in order to receive or access that which is rightfully theirs. In addition, with increased influx of youthful labour, there is expected increase in the number of Sexual Exploitation and Abuse cases. It was also reported that children engage in sexual activities and hence it will be prudent for the project to be aware of the existing situation and put in place mechanism to prevent cases of SEA through signing of Code of conduct and development of the GBV/SEA&SH prevention action plan.
23.	Spread of COVID-19 amongst community members during consultation processes	Covid-19 remains a challenge to the global community in spite of reduced coverage in the media. To meet requirements, there is need for community sensitization and awareness creation which is a highly consultative process. Consultations activities increase the chances of interaction among the community members and in the

		event of an infected person, the virus shall spread among the community members.
24.	Spread of COVID-19. During construction at work sites	The virus is highly infectious and there are high chances that it could spread at the work place in the event of an infection on the work site.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1. Chapter Overview

The chapter highlights the environmental and social management measures for the anticipated negative impacts. The ESMP captures the impacts, receptor, proposed mitigation measures, institution responsible for the mitigation, frequency, and budget.

7.2. Proposed Environment and Social Management Measures

The objectives of the proposed environmental and social management plan is to ensure smooth implementation of environmental protection measures, mitigate adverse impacts and ensure environmental protection activities are conducted efficiently at the project site.

The specific objectives include but are not limited to:

- Ensuring environmental health and safety within the living environment and *minimizing environmental risk* during the design, construction, and operation phases.
- Incorporating environmental principles into development planning, design, construction, and operation to enhance environmental management and protection as well as promote sustainable development.
- To provide mitigation measures against all identified and potential negative impacts resulting from the activities of the proposed development
- Reduce contamination
- Apply climate change adaptation measures
- Apply green building construction measures
- Apply measures required by Kenya regulations
- Apply measures required by the World Bank Safeguard Policies triggered under the KEMFSED sub- project
- To assign duties to various actors in the management plan for purposes of enhancing accountability in this project.
- To provide a logical framework for environmental management and monitoring.
- To provide a baseline for future environmental and social audits of the proposed development.

Various potential adverse environmental and social impacts associated with the proposed training centre building have been identified, and an ESMP developed to guide in mitigating the negative impacts. The project implementing agency *(SDBE&F together with KMFRI through Joint Project Supervising Committee)* and the contractor are required to identify the actions and coordinate the various stakeholders appropriately. Table 7-1 to Table 7-3 below shows the anticipated impacts, proposed mitigation measures, the institutions responsible, and the estimated possible cost of the action. Although the cost of ESMP implementation has been provided, future dynamics during project operation and decommissioning were a limiting factor and could not be well envisioned at this point. The contractor will be required to update the ESMP for operation by providing operation and maintenance guidelines through the as-built documents to be surrendered to the client at the end of the construction period.

Table 7-1: Environmental and Social Management Plan During Construction

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
1.	Occupational Health and Safety (accidents and Injuries)	Risk of fire, material and manual handling, dehydrations, electrical shocks, exposure to chemical, Slip, trips and falls, noise and vibration, dust, moving objects, falling objects, working at heights and collapsing trenches	Workers on site	▪ Contractor to complete hazard identification and risk assessment, develop a site safety action plan detailing safety measures/procedure, equipment to be used, emergency procedures, restriction on site and personnel responsible for safety inspections and controls. This shall be ready and approved by the joint supervising committee before commencing of the proposed works ▪ Contractor shall hire and retain a duly qualified construction environment safety and health officer throughout the construction period, to ensure implementation of the safety plan. ▪ Train workers on safety and first aid skills before commencing works ▪ Ensure safety of the construction workers by putting first aid facility, and having trained first aiders among the workers and injury reporting mechanism. The ration of first aiders to works shall be in line with the OSHA First Aid Rules. ▪ Provide appropriate personal protective equipment (PPE) to workers and training on appropriate use. (Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, fall arrestors, welding masks etc.). The safety plan shall identify the mandatory PPEs by the tasks performed. ▪ Adequate provision of requisite sanitation	To ensure the safety of workers and persons on site	contractor and Joint Project supervising committee	3,000,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
		among others		facilities for human waste disposal for workers on site ▪ Recording of all injuries that occur on site in the incident register, corrective actions for their prevention as appropriate. ▪ The contractor is required to have WIBA insurance policy to compensate workers in the event of injuries. ▪ Provide clean drinking water for the workers to mitigate against dehydration. ▪ Have an understanding with a nearby health facility for emergency cases on-site before decisions are made. ▪ Adherence to Covid-19 rules/guidelines as provided from time to time by the ministry of health and the bank with provision of easily accessible and adequate covid-19 PPE to all persons on site. The specific action to be captured in the contractor ESMP. ▪ Training of workers on covid-19 rules and requirements. ▪ As applicable, only qualified personnel shall be allowed to operate construction equipments on site that may require specialized skills			
2.	OHS risks from working above and falling into deep waters	Risk of drowning	workers	▪ To the extent possible, consider working during low tide periods or use pilling for the foundations ▪ The workers to be provided with appropriate footwear to reduce the risk of slipping.	To ensure the safety of workers	contractor and Joint Project supervising committee	950,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				▪ Ensure workers are provided with life jackets and enforce use at all times when exposed to sites or working under deep waters ▪ Ensure workers working on such sites are experienced swimmers ▪ Train workers in safety measures when working above deep waters ▪ Avoid working at night to reduce cases of drowning ▪ Having rescue teams on site in the event of an accidents ▪ Provide necessary information on rescue during emergencies.			
3.	Public health and safety (accidents and Injuries)	injuries and accidents	Pedestrians at Shimoni market and users of existing KMFRI administration office.	▪ Ensure the safety of residents and officers with offices near the site by providing safety signs at strategic places around the access roads. ▪ Hoarding off working sites to protect the public or unauthorized persons from entry. ▪ Reduce unnecessary speeding by the construction vehicles to control for accidents from the movement of pedestrians in the area. ▪ Prior creation of awareness and sensitization of the public and the officers of any activities that is likely to have an impact in adequate time (2 weeks) before commencement. ▪ Implement Grievance mechanism and use feedback to improve any management measures as may be necessary.	To ensure public safety at site area	contractor and the joint Project supervision committee	400,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
4.	Visual/ aesthetic Impacts	Psychological nuisance	workers, KMFRI officers using the existing office and any other visiting persons	• Cleaning of the site and organized sitting different construction materials. • Backfilling of soil cuttings • Landscaping of the project site • hoarding of the construction site using appropriate screening materials	To reduce psychological impacts to public, residents, and workers on site	contractor and the joint Project supervision committee	no direct cost
5.	Leakages and spills	contamination and pollution	soil, water, plants, and air	▪ In the event of hazardous waste leakage or spills, engage authorized waste handlers to dispose of contaminated soils. ▪ Disposing of contaminated soils in cutting pit if volumes are low. ▪ Use of NEMA licensed hazardous waste handlers to dispose off in licensed disposal areas. ▪ Development of site-specific incident management or response plan. ▪ Use of an authorized garage or fuel station in the project area by the contractor. ▪ No servicing of construction equipment shall be undertaken on site. For emergency works, fuel and oil trays shall be used.	to avoid any contamination and pollution on-site or at the contactor's camp	contractor and the joint Project supervision committee	no direct cost
6.	Excessive Noise	auditory injuries	workers, officer sharing site and the public	• The contractor to use equipment with low noise levels or fitted with silencers where appropriate. • Regular servicing of the equipment to reduce the possibility of noise from worn-out parts. • Informing the public about the possibility of unusual noise levels, particularly to	to ensure Workers and public safety	contractor and the Joint Supervision Committee	800,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				residents and nearby offices, whenever working on such activities. • Ensure adherence to PPE by workers[11] working on excessive noise and vibration activities • Minimize unnecessary hooting and speeding by construction vehicles. • Restricting noisy activities to be during the day and no noisy activities should be conducted on site at night. • Regular measurement of noise levels and devising control measures.			
7.	Air pollution	air pollution	workers, area residents, and the general public	• Vehicles to be used on-site to meet NEMA emission standards as required under NEMA air quality regulations. • Reduce unnecessary speeding or idling of construction vehicles • Use of non-lead paints during construction. • Adherence to proper uses of PPE by the workers, especially those working on activities requiring mixing of cement. • Inform the public and residents about activities with possibility of unusual air pollutants • Use of silt screens to reduce dust from site. • Consider wetting all the sand or soil materials being transported to or from the construction site. Where appropriate, cover the materials being transported to avoid being blown by the wind during	to ensure workers and public safety	contractor and the joint project supervision committee	800,000

[11] The measure should be according to the law (Occupation safety and health Act 2007, National Construction Act

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				transportation.			
8.	Solid Waste generation	increased waste generation at project site and contractor s camp if any	The environment in general (public nuisance, soil, water and air)	• Provision of mobile sanitation facilities for adequate human waste management[12] during the construction phase for workers and persons on site. • Promotion and adoption of the principles of waste avoidance, reduction, reuse and recycle. Through avoiding unnecessary generation of waste, use of debris for backfilling where possible, use of waste materials on-site for other purposes where appropriate, or selling to recycling merchants. • Designate proper waste transfer stations onsite with controlled access. • Seek appropriate approvals from NEMA and County Government on management and Disposal of the waste[13].(this may include using authorized disposal sites, use of NEMA authorized waste pickers/transporters, acquiring dumping certificates, and keeping proper records or use of authorized vehicles to ferry waste from site) • Consider formulating a site-specific waste management plan informed by waste characterization[14].	to ensure waste is managed properly	contractor and the joint project supervision committee	450,000

[12] According to the Public Health Act Cap 242, 2012 and Occupation safety and Health Act 2007 requirements

[13] Waste management and disposal procedures need to be in accordance to waste management standards proposed under NEMA waste management regulations of 2006 (legal notice 121).

[14] Waste characterization should consider waste from construction site and the contractors' camp if any.

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				• Observing waste management standards proposed under EMCA (Waste Management Regulations 2006. (with a particular focus on waste separation and management before disposal)			
9.	Increased Water consumption for construction	pressure on existing water resources	groundwater table	• The civil works to consider having vertical drains for surface storm water runoff to replenish the water table after abstraction. The vertical drains to be done cautiously to avoid any possible pollution to the water table. • Sensitization and awareness creation among construction workers on significance of water conservation measures. • Curing the concrete structures during evening and early morning to reduce evaporation. • Covering the concrete structures to be cured with sand or any water retaining material to shield from direct sunlight • Regular maintenance and prompt response to leakage in the water system during construction phase. • Use of alternative water sources if available, particularly rain water if any during construction phase	to ensure efficient and sustainable consumption of water resources	KMFRI contractor and the Joint Project Supervision Committee	no direct cost
10.	Risk of Spread of HIV/AIDS	Increased cases of STIs and HIV/AID	Surrounding community	• Promote HIV/AIDS Prevention messaging • Access to safe sex (Condoms-Male and female) • Install HIV testing services at the construction site or an MoU with an	HIV free site	contractor and the joint Project supervision	800,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
		S infections in view of worker on site		existing government health facility in the area. • Support infected workers with access to ARVs from local public health facilities. • Peer counseling services at the site		committee	
11.	Grievances	conflict between affected parties	All project stakeholders	• Establish grievance redress committees at the site • Ensure that there is a trained focal person to facilitate the receipt and management of the grievance resolution process • Ensure contractor staff grievance structures exist • Sensitization and awareness creation among workers and the public on grievance redress mechanisms in place	Prompt addressing of grievances and issues of concern	contractor and the joint project supervision committee	950,000
12.	Effects of Immigrant workers	increase in grievance	workers and the local communities	▪ Contractor should use the local workforce as much as possible (preference to local community members on skills locally available). ▪ Effective community engagement and strong grievance redress mechanisms on matters related to labour ▪ All workers to sign an employment contract including a Code of Conduct governing appropriate behaviour ▪ The workforce should be sensitized to local social and cultural practices and be educated on the expected behaviour and conduct ▪ Contractor should prepare and enforce a No Sexual Harassment and Non-	Maximize benefit to local people and conflict with immigrant	contractor and the joint project supervision committee	no direct cost

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				Discrimination Policy ▪ Contractor should prepare and implement a Gender/SEA/SH action plan ▪ The contractor as part of the C-ESMP will Prepare labor Management Plan (LMP) that included mandatory requirement to procure all unskilled (and as much as possible, semi-skilled) labour as well as locally available materials from the local community and ensure equal pay for same type of work for men, women and people with disability.			
13.	Risk of Child Labour and other labour related disputes	Abuse and exploitation of children	children	▪ Ensure no children are employed on site in accordance with national labour laws. This can be done through incorporating prohibitive provisions in the code of conduct and also having the recruitment policies that prohibits child labour. ▪ Ensure that any child sexual relations offenses among contractors' workers are promptly reported to the police. ▪ Ensure that the CoC and the employment contract has clear measures in dealing with such contraventions ▪ Prioritize to the extent possible recruitment of local labor ▪ Adherence to labor laws and practices such as the working hours and payment ▪ Ensure the workers have contracts with terms and conditions consistent with national labor laws and policies ▪ The Contractor shall keep complete and	zero tolerance to child labour	contractor and the joint project supervision committee	no direct cost

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				accurate records of the employment of labor at the Site to include the names, ages, genders, hours worked, wages paid to all workers			
14.	Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	Injury and Psychological	Vulnerable persons at the work place.	▪ The contractor should prepare and enforce a No Sexual Harassment and Non-Discrimination Policy ▪ The contractor will strive to ensure equitable distribution of employment opportunities between men and women. ▪ Provision of gender disaggregated bathing, changing, sanitation facilities ▪ Whenever harassment are recorded on site, the contractor should ensure prompt and effective remedial action ▪ The employees should be trained and sensitized on appropriate behavior ▪ All workers signing a code of conduct ▪ Sensitization and awareness creation ▪ Measures that will allow for the uptake of complaints without the fear of retaliation (whistle blower policy)	Gender equity at work place and free of SEA	contractor and the joint project supervision committee	150,000
15.	Gender-based violence at community level	Injury	Vulnerable persons in the community.	▪ The contractor will implement provisions that ensure that gender-based violence at the community level is not triggered by the Project, including: ▪ Engagement with community liaison person, effective and on-going community engagement and consultation, particularly with women and girls; ▪ Review of specific project components that are known to heighten GBV risk at the	prevent cases of GBV in the community due to project activities	contractor, community leadership and the joint project supervision committee	200,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				community level, ▪ Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to employment, representation, management, school pupils etc ▪ The contractor will ensure adequate referral mechanisms are in place if a case of GBV at the community level is reported related to project implementation.			
16.	Sexual exploitation and abuse (SEA)	Injury	Vulnerable persons in the community.	▪ Develop and implement a SEA/SH prevention and response Action plan with an Accountability and Response Framework as part of the ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing. ▪ The SEA action plan will include how the project will ensure necessary steps are in place for: ▪ Prevention of SEA: including CoCs and ongoing sensitization of staff on responsibilities related to the CoC and consequences of non-compliance; project-level IEC materials; ▪ Response to SEA: including survivor-centred coordinated multi-sectoral referral and assistance to complainants according to standard operating procedures; staff reporting mechanisms; written procedures related to case oversight, investigation and	zero tolerance to SEA	contractor and the joint project supervision committee	350,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
				disciplinary procedures at the project level, including confidential data management; ▪ Engagement with the community: including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; community-level IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights; ▪ Management and Coordination: including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection and investigation and disciplinary procedures; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated PSEA focal points in the project and trained community liaison officers.			
17.	Spread of COVID-19 amongst community members during	Infection or loss of life	Community members	• Electronic means of consulting stakeholders and holding meetings shall be encouraged, whenever feasible. One-on-one engagements with stakeholders while observing social distance and adhering to PPE wearing shall be enforced; • Avoid concentrating people in a small area	avoidance of infection	contractor and the joint supervision committee	50,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
	consultation processes			based on need basis as the spread of the virus among the population remains dynamic. • The team carrying out engagements within the public on one-on-one basis will be provided with appropriate PPE for the number of people and stakeholders they intend to meet. • Use traditional channels of communications (TV, newspaper, radio, dedicated phone-lines, public announcements and mail) when stakeholders do not have access to online channels or do not use them frequently. Ensure to allow participants to provide feedback and suggestions. • Hold meetings in small groups, mainly in form of FGDs if permitted depending on restrictions in place and subject to strict observance of physical distancing and limited duration. • In situations where online interaction is challenging, disseminate information through digital platform (where available) like Facebook and WhatsApp & Chat groups. • Ensure online registration of participants, distribution of consultation materials and share feedback electronically with participants.			
18.	Spread of COVID-19. During	Infection or loss of life	workers and members of the public	• The Contractors will develop standard operating procedures (SOPs) for managing the spread of Covid-19 during project	avoidance of infection	contractor and the joint supervision	50,000

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
	construction at work sites		accessing the site for some reason	execution and submit them for the approval of the Joint Supervision committee and the client, before mobilizing to site. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel including workers and visitors; • Avoid concentrating more than 15 workers at one location. Where two or more persons are gathered, maintain social distancing of at least 1.5 meters; • Install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;		committee	

The estimated total cost for the implementation of the construction phase ESMP is Kenya Shillings 9,570,000.00 for the resource center and 7,790,000.00 for the Hatchery[15]. However, the actual cost shall be prepared by the contractor and captured in the C-ESMP. The project's Bid Documents will incorporate the Environment, Social Health and Safety Provisions discussed under this ESMP.

[15] The cost does not include monitoring which is captured under chapter 8 elsewhere

Table 7-2: Environmental and Social Management Plan (ESMP) during Sub-project Operation

NO.	ASPECT	RISKS	RECEPTOR	MITIGATION MEASURES	GOAL	RESPONSIBILITY	COST (KES)
1.	Occupational Health and Safety (*accidents and Injuries*)	Injuries and accidents	Training centre staff, maintenance and repair workers	• Workers to be trained on safety at sea as well as swimming. • Regular medical checks of staff to monitor possibilities of water borrne disease contamination • Use of automated equipments to reduce lifting of heavy loads. • To consider tailor made work stations for workers working for long hours. • Adopt rectangular ponds for easy of harvesting the fish. • Ensure compliance to Occupational Safety and Health Act Cap. 514 and its Subsidiary Legislations standards including: registering the office as a workplace, constituting a safety committee, providing first aid facilities, conducting emergency drills and annual office safety audits. • Provide personal protective equipment to operation and maintenance workers • Recording all injuries that occur on-site to workers while doing their daily duties in the incident register, corrective actions for their prevention should be initiated as appropriate. • Cordoning off working sites to protect the public or unauthorized persons during repair	Ensure the safety of workers at the training centre and those who will be conducting routine repair and maintenances activities.	maintenance contractor and KMFRI	To be determined under operation and maintenance costs

				and maintenance of the different utility systems on site • Creation of awareness and training of workers on site on safety and first aid skills, as well as the facility emergency response plan. • Hiring employees with proper qualifications for specialized and risky tasks during operation and maintenance of the various utility systems. • Adherence to Covid-19 rules as provided by the ministry of health and the bank while conducting daily duties. • Providing requisite PPE and training of workers on covid-19 rules and requirements.			
2.	Public health and safety (*accidents and Injuries*)	Injury and accidents	clients seeking services or visiting the training centre	• using signage during cleaning, maintenance, or repair to warn the public • Easily accessible fire risk information to the public visiting the premise • Provision of safe acess routes to avoid drowning by the public. • Prevention and management of sea water from intrusion to community water sources by preventing pond seapage • Adoption of proper dyking to prevent and management of salinaization of agricultural land. Planning the site design and operate in a manner that prevents and control potential impacts of breeding of disease vectors such as mosquitoes.	ensure protection and safety of the public who visit the training centre building	maintenance contractor and KMFRI	To be determined under operation and maintenance costs

3.	OHS risks from working above and falling into deep waters	Risk of drowning	workers	▪ To the extent possible, consider working during low tide periods or use pilling for repair and maintainance of the foundations ▪ The workers to be provided with appropriate footwear to reduce the risk of slipping during repair and maintainance . ▪ Ensure workers are provided with life jackets and enforce use at all times when exposed to sites or working under deep waters ▪ Ensure workers working on such sites are experienced swimmers ▪ Train workers in safety measures when working above deep waters ▪ Avoid working at night to reduce cases of drowning ▪ Having rescue teams on site in the event of an accidents at the swimming pool, fish cages and sea water pump. ▪ Provide necessary information on rescue during emergencies.	To ensure the safety of workers	contractor and Joint Project supervising committee	To be determined under operation and maintenance costs
4.	Deposition of organic matter	algae bloom and high oxygen demand	seascape, benthic ecology and communities below the cages	• Filter feeders to be integrated into the hatchery together with finfish to use uneaten feed. • the cages to be located at least 5 meters above the seascape to allow the benthic organisms to feed on the extra feeds • Locating the cages within areas with optimal environmental factors *(wind, temperature, tidal waves benthic community composition and the size of the feeds)* that will not allow settlement to the sediments.	reduce organic matter loading by the fish cages to the sea sediments	community groups growing the fish	To be determined under operation costs
5.	Inorganic discharges	water quality	sea water, culturing	• Automate hatchery monitoring systems	prevent pollution	community groups	To be determin

	from excretory products	impact	pond and culturing tanks	to mitigate against any human error since marine species are highly sensitive to slight changes in water quality parameters. • Adoption of bio-security measures that prevents introduction of disease pathogens • Limit treatment to substances that do not negativity affect the bio-filter • Adherence to international code of conduct regarding chemical usage		culturing the fish	ed under operation costs
6.	entanglement by marine mammals	injury and drowning	marine mammals	• Before location of the cages undertake site specific assessment to determine the risks associated with the cages. • The assessment to consider temporal and spatial distribution of ecological communities with the cage location area. • conduct regular assessments to determine the impacts of the cages to the marine mammals • Consider using the appropriate cage net based on the community within the location to reduce entanglement.	reduce impacts to non-target species	community groups culturing the fish	To be determined under operation costs
7.	Risk to genetic Diversity of the wild fish from escapes	species extinction	wild fish	• control for the amount and frequency fish escapes from the cages • Avoid or minimize the alteration of natural genome after capture of the fingerlings from the wild to reduce genetic differentiation from similar species. • Retain genetic compatibility between the cultured and wild fish through sourcing	prevent extinction of fish species	KMFRI	To be determined under operation costs

				sufficient brood stock fr0om the wild population in arandom manner • Have mating program that prevents in-breeding and maintain sufficient effective population size • Conduct regular genetic compatibility between cultured and wild fish population as well as before caging • Maintaining a lower population of caged fish in comparison to wild population • Adopt reproductive sterility to eliminate mating by the escaping cultured fish • Regular assessment of the comparative genetic profiles of cultured and wild population.			
8.	spread of parasites viruses, bacterial infection	loss of stock	wild and cultured fish	• Use of vaccines to be considered as a way of reducing the reliance on antibiotics and anti-parasitics. • Regular backwash of inlet pipe with fresh water shall be conducted to kill marine pathogenic organism building up in the pipes • Adopt selective breeding, vaccination, and observing fish health management to control parasitic diseases • regular surveillance and reporting of diseases and parasites • Responsible use of chemicals and antibiotics • Optimizing feeding • Adopting good husbandry techniques	control spread of diseases	KMFRI	To be determined under operation costs

9.	Solid Waste generation	contamination and littering	public nuisance, soil, water and air	• Consider giving back the RO filters to the supplier for safe disposal at the time of replacement. • Consider contracting NEMA registered hazardous waste management expert to manage old/ faulty solar panels related waste or having an agreement with the repair and maintenance firm to return the waste to the supplier replacing the worn out parts for safe disposal. • Sensitization and awareness creation among the office and hatchery users on the significance of waste separation and in addition provide for waste sorting bins at the premise with clear labeling. • Provide for a waste transfer station at the premise for temporal holding of waste before final disposal. • Sensitization and awareness creation among the office building users on the significance of waste recycling. • To engage the county government environment and natural resources department mandated with waste management to collect and properly dispose of the waste.	to ensure waste is managed properly	county government environment and natural resources and KMFRI	To be determined under operation and maintenance costs
10.	Waste water generation	increased waste water generation during	public nuisance, soil and water	• Brine waste water from the RO to be connected to the artificial wetland. • Regular monitor of outlet for water quality parameters before being discharged to the environment.	to ensure adequate treatment and manageme	KMFRI	To be determined under operation and

		operation		• Regular sensitization and awareness to facility users as well as discouragement on releasing detergents or other chemical solutions in black water system. • Regular cleaning of the wastewater drainage system • Regular and proper maintenance of the drainage system • Prompt response to any reported blockage and leakages • Sensitization and awareness of building users from discharging or emptying any chemical solutions or oils to the sewer system. • Treating the waste water through an SBR and using the water for landscaping.	nt of waste water		maintena nce costs
11.	Fire Hazards	destructio n of property in the building and injury to users	building users and KMFRI assets	• Provide recessed swinging type hose reel complete with 30 meters of 20mm internal diameter rubber fire hose with nylon spray/jet shut off nozzle • Provision of a Fire assembly point in the design • Installation of fire extinguishers in the building • Provide signages of fire hose Reel, fire exits and fire instructions. • Provide for fire risk and appropriate response equipment as well as signages with short and clear information. • Train selected staff as fire marshals who	to ensure the building is protected from fire hazards	county government Fire department and KMFRI	To be determin ed under operation and maintena nce costs

				can take lead in case of fire emergency in the building • Regular fire drills for the building users • Regular awareness and sensitization on fire safety measures and response to the users of the building. • Clear fire incidents reporting procedures and response. Ensure regular provision of operational emergency reporting contacts. • Regular servicing and maintenance of the fire extinguishers. • Ensuring availability of adequate water resources at the premise at all times for the hydrants as per the OSHA requirements..			
12.	Electric shock	Shock from electrical devices used in aquaculture such as manifolds, cover water pumps, lighting installations	workers	• Water proof all the electrical installations • Ensure all the cables are intact, water proof and without connections • Ensure fuses are used and there is appropriate connection to the ground • Provide training in correct handling of electrical equipment such as pumps to avoid risks of short circuits	To mitigate risk of electric shock	KEMFRI	To be determined under operation and maintenance costs
13.	Increased Water	pressure on existing	KMFRI, Kwale water and sewerage	• Sensitization and awareness creation among users of the building on significance of water conservation	to ensure efficient and	KWAWASCO and KMFRI	To be determined under

	consumption	water resources	company (KWAWASCO[16]) and other water users	measures. • Use of water efficient appliance such as taps installed with sensors • Regular maintenance and prompt response to leakage in the water system. • Use of alternative water sources eg rain water harvesting • Prompt reporting of leakages through sensitization of the public members	sustainable consumption of water resources		operation and maintenance costs
14.	Increased Energy consumption	contribution to carbon generation and pressure on energy resources	energy resources and climate change	• Sensitization and awareness creation among the facilities users on the significance of energy conservation measures • Sensitization and awareness creation among the maintenance team to continue observing the use of energy-saving electrical appliances on the building. • Proper and regular maintenance of the green energy appliances and equipment provided for in the design of the building.	to ensure efficient and sustainable consumption of energy resources	KMFRI	To be determined under operation and maintenance costs
15.	Spread of COVID-19. During operation at work sites	Infection or loss of life	building Users	• The county departments of fisheries to develop Standard Operating Procedures (SOPs) for managing the spread of Covid-19 during office operation and submit them for the approval by the county department of public health before use of the building. The SOPs shall be in line with the World Bank guidance on COVID-19, Ministry of Health Directives and site-specific conditions; • Mandatory provision and use of appropriate	avoidance of infection	County Public Health department and KMFRI	To be determined under operation and maintenance costs

[16]In the event that KMFRI connect to the utility company's services

	Personal Protective Equipment (PPE) shall be required for all office users including visitors; • Install hand washing facilities with adequate running water and soap, or sanitizing facilities at building entrance including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;	

Table 7-3: Environmental and Social Management Plan (ESMP) during Decommissioning.

NO.	ASPECT	IMPACT	RECEPTOR	MITIGATION MEASURES	Goal	Responsibility	Cost (KES)
1.	Occupational Health and Safety (*accidents and Injuries*)	Injury and accidents	Workers	• Preparation of project decommissioning plan. • Ensure the safety of the decommissioning workers by putting first aid area and injury reporting mechanism • The contractor should consider having a WIBA insurance policy to compensate workers in an event of an accident on site. • Provide personal protective equipment to workers. • Recording all injuries that occur on site in the incident register, corrective actions for their prevention. • Cordoning off demolition sites to protect the public or unauthorized persons • use of signs and warnings on sites with high risks • Creation of awareness and training of workers on-site on safety and first aid skills. • Hiring employees with proper qualifications for specialized and risky tasks. • Ensure compliance to Occupational Safety and Health Act Cap. 514 and it's Subsidiary Legislations.	to ensure workers safety	KMFRI and decommissioning contractor	To be determined under the decommissioning plan
2.	Leakages and spills	contamination and	soil, water, plants, and	• In the event of hazardous waste leakage or spills, engage authorized waste handlers to	to reduce contaminati	contractor	To be determin

		pollution	air	dispose of contaminated soils. • Disposing of contaminated soils in cutting pit if volumes are low. • Use of NEMA licensed waste handlers to dispose of in licensed disposal sites. • Development of site-specific incident management or response plan. • Use of an authorized garage or fuel station in the project area by the contractor or specific concrete and oil traps should be constructed at the contractor's yard.	on on site		ed under the decommissioning plan
3.	Excessive Noise	Auditory injuries and psychological nuisance	workers, residents and neighbouring NAMARET centre	• Adequate use of PPE by the workers e.g. earplugs • Working on and restricting noisy activities during the day • Reducing the duration of exposure of workers to high occupational noise levels during demolition. • Acquisition of permits/Licenses for any activity with high noise levels eg drilling of walls or slabs for demolition. • Using models of machines and equipment with low noise levels. • workers using drilling or handheld pneumatic equipment to be provided with specialized anti-vibrating gloves, • Switching off vehicles and machines when not in use, • Avoiding unnecessary hooting, • Warnings to be issued to the locals in case of any unusual noise levels,	to ensure workers and public safety	KMFRI and decommissioning contractor	To be determined under the decommissioning plan

				• Ensure that NEMA noise and Vibration standards are observed in all project activities.			
4.	Air pollution	contamination of air	air, local communities, and workers	• Workers to use masks when working in dusty conditions during the decommissioning process. • Use all means possible to suppress dust if considered to be a menace during demolishing of obsolete walls or structures on-site	to ensure workers and public safety	KMFRI and contractor	To be determined under the decommissioning plan
5.	Solid Waste generation	littering environment and contamination	water, air, soils, environment, and local residents	• Proper disposal of any hazards waste from the decommissioned site. • Preparation of waste management plan to guide waste management and disposal activities of all debris from demolition activities. • Disposal of debris to NEMA authorized damping sites • Use of certified vehicles or NEMA licensed waste disposal firms for waste management and disposal	to ensure waste is managed properly	county department of environment and natural resources, KMFRI and decommissioning contractor	To be determined under the decommissioning plan
6.	Spread of COVID-19. During construction at work sites	Infection or loss of life	workers and members of the public accessing the site for some reason	• The Contractors will develop standard operating procedures (SOPs) for managing the spread of Covid-19 during project decommissioning and submit for approval to the county department of public, before mobilizing to site. The SOPs shall be in line with Ministry of Health Directives and site-specific project conditions; • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) shall be required for all project personnel	avoidance of infection	contractor and KMFRI	To be determined under the decommissioning plan

	• Install hand washing facilities with adequate running water and soap, or sanitizing facilities at entrance to work sites including consultation venues and meetings and ensure they are used; • Ensure routine sanitization of shared social facilities and other communal places routinely including wiping of workstations, door knobs, hand rails etc.;	

8. Environmental and Social Monitoring Plan (EMoP)

8.1. Chapter Overview

The chapter highlights the environmental and social monitoring indicators for the anticipated negative and positive impacts as captured in

Table ***8-1***andTable 8-2. The preparation of the plan was informed and guided by the indicators that were anticipated in the KEMFSED project Environmental and Social Management Framework 2019.

The institutional responsibilities for implementation and supervision are presented in Section3.7 of this report. The progress reports prepared, incorporating ESMP implementation progress status, shall be on a monthly and quarterly basis. The client (SDBE&F) including the project joint supervising committee and the safeguards consultants shall review the reports and submit to the World Bank.

In addition to regular reporting, all ESHS incidents, accidents, dangerous occurrences including occupational diseases shall be promptly reported to the respective regulatory institution in the prescribed manner and template outlined in DOSH ML/DOSH/FORM 1 and further to the World Bank in line with the requirement of the World Bank EHS guidelines, Occupational Health and Safety Act (OSHA) 2007 and EMCA CAP 387. Investigation shall be conducted, and a corrective action plan developed for every reportable incident to prevent recurrence.

Table 8-1: Environmental And Social Monitoring Plan (EMoP)

PARAMETER/ ACTIVITY	LOCATION	MEANS OF MONITORING	INDICATORS	FREQUENCY	RESPONSIBLE AGENCY		COST
					IMPLEMENTED BY	SUPERVISED BY	
Occupational Health and Safety	construction site	Visual inspection of first aid area, injury reporting mechanism, WIBA insurance policy, appropriate use and wearing of PPE, training programs for workers, health and safety plan prepared for site, clean drinking watering points, housekeeping on site and at the contractor's camp. safety training certificates, gloves, earplugs, safety boots, reflector jackets, drinking water, nose mask, helmet, overall, sanitation facilities, anti-vibrating gloves	▪ availability of approved risk assessment and site safety action plan ▪ Availability of safety and health officer on site during works implementation ▪ No. of trained workers on safety and first aid skills ▪ Availability of First aid facility and injury reporting mechanism ▪ Appropriate use of personal protective equipment (PPE) *(Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, etc.)* ▪ No. of trained workers on appropriate use of PPE. ▪ *Construction site registration with DOSHS* ▪ *Accreditation/licensing of workers and equipment operators, where required* ▪ Adequacy of sanitation facilities on site ▪ Incident register ▪ Maintenance of Contractor WIBA insurance policy	Daily	Contractor	Joint Supervision committee	1,000,000

			▪ No of watering points for worker on site with clean water ▪ MoU with health centre. ▪ Covid-19 management rules/guidelines on site ▪ Covid-19 PPE and use on site. ▪ No of trained workers on covid-19 rules				
COVID-19 spread among workers	Construction site and operating office	Approved SOPs in line with World Bank and ministry of health guidelines in place, routine fumigation of shared area and shared tools, sanitizing and hand washing area and facilities, isolation area, proper use of covid-19 PPE, visual inspection of social distance and rapid covid-19 screening measures	• Approved SOPs in line with World Bank and ministry of health guidelines in place, • No of routine fumigation of shared area and shared tools, • Sanitizing and hand washing area and facilities put in place • Isolation area, • proper use of covid-19 PPE, • visual inspection of social distance and rapid covid-19 screening measures put in place	weekly	Contractor	Joint Supervision committee and County department of public health.	50,000
COVID-19 spread among community members during consultations	at construction site	visual inspection of social distance, electronic channels adopted for engagement of stakeholders, the number of stakeholders per meeting, provision of appropriate PPE during meetings, traditional	• electronic channels adopted for engagement of stakeholders • Measures to observe social distance put in place • Covid-19 PPE use on site • Use of Covid-19 PPE during community engagement • Traditional Communication channels adopted • No. of stakeholders per meeting, • No of digital platform adopted	regularly based on the consultation sessions	Contractor	JPSC and County department of public health.	50,000

		communication channels in use, feedback and suggestion platforms for participants, size of groups attending meetings and digital platforms in use to disseminate information to stakeholders	• Online services of community engagement put in place • feedback and suggestion platforms for participants, • No of people attending meetings				
Public health and safety	Areas surrounding the construction site.	visual inspection of site for; safety signs at strategic places, cordoned off working sites to protect the public or unauthorized persons, usage of signs and warnings on sites with high risks, low speeding of construction vehicle and consideration of wind action. No. of reported injuries and accidents and No. of grievances reported.	▪ Safety signs at high risk places. ▪ Hording off working site and access restriction in place ▪ Speed limit ▪ No of awareness and sensitization activities ▪ Complaints registered by members of the public on safety and health matters	weekly	Contractor	JPSC	no direct cost
Leakages and spills of greases, oil or fuel	contractor yard and construction site	Visual inspection of hazardous waste leakage or spills to soils on site, records of cutting pits for disposed off contaminated soils, Developed site-specific	▪ No of incidents of hazardous waste leakage or spills. ▪ Availability of site-specific incident management and response plan. ▪ Oil trap measures at contractors yard, where necessary	weekly	Contractor	Joint Supervision committee	no direct cost

		incident management or response plan.					
Noise and vibrations	construction site	Use equipment with low noise levels or fitted with mufflers. Visual inspection of site for use of PPE, use of sound proof materials, notices to public on noisy construction activities, restricting noisy activities to day time and regular measurement of noise levels through mobile phone gadgets.	• Noise regulation measures on construction equipments. • No of Equipment and Machine servicing records • Presence of public notices on high noise level activities • use of noise PPE where determined necessary • Guideline on hooting and speed limits. • Records of noise monitoring	weekly	Contractor	Joint Supervision committee	400,000
Air quality	Construction site and along construction vehicle movement routes	Physical inspection of vehicles records to ensure meets emission requirements, Use of masks while working in dusty conditions, shielding wind impacts during construction, low speed of construction vehicle, catalytic devices on vehicle and suppress dust	• Availability and use of dust nests around the construction site • Certificates of inspection on emission for vehicles • No of Workers using air pollution PPEs • Speed limits enforcement • No of times sand and soil material are covered in transit. • Complaints registered on dust nuisance	daily	Contractor	Joint Supervision committee	400,000
Waste generation	Construction site	Visual inspection of; sanitation facilities for human waste management, amount of waste correctly disposed,	• adequacy of sanitation facilities on site for workers • Site-specific waste management plan • Measures of waste avoidance, reduction, reuse and recycle put in	Monthly	Contractor	Joint Supervision committee	200,000

		Visual inspection of haphazard littering, practicing of waste avoidance, reduction, reuse and recycle, designated waste transfer station onsite, documented approved waste dumping site, presence and compliance to implementations of site-specific waste management plan.	place. • Designated waste transfer station on site. • Records of approvals from NEMA and County Government on waste management and disposal. • waste tracking records maintained • Status of housekeeping on site				
Grievances among project stakeholders	construction site	grievance redress committee formed, existence of grievance redress structures put in place, sensitization and awareness creation among workers and other stakeholders on grievance redress structures in place, grievance log forms and	• Grievance redress committees put in place • Contractor staff grievance structures put in place • No. of sensitization and awareness events • No. of grievances logged and status of resolution	Monthly	contractor and safeguards officer	Joint Supervision committee	1,000,000
HIV/AIDS prevalence	Construction site	HIV/AIDS prevention and awareness campaign; as well as HIV/AIDS testing services at the construction site or an MoU with an existing government health	• No. of HIV/AIDS prevention messaging events or meetings • No. of condom supplied and picked • HIV testing services or a MoU with an existing government health facility. • No. of supported infected workers with ARVs • Peer counseling services put in	Monthly	contractor	Joint Supervision committee	2,600,000

		facility in the area, type of support for infected workers for ARVs and peer counseling services at the site.	place • No of trained peer counselors				
Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	construction site	Training of workers on sexual harassment, signing of code of conduct prohibiting GBV/SEA, equitable distribution of employment opportunities, disaggregated bathing and sanitation facilities on site and records of sexual harassment.	• No of Sexual Harassment incidents reported • Proportion of women and men employed • No of sanitation facilities disaggregated by sex • No of reported harassment cases • No of trained and sensitized employees on appropriate behavior • Proportion of workers who have signed code of conduct against SH • Gender action plan	Monthly	contractor	Joint Supervision committee	300,000
GBV at community	construction site	Community? Referral mechanism put in place for GBV cases, Mitigation plan put in place for project activities with high risk GBV incidences, Mechanisms put in place to deter GBV cases and an engagement mechanism put places for GBV victims.	▪ No. of community engagement and consultation with women and girls; ▪ Referral mechanisms put in place in the event of GBV at Community level	Quarterly	safeguards officer	Joint Supervision committee	200,000
GBV: Sexual	Construction site	SEA management plan in place, sebsitization	▪ SEA management action plan ▪ Signed code of conduct (CoC) by all workers and sub-contractors	Quarterly	safeguards officer	Joint Supervision	200,000

exploitation and abuse (SEA)		and awareness creation among workers and the community, SEA response mechanism put in place, Special GRM for SEA cases put in place, SEA awareness in community engagement activities, Integration of SEA management principles in project engagement documents, training of all workers at the construction site and signing of code of conduct prohibiting GBV/SEA	▪ No. of workers trained on CoCs and responsibilities (Proportion of signed CoCs against the expected) ▪ Project-level IEC materials put in place ▪ Survivor-centred mechanisms put in place (how do you measure this?) ▪ Multi-sectoral referral and assistance plan put in place ▪ Disciplinary procedures at the project put in place ▪ Confidential community-based complaints mechanisms in place ▪ PSEA awareness-raising done (no of awareness raising events undertaken attendance along gender lines?) ▪ community-level IEC materials put in place ▪ No of community outreaches to women and girls about social risks and their PSEA-related rights; ▪ Integration of SEA in job descriptions, employments contracts, performance appraisal systems, ▪ Whistle-blower protection and investigation and disciplinary procedures put in place ▪ No. of training of project staff on SEA conducted			committee	
Child Labour and Protection	construction site	Workers to have national identification card, recruitment policy prohibiting child labour	▪ Records of employees including copies of identification cards ▪ Records of child sexual relations offenses reported to the police. ▪ Recruitment policy prohibiting	Monthly	safeguards officer	Joint Supervision	no direct cost

		put in place and review of employee records	child labour put in place			committee	
Labour and employment-related issues	Construction site and contractors office	Physical counts and inspection of records on; No. of locals employed on the project from the employment records. No. of Grievance recorded from employees and how they were addressed	▪ No of local workforce relative to the total workforce ▪ Community engagement plan ▪ Signed Code of Conduct by all workers ▪ No of sensitization meeting on local social and cultural practices on acceptable behavior ▪ Labour Management Plan (LMP)	Monthly	safeguards officer	Joint Supervision committee	no direct cost

The estimated total cost for monitoring of ESMP implementation during the construction phase is Kenya Shillings 6.7 Million. However, the actual cost shall be prepared by the contractor and captured in the C-ESMP. The project's Bid Documents should incorporate the monitoring requirements discussed under this EMoP.

Table 8-2: Environmental and Social Monitoring Plan (EMoP) for Positive Impacts

PARAMETER / ACTIVITY	LOCATION	MEANS OF MONITORING	INDICATORS	FREQUENCY	RESPONSIBLE AGENCY	
					IMPLEMENTED BY	SUPERVISED BY
Employment opportunities	Construction site	temporal Job opportunities for construction workers and service providers at construction site eg (electrical, security)	▪ No of local workers employed at construction site ▪ No of local service providers employed on site to provide security or electrical conduits or cables.	Monthly	Contractor	JPSC
Business opportunities	Construction site	Materials available within the local, Identify local suppliers and identified women food vendor	▪ Amount of materials Sourced locally ▪ No of local suppliers ▪ No of local women food vendors supplying the site.	Monthly	Contractor	JPSC

Acquiring a NAMARET centre with a *(hatchery and a training resource center)*	operation	Constructed training centre	Operational offices	Monthly	Contractor	JPSC

9. GRIEVANCES MANAGEMENT SYSTEM AND PROCEDURE

9.1. Chapter Overview

This chapter describes the procedure and mechanism by which community members and any other sub-project aggrieved parties will be able to report, make, place/lodge, or express a grievance against impacts from construction activities of the NAMARET Training centre office or contractor activities at the site as part of the implementation of the ESIA. The chapter discusses in simple terms the need for a grievance redress mechanism, the grievance redress structure, the grievance redress method, institutional organization, and awareness and sensitization on the grievance redress mechanism.

9.2. Need for Grievance Mechanism

It is anticipated that the construction of the NAMARET Training Centre in the Shimoni location will generate perceived or actual complaints from sub-project interested parties, including community members, workers, individuals, groups, and county officers from other departments affected or likely to be affected by environmental and social impacts of the construction activities. Considering this, it is necessary to anticipate and implement a grievance redress mechanism outlining the KEMFSED project's approach to accepting, assessing, resolving, and monitoring grievances from aggrieved parties regarding the construction of the training resource centre. A grievance is any dissatisfaction or sense of injustice or unfairness felt by a person – in this case, a project affected person or his/her representative in relation to labour, project impacts, GBV, SEA, the work implementation process, the project developer, the contractor, and other project implementation-related scenarios. Typically, the grievance is brought to the attention of the person(s) in authority, referred to in this ESIA report as the Grievance Officer (GO) selected by the project contractor. For this NAMARET sub-project, the contractor's safeguards Officer have been designated as the grievance officer.

9.3. Scope of the GRM

The GRM system will encompass a broad range of community-related grievances arising from construction activities. These include concerns surrounding the recruitment of unskilled labor, with a focus on ensuring fairness and equal access to job opportunities across diverse segments of the community. Additionally, the system will address issues related to noise, dust, and damage to roads caused by construction trucks. Specifically, the GRM system will monitor and respond to complaints regarding noise and dust generated by construction activities, as well as address any damage inflicted on local roads by construction trucks. It will also oversee waste management practices to minimize environmental impact and ensure the health and safety of unskilled workers involved in the construction process. Furthermore, the system will be equipped to handle grievances related to Gender-Based Violence (GBV) committed by site workers, including instances of Sexual Exploitation and Abuse (SEA). This includes facilitating referrals to the criminal justice system when necessary. Additionally, the GRM system will address concerns surrounding child labor and promote safe waste disposal practices within the

community. By addressing these various grievances, the system aims to foster a more inclusive, equitable, and sustainable approach to construction projects that prioritize the well-being of both workers and the surrounding community.

9.3.1. Grievance Log

Documentation of complaints and grievances is important, including those that are communicated informally and orally. These should be logged, assessed, assigned to an individual for management, tracking and closed out when resolved. Records provide a way of understanding patterns and trends in complaints, disputes and grievances over time.

The log will contain a record of the person responsible for an individual complaint, and record dates for the following events:

i. Date the complaint was reported;
ii. Date the grievance log was uploaded onto the project database;
iii. Date information on proposed corrective action sent to complainant (if appropriate);
iv. The date the complaint was resolved

A sample grievance redress form is included in Annex VIII of this report.

Once parties agree on a path forward – such as an apology, compensation or an adjustment to operations – an action plan should be formalized and implemented. Depending on the issue, responses may vary from a single task to a program of work that involves different parts of the operation. Effective responses will also include engagement with parties involved to ensure that the response continues to be appropriate and understood.

For serious gender-based violence cases, the following procedures will be followed

- Ensure access to service – health, psychosocial, legal/security, safe house/shelter, livelihood
- Ensure a survivor centred approach – give the power back to the survivor – listen, present options of support, ensure informed decision making
- Ensure safety – facilitate the survivor feeling safe at all times
- Ensure confidentiality – (for the survivor and her family) Not disclosing any information at any time to any party without the informed consent of the person concerned.
- Actions are to be guided by respect

Non-discrimination - Survivors of violence should receive equal and fair treatment regardless of their age, race, religion, nationality, ethnicity, sexual orientation or any other characteristics

9.4. Grievance Redress Structure

The grievance redress structure for Shimoni sub-projects shall be a 2 tier review and settlement of disputes mechanism. The tiers shall consist of; Site –Level Grievance Redress Committee (SL-GRC) and Joint Project Supervising Committee which shall feed into KEMFSED GRM. In spite of having the different tiers, an aggrieved party is free to lodge a complaint at any level. However, it's encouraged that the complaint should be made at the lowest level possible for

quick and prompt response and only escalated if the issue is complex and cannot be handled at such level.

9.4.1. First level: Site –Level Grievance Redress Committee (SL-GRC)

The first level: Site Level (Project site level) Grievance Redress Committee (SL-GRC), this will be formed at sub-project site in Shimoni location. This ESIA prefers the first level of grievance or conflict redress on project related issues as a result of this sub-project to be handled by the contractor and SL-GRC. The committee will be drawn from the contractor, the community and from the county government. The community representative will be elected by community members. The committee will handle all forms of grievances in an amicable manner and as an alternative dispute resolution to formal process, which is normally lengthy and costly. Grievances not resolved by the site level committees (SL-GRC) will be taken to the second level. In the affected sites as described above there will be a **Site –Level Grievance Redress Committee (SL-GRC)** and the membership will include:

- Area Chief, who will be the chair
- Contractor safeguards specialist who will be the secretary of the committee and
- Male Community Representatives
- Female community representative
- Representative of Persons with disabilities
- Religious representative from Shimoni area

9.4.2. Second level: Joint Project Supervising Committee

The committee will include NPCU Engineer, Director responsible for NAMARET centree, NPCU safeguards team, Deputy County Commissioner for Lunga Lunga sub-county, Kwale. It is envisaged that the committee will be meeting on a monthly basis. Part of their role will be to review grievances emanating from Site-Level Grievance Redress committee and how they have been addressed and to address those that have been referred to them as urgently as possible.

9.5. Grievance Redress Procedure

9.5.1. Step 1: Receipt of Complaint/Grievance

Any aggrieved party shall present a grievance or feedback to the GRM desk at the contractors' office on site. The contractor shall ensure avenues for lodging grievances are accessible to the public for any aggrieved parties. The contractor's safeguards officer shall be designated Grievance officer (GO) to receive and appropriately record in a grievance log form attached in Annex VIII. The grievance log form will indicate grievances, date opened/lodged, actions taken to address or reasons why the grievance was not acted upon (e.g. the grievance was not related to the project), information provided to complainant and date on which the grievance was closed. The complaints can be lodged by telephone, email, physically/verbally, suggestion box, through representatives/third party, letters, face book, what's up, twitter or any other digital platform. The grievance officer shall in consultation with the contractor team resolve all the complaints and refers those which cannot be resolved to **Site –Level Grievance Redress Committee (SL-**

GRC). All cases related to GBV/SEA shall be handled by the KMFRI Director responsible for NAMARET Training centre through appropriate GBV/SEA service provision channels and the details shall not be recorded in the public logbook. For serious GBV cases the KMFRI Director will refer to the National Police Service

The GO (Contractor Safeguards Officer) within an appropriate time period, shall as agreed by the **Site –Level Grievance Redress Committee (SL-GRC)**, acknowledge receipt of complain and assure the complaint of the necessary action being taken. The grievances can also be made to the KEMFSED NPCU either by the complainant, community leaders, community representative or by any other third party of choice, non-chargeable telephone number or website. If the complaint is made at NPCU, NPCU shall take necessary measures to ensure that SL-GRC addresses the complaint. Complains will be acknowledged in a day or within any other project agreed time frame to the complainant confirming that the grievance is received and under investigation for appropriate action. The fisheries office in Lunga Lunga sub-county shall also be an alternative for the complainants who shall not be comfortable to report to the contractor's office directly. However regardless of the source of grievance or complain, the contractor reporting desk will record all grievances on the grievance reporting form or logbook. The complaint could be from members of the public, workers or any other aggrieved party.

9.5.2. Enquire or Investigating the Complain

The complaints received shall be screened to determine whether the matter bares any relationship with the NAMARET sub-project activities, and whether the contractor team can handle the grievance or refer to a more competent or relevant agency. Any grievance matter not related to the sub-project shall be recorded together with the action taken and be escalated as appropriate. The complainant shall be appropriately informed and guided on the next steps. The complaints to be referred shall be those whose issues are not related to the sub-project and the issues raised does not fall within the scope of issues to be addressed by the GRM for example cases of GBV/SEA or any other related criminal offences. The verification and screening process may consist of community site visits and meeting to determine the scale, scope and magnitude of the grievance and available options to address the matter appropriately.

9.5.3. Responding and Resolving the Conflict

All grievances will be responded to through the chairperson of the SLGRC after completing the investigation or enquiry into the matter. The communication should be done within an agreed timeframe of 14 days after the completion of the investigations, discussions and identification of potential means of resolving the matter. Where the investigations and resolution of the issue is delayed, the complainant must be informed appropriately together with the cause of the delay and the new timelines provided in advance. The contractor shall endeavor to solve issues directly and promptly on site but if the matter is more complex or beyond the contractor, it should be handled by the SLGRC or JPSC. If the complainant is not satisfied with the decision made at any stage of the GR structure, the aggrieved party will be made aware of their rights to pursue the

matter to the next level. The complainant however should be informed of the process and directed to a person that will offer the assistance. A copy of written documentation of the decision should be given to the complainant and another copy shared with the next level of the GR structure to bring to their attention of the complaint. The records of any grievance redress process with all the activities that were involved and decisions should be kept well and will be monitored by the NPCU Social Safeguards Specialist and included in regular KEMFSED project reporting. If an aggrieved party is not satisfied with the decision of **Site –Level Grievance Redress Committee (SL-GRC),** the grievance will be escalated to JPSC for review and final decision making. The JPSC should resolve all grievances during the monthly site meetings. If the complainant is stilldissatisfied, further action will be referred to the **Sub-County - Grievance Redress Committee (SC-GRC)**

If the grievance is solved at any stage and the designated, GO and a representative of a GRC will determine a corrective action in consultation with the aggrieved person. A description of the action, the time frame within which the action is to take place, and the party charged with implementing the action will be recorded in the grievance database. Grievances will be resolved and the status reported back to complainants within 7 days. If more time is required, this will be clearly communicated and in advance to the aggrieved person. Cases that are not resolved within the stipulated time, detailed investigations will be undertaken by Joint Project Supervision Committee (JPSC) and results discussed in the monthly meetings with the affected persons. In some instances, it may be appropriate to appoint an independent third party to undertake the investigations.

9.5.4. Follow up and Closure

9.5.4.1. Meeting with the Complainant

The proposed corrective action and the time frame in which it is to be implemented will be discussed with the complainant within **7 days** of receipt of the grievance. Written agreement to proceed with the corrective action will be sought from the complainant (e.g. by use of an appropriate consent form).

9.5.4.2. Implementation of Corrective Action

Agreed corrective actions will be undertaken by **Site –Level Grievance Redress Committee (SL-GRC)** or the contractor within the agreed time frame. The date of the completed action will be recorded in the grievance database and a copy shared with the NPCU Social Safeguards Specialist.

9.5.4.3. Verification of Corrective Action

To verify satisfaction, the aggrieved person will be approached by the GO/NPCU Social Safeguards Specialist to verify that the corrective action has been implemented. A signature of the complainant will be obtained and recorded in the log and/or on the consent form. If the

complainant is not satisfied with the outcome of the corrective action, additional steps will be undertaken to reach agreement between the parties. If additional corrective action is not possible alternative avenues may be pursued.

9.6. Institutional Arrangement at SL-GRC

The committee shall consist of 5 members drawn from the community, county government and the contractor, who will be;

- Contractor safeguards specialist who will be the secretary of the committee and
- Male Community Representatives
- Female Community Representatives
- Area Chief as the chair
- Religious representatives

9.6.1. The role and functions of the committee

The process of lodging a complaint is outlined below:

a) *The designated GO(Contractor's safeguards officer) will receive a complaint from the complainant*
b) *The designated GO will ask the claimant questions in swahili language, write the answers in English and enter them in English onto the grievance form (refer to grievance log form in Annex VIII).*
c) *The local leader (representative of GRC) and the complainant both sign the grievance form after they have both confirmed the accuracy of the grievance.*
d) *The designated GO lodges the complaint in the grievance log.*

9.6.2. The Role and Functions of the Committee members

9.6.2.1. KMFRI Director responsible for NAMARET Centre

- Coordination of the office construction on behalf of Kenya Marine Fisheries and Research Institute
- Coordination of Grievance Management for the whole of NAMARET project management
- Documentation of proceedings, recommendations and decisions related to NAMARET
- Facilitation and provision of information and services to resource persons required to deal with grievances
- Maintenance of grievance-related documents, reports and attendance
- Coordination of grievance uptake channels and ensuring they are operational
- Liason with JPSC, contractor to ensure the publicizing the GRM channels, structure and other essential GRM related awareness and sensitization
- Providing feedback to affected persons and agencies or institutions that are involved grievances

- Reporting progress to JPMC and NPCU in the required format
- Planning and effecting GRM trainings in consultation with NPC safeguards team. Planning and executing grievance redress evaluation and refining the GRM process for continuous improvements.

9.6.2.2. Contractor safeguards specialist

- Operate and manage uptake point for complains and resolving complaints in consultation with the contractor project manager
- Receive and registration of grievance using appropriate forms provided
- Promptly refer grievances to JPSC that cannot be resolved at project level
- Monitor and provide feedback on environmental and social impacts and effectiveness of mitigation measures at project level.
- Provide monthly and quarterly reports on grievances to JPSC through NPCU social safeguards specialist
- Participate in development and implementation of grievance prevention sub-plans.

9.6.2.3. Community Representatives

The community representatives will be elected to represent the interests of the community and participation in decision making process during resolving of grievances. The role of the representative shall include;

- Liaison between the community and the contractor
- Receive and communicate complaints to the contractor from the community members who for some reason cannot register their complains with the contractor
- Participate in training programs
- Be involved in participatory planning with contractor to prevent grievances
- Assist in disseminating project information
- Coordinate community meetings or any other engagement
- Participate in Grievance Resolution meetings

9.6.2.4. NPCU Social Safeguards Specialist

- Generate performance indicators for the GRM on NAMARET site
- Develop reporting and management formats to support the PGRM at NAMARET project site
- Conduct independent monitoring of GRM operations and provide any corrective measures for the project grievance redress committee PGRC.
- Conduct community and stakeholder satisfaction surveys
- Work with the contractor in developing grievance prevention plans.
- Address grievances that require national attention

9.7. Awareness Creation and Disclosure of Grievance

The Grievance Committee members will be oriented with the grievance management system suggested in the ESIA and provided with skills to handle complaints in a just and fair manner. The capacities of the Grievance Redress Committee members will also be enhanced around project mobilization, implementation, Gender Based Violation, Sexual Harassment, Labor issues, child labor and conflict management.

10. CONCLUSION AND RECOMMENDATIONS

10.1. Conclusion

Although mariculture provides a potential to attain reduced dependence on catch fisheries, the use of rudimentary technologies among the coastal communities remains the main challenge to up-scaling mariculture production. Low education and awareness among farmers, unsustainable access to quality seeds, inadequate access to quality and well balanced feeds, inadequate pond management skills, inadequate pest and disease management awareness, lack of consistent technical and extension services and lack of mariculture project management skills among others were identified as the main constraints affecting the sector. The construction of proposed NAMARET centre is anticipated to contribute towards access to sustainable supply of quality and quantity seeds, access to quality fish feeds, dissemination of information on new technology for capacity development and training of skills in mariculture. Such transfer of new technology and skills among mariculture farmers will play a key role towards the development of current small-scale mariculture sector from subsistence to a medium size commercial state to reduce pressure on near-shore fishing, and to enhance access to alternative livelihoods among the coastal communities for improved living standards.

The project has generally positive impacts and for the negative impacts, readily implementable mitigation measures have been proposed. The proposed project area was noted to be a highly modified habitat through anthropogenic activities mainly from settlement. Several institutions as mandated by the laws guiding and governing the project activities will have differing roles on the project at varied phases of the project which shall require synergy as facilitated by SDBE&F. The environmental and social assessment findings indicate that the project impacts are of low impacts. The implementation of the project therefore is not anticipated to significantly influence the physical, biological and social environment. It was further noted that the anticipated impacts shall be of low magnitude due to the size of the project and with mitigation measures having been proposed in this report.

10.2. Mandatory Requirements

The development of the proposed NAMARET centre is anticipated to have some negative impacts socially and to the physical environment. In spite of the anticipated environmental and social impacts, with proper mitigation measures, the project is environmentally viable. The environmental assessment team proposes the implementations of the sub-project with the following recommendations as a requirement during the implementation of the sub-project;

- Before implementation of any fish culture by community groups, a site specific assessments to be conducted to identify any environmental and social impacts unique and specific to a site.
- Any sea-based cage culture farms must be under close supervision of its management by qualified extension officers from KMFRI but not left to communities to reduce any possible bio-risks.

- The KMFRI technical experts to ensure regular monitoring of the wetland's integrity during the operation and maintenance phase to mitigate against any leakage of sea water to the shallow water table in the area. Pollution of the water table may increase salinity.
- KMFRI to ensure that proposed risks and mitigation measures and the project operation phase to be reviewed regularly based on available market technologies.
- The contract shall be between the KEMFSED project under the State Department for Blue Economy and Fisheries, (SDBE&F) and the contractors
- The subcontracts of the contractor will be accepted and cleared by the JPSC in charge of the supervision of the works. The JPSC will be responsible that the subcontractors enforce and apply all measures included in this ESIA including the Environmental Technical clauses included in the bidding document and contracts.
- The Joint Project Supervision Committee to ensure full implementation of ESMP requirements by the contractor and subcontractors during construction/implementation phase
- The contractor's project Engineer and the Environmental, Health and Safety Manager in charge of Environmental and Health and Safety, Labor and Social safeguards officer to prepare a Construction ESMP which shall be implemented by the contractor and all its subcontractors.
- The contractor's project Engineer and the mmanager in charge of Environmental and Health and Safety, Labor and Social safeguards to prepare an Operation ESMP (EMoP) to guide the operation and maintenance of the building by KMFRI during operation and decommissioning stages of the project as required.
- The Joint Project Supervision Committee and the contractor to ensure that the ministry of health and world bank covid-19 guidelines are implemented to the latter at the project site during the construction period and that all the workers commit to observing the rules. KMFRI to ensure the covid-19 rules are adhered to during operation of the building.
- The project contractor and Joint Project Supervision Committee to ensure a functional and effective GRM and that sensitization and awareness is created among construction workers, contractor, subcontractors and the general public, on project Grievance Redress Mechanism (GRM) structures in place in the event of a need to address or report any emerging issues, Gender based violence and Sexual Exploitation Abuse on site or any complains by any aggrieved part in the area.

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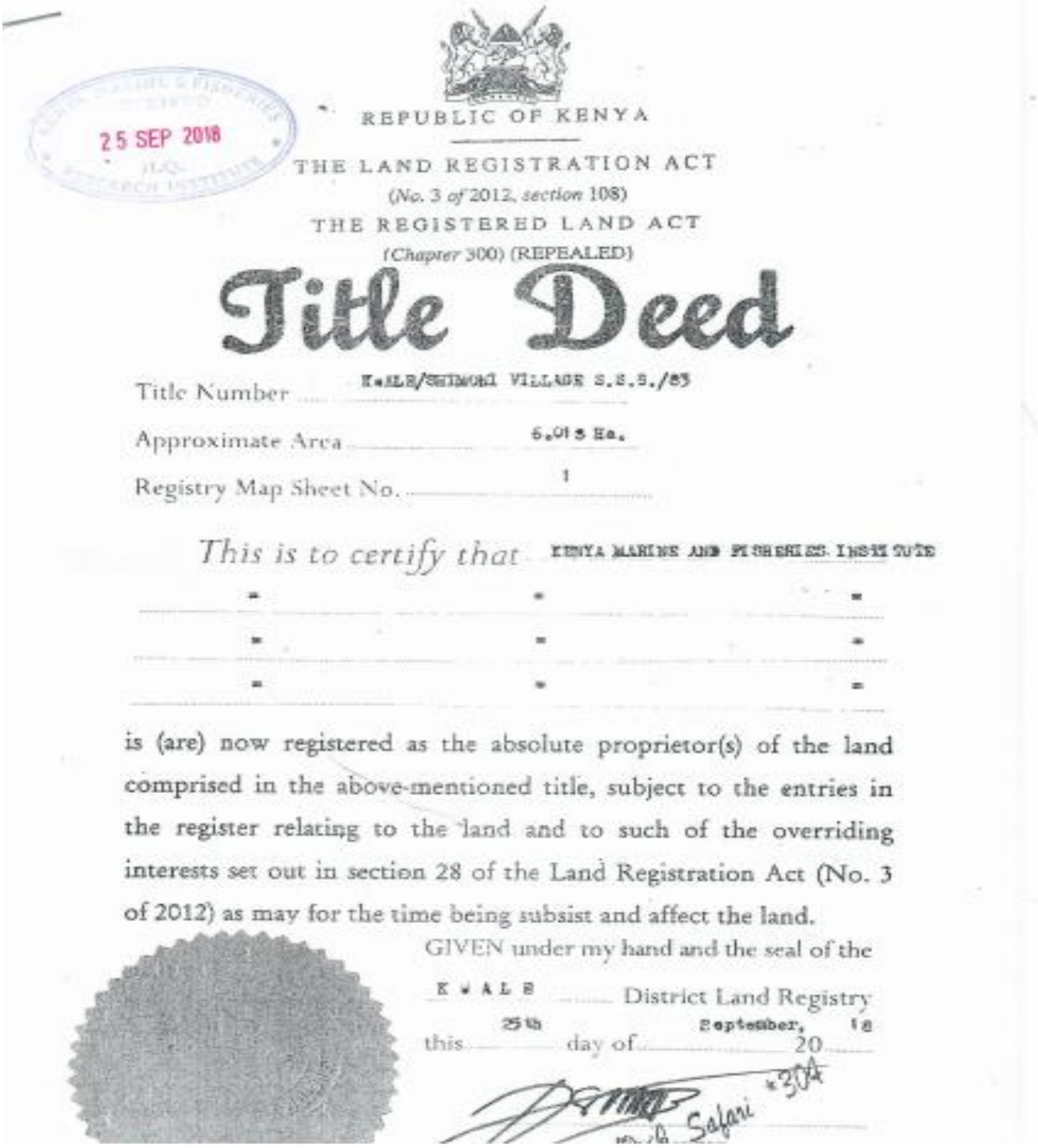
ANNEXES

I. PROJECT DESIGN AND DRAWINGS

Annex IA- Drawings for the Training Resource Centre

Annex IB- Drawings for the Hatchery.

II. Land Ownership Documentations



25 SEP 2018

REPUBLIC OF KENYA

THE LAND REGISTRATION ACT

(No. 3 of 2012, section 108)

THE REGISTERED LAND ACT

(Chapter 300) (REPEALED)

Title Deed

Title Number KWALE/SHIMONI VILLAGE S.S.S./85

Approximate Area 6.015 Ha.

Registry Map Sheet No. 1

This is to certify that KENYA MARINE AND FISHERIES INSTITUTE

is (are) now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 28 of the Land Registration Act (No. 3 of 2012) as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

KWALE District Land Registry

this 25th day of September, 20 18

Safari

III. Minutes for public Consultation and Participation Meeting

KENYA MARINE FISHERIES SOCIOECONOMIC DEVELOPMENT (KEMFSED) PROJECT

STAKEHOLDERS CONSULTATIONS MEETING MINUTES HELD AT NAMARET RESEARCH CENTRE, SHIMONI ON SUNDAY, 6TH NOVEMBER 2022

Type of Meeting:	Local Leaders Consultations Meeting
Date of Meeting:	6th November 2022
Time of Meeting:	10:00AM –2:00PM
Venue:	SHIMONI
Attendance:	30 PARTICIPANTS
Agenda:	*i. Introduction;* *ii. NAMARET Resource Centre project;* *iii. ESIA consultation;* *iv. Concerns and Response;* v. *Close Remarks*

6/11/2022/01: INTRODUCTION

The meeting was opened with a word of prayer from MwarabuDosa Omari. The Chief welcomed the participants to the meeting and outlined the importance of public consultation as one of the constitutional requirement to any important decision affecting the citizenship in Kenya. He invited the community to ask important questions and raise concerns that the community would have raised. He also observed that the community should not later complain that they weren't consulted like the Shimoni Ports project.

6/11/2022/02: NAMARET RESOURCE TRAINING CENTRE

Dr. James Mwaluma proceeded to make a presentation about NAMARET Resource Training Centre.

He noted that NAMARET research facility will help generate quantity and quality marine seeds and broodstock; promote collaborative scientific research within the different stations of the institute as well as other relevant institutions and generate mariculture technologies appropriate for Kenya and the East African region; develop managerial, technical skills for aquatic sector and transfer mariculture technologies to communities.

James reported that the training opportunities offered at the facility will be geared towards developing managerial, technical and skilled manpower for the mariculture sector where skills are most lacking. The courses will be tailored towards community groups and farmers, extension officers, technicians, researchers, academicians and private companies.

Mwaluma noted there were 200 culturable marine species in the Exclusive Economic Zone in the marine space owned by the country.

In his presentation James cited that for mariculture to develop in Kenya sustainably, production of marine species for human consumption will depend primarily on the availability of good quality and quantity broodstock and seed stocks. Currently, James opined that the farmers rearing marine species depend entirely on seeds from the wild. However, he opined that the quantity of seed from the wild is not enough to even maintain mariculture at its current subsistence levels. The establishment of a marine hatchery would help solve this and also ensure production of quality broodstock and seed in good quantities all year round. Currently, there is no marine hatchery in operation in the Western Indian Ocean (WIO) region where farmers can source their seeds apart from the shrimp hatchery in Mafia island Tanzania and the proposed milkfish hatchery in Zanzibar.

Mwaluma also noted that once NAMARET research facility is ready and running, it will create the opportunities for reliable research output which will enhance generation, verification, dissemination and exchange of mariculture information in Kenya and in the Western Indian Ocean region. Tested and approved mariculture technologies developed in the research facility will be transferred to the community and to the small and medium enterprises (SMEs) and private enterprises in Kenya.

Some of the construction units to be included in the development within the NAMARET resource centre will include;

1. *Administration Block*
2. *Research section)*
3. *Training Facility*
4. *Library services and data management unit*
5. *Visitors Areas and Accommodation*
6. *Business park*
7. *Labaratory section*
8. *Hostel facilities*

James informed the attendees that KMFRI will provide 6 hectares of land for the construction of the hatchery facility - Plot Number: PDP No. 141.KWL.4.94 at Shimoni, Kwale County. The land was approved by the community to be a KMFRI Shimoni Center.

To the extent necessary, hatchery and grow-out facilities will be developed and operated as demonstrations and to provide juveniles and brood stock to farmers in the initial stages of sector development, with the goal of promoting the establishment of private hatcheries over time. This center will grow incrementally and focus on one or two key species in its early stage of development, and refining its service-delivery model before expanding to other mariculture products.

James outlined the aquaculture courses will be offered at the center: 1) Seed production; - ornamental (both marine and fresh water); marine water finfish and shell fish; fresh water fish species – Tilapia, catfish etc.; 2) Feed formulation and nutrition - dry – extruded and pelleted feeds; live feeds – Artemia, algae (Spirulina, mitochoccus), rotifers etc; 3) site selection criteria and farm design; 4) Construction of aquaculture services – cages, ponds, aquaria etc.5) Hatchery management; 6) Fish farm management; 6) Fish health and diseases; Aquaculture services - Aquarium services – construction, maintenance and servicing; laboratory services – water quality analysis, plankton analysis, artemia hatchability tests, nutrient analysis etc.; pond culture models, cage culture models, RAS culture systems, aquaponics etc.

James also reported that NAMARET will offer a range of products for their customers in terms of finished or value added products. These products which will be available at a fee include; value added fish products – Fish samosas, sausages, kebabs, skewers, fingers, fillets, burgers, pies, oil, cakes, dried fish products, smoked fish products; artemia cysts and biomas; seaweed products – juice, soap, detergent, shampoo, biopolymers (carrageenan extracts); fish feed – starter feeds, grow-out feed, brooder/finisher diet

He concluded by saying that the resource centre would one-stop shop for conference facilities for meetings, training venues, with the accommodation/hostels; training and extension for youths and women; attachments; exchanges researches; and private partnerships.

6/11/2022/03: COMMUNITY ISSUES/ CONCERNS AND RESPONSE

The participants raised the following issues:

	Names	Issues	Responses
	BakariZonga, Villager Elder	The project is worthwhile, and the community supports it. But there is a really risk that an KMFRI administration or management won't pay attention to community issues both throughout the construction and operational phases of the NAMARET centre?	KMFRI will employ a Community Liaison Person to link the community withKMFRI and ensure that community issues/concerns are well addressed.

		Now that we have given you our approval, how can you possibly avoid becoming condescending?	
	Peter Nyale, Snr. Village Elder	In your Masterplan presentation, I did not see where you will plan to deposit the waste generated by the persons that will be staying and operating from NAMARET Resource Centre.	We'll employ the MBBR system. The Moving Bed Biofilm Reactor is known as the MBBR system (MBBR). A fill-and-draw activated sludge system for wastewater treatment. This approach involves adding wastewater to a single "batch" reactor, treating it to get rid of unwanted materials, and then releasing it. Using a single batch reactor, normalization, oxygenation, and purification can all be accomplished. SBRs have the benefit of allowing for the simultaneous completion of equalization, primary clarification, biological treatment, and secondary clarification in a similar heat exchanger. These benefits can lower the cost and treatment area.
	AthmaniFadhili, Shimoni Developme nt Org,	Do you have land for the NAMARET Training Resource Centre? And has the community approved it for this development project	The project will be done on KMFRI's 6 hectares of land - Plot Number: PDP No. 141.KWL.4.94 at Shimoni, Kwale County. The land was approved by the community to be a KMFRI Shimoni Center in previous meetings.
	Patricia Kamende, Human Right Activist, Shimoni Child Care	The project is likely to result in an increase in foreign tourists and scholars, which could result in sexual tourism, child sex exploitation, and the commercialization of sex among our 18 to 20-year-old teenagers. How does the project intend to lessen the potential for gender-based violence, sexual exploitation and probably sexual harrassment? Can we educate more women and young people so they won't be exploited by the scholars likely to influx Shimoni?	We anticipate that the Contractor will ensure that every one of his employees signs a code of conduct (CoC) throughout the construction period, pledging to refrain from gender-based violence, sexual exploitation of minors, and any conduct that could be interpreted as sexual harassment. We also anticipate that KMFRI will develop a sexual harassment policy in accordance with the Employment Act 2020 requirements and compel all of her staff/visitors to sign a code of conduct that permits avoidance of sexual harassment, exploitation, and actions that may result in GBV.
	Patricia Kamende, Human Rights	How will the project benefit the Shimoni community, which is hosting it? Instead of our local members, we're likely to see a	All Kenyans are expected to profit from the project, which is supported by the Kenyan government and the World Bank. However, employment that doesn't require a lot of

	Activists.	rise in the number of non-locals hired here.	specialization will be reserved for Shimoni residents during the construction and operational phases. The competitive hiring process will be followed for additional specialist jobs.
	Ali Mazrui, Teacher, Shimoni Primary School	This idea of a mariculture research training institute in Shimoni is really ingenious and profound, especially for Shimoni Primary School, who are your neighbours. Is there a way the school may be inspired further, perhaps by starting a club for aquaculture or mariculture? The institutions of KMFRI and KWS might work well together to inspire young kids to mariculture interest and wildlife conservation.	This is possible and the school could initiate this idea with KMFRI. I am sure KMFRI is open to such interesting ideas that help inspire next generation of leaders.
	Mbwana Mohammed, Youth Representative	What happen to "Mikoko" (Mangrove trees" that may be brought down during clearance of the site and laying of the extraction pipeline.	We are all aware the role mangrove trees play in providing natural infrastructure and protection to nearby populated areas by preventing erosion and absorbing storm surge impacts during extreme weather events such as hurricanes and we must protect Mikokoat all costs. They are also important to the ecosystem too and the local ecosystem in Shimoni. Their dense roots help bind and build soils. During the laying of the Shimoni water pipeline from the sea, we may lose Mangroove trees along the Right of Away. However, the design has tried as much as possible to avoid destruction of Mangrove trees (Mikoko).
	Ambrose Nyaga, Patron of Christian Churches Shimoni	Will the project have a component for youth and women especially during the award of tenders or some works.	Young people and women who could be interested in aquaculture or mariculture will likely receive training at the center. Youths who perform manual labor or non-specialized services will be given consideration for employment prospects throughout the construction period of the centre by the contractor.

	Ishmael Ongera, Fisheries Officer	How do you intend to use indigenous knowledge to address fish disease? The fishermen here have a lot of indigenous knowledge that could be tapped to support the research centre	We acknowledge that fact that fisheries resources have existed on earth for centuries and their management has depended on the knowledge available to those that were, and are, entrusted with management responsibilities. Formal technical and traditional knowledge have formed the basis for the formulation of fisheries management approaches in Kenya and we cannot ignore the indigenous knowledge. In the midst of fisheries crises, such as fish stock over-exploitation and effects of climate change on fisheries, there has been great interest in fostering sustainable fisheries management as a means to improve the capacity of fishing communities to adapt to the changes. We have not adequately involved local people who have acquired traditional knowledge through their direct experience with nature and especially fishing. The NAMARET centre will document indigenous knowledge used in fisheries management within the wider context of livelihood systems and indigenous technologies that offer insights of its value to biological scientists of international repute and fisheries managers in Kenya; second, to demonstrate the value of indigenous knowledge as a lens through which biological scientists can look when managing fishery resources. We believe that fisherfolk have a better understanding of the wide range of fishing systems and we will also learn from them.
	Ngarana Mohammed , Wakifundi Initiative, VMGs	How will this project of constructing NAMARET centre benefit the VMGs in Shimoni. Is there a 10% that goes to the community for this support of the VMGs?	We are much aware that Shimoni has Wakifundi, Watshwaka, Wavumba, Washiratzi indigenous minorities. The larger project KEMFSED has a much larger component and budget that mainstreams aspects of VMGs. In fact we will be coming to talk to you on how the project can be of assistance to you.
	Hussein Tuwa, Imam-Shimoni	We support the project but we are also keen not to lose our culture and traditional values. We hope the visit will be as respect to our	No matter their personal opinions, we will expect that the visitors to the NAMARET will willingly step into the cultures and traditions of Shimoni area. They are the guests in Shimoni's

		cultural norms as much as possible.	community and the rules and traditions of Shimoni should hold of significance way of doing things — they must willingly respect the community and relate respectfully to people in the locality of Shimoni. Being culturally responsive requires openness to the viewpoints, thoughts, and experiences of others. This is not about changing others to be more like you. It is about respect and we will expect them to show you respect. On the other hand, we also expect you to develop understanding for other cultures. Developing your understanding of other cultures, or 'cultural awareness', lets you have more meaningful interactions with those around you by celebrating their differences as well as your similarities. We hope this will dispel negative stereotypes and personal biases about different groups. In addition, cultural diversity helps us recognize and respect "ways of being" that are not necessarily our own. So that as we interact with others we can build bridges to trust, respect, and understanding across cultures.
	Halifa Omari Paragi, Chairman BMU Network	Does the project also have intention to improve for us the Beach Landing Sites?	The bigger project KEMFSED has a budget of KES 800M to improve fish landing sites and not beach landing site. However, we need to first ascertain the land ownership document of the proposed fish landing site.

6/11/2022/04: SEEKING COMMUNITY CONSENT

The question was put to the community Chief Adin, if they supported the project and all the attendees raised up their hands in support of the project.

6/11/2022/05: CLOSURE

There being no other business, the meeting ended at 2:04pm with a word of prayer.

Thanks.

Minutes prepared:	**Minutes Approved:**
Secretary:	**Chairman of the Community**
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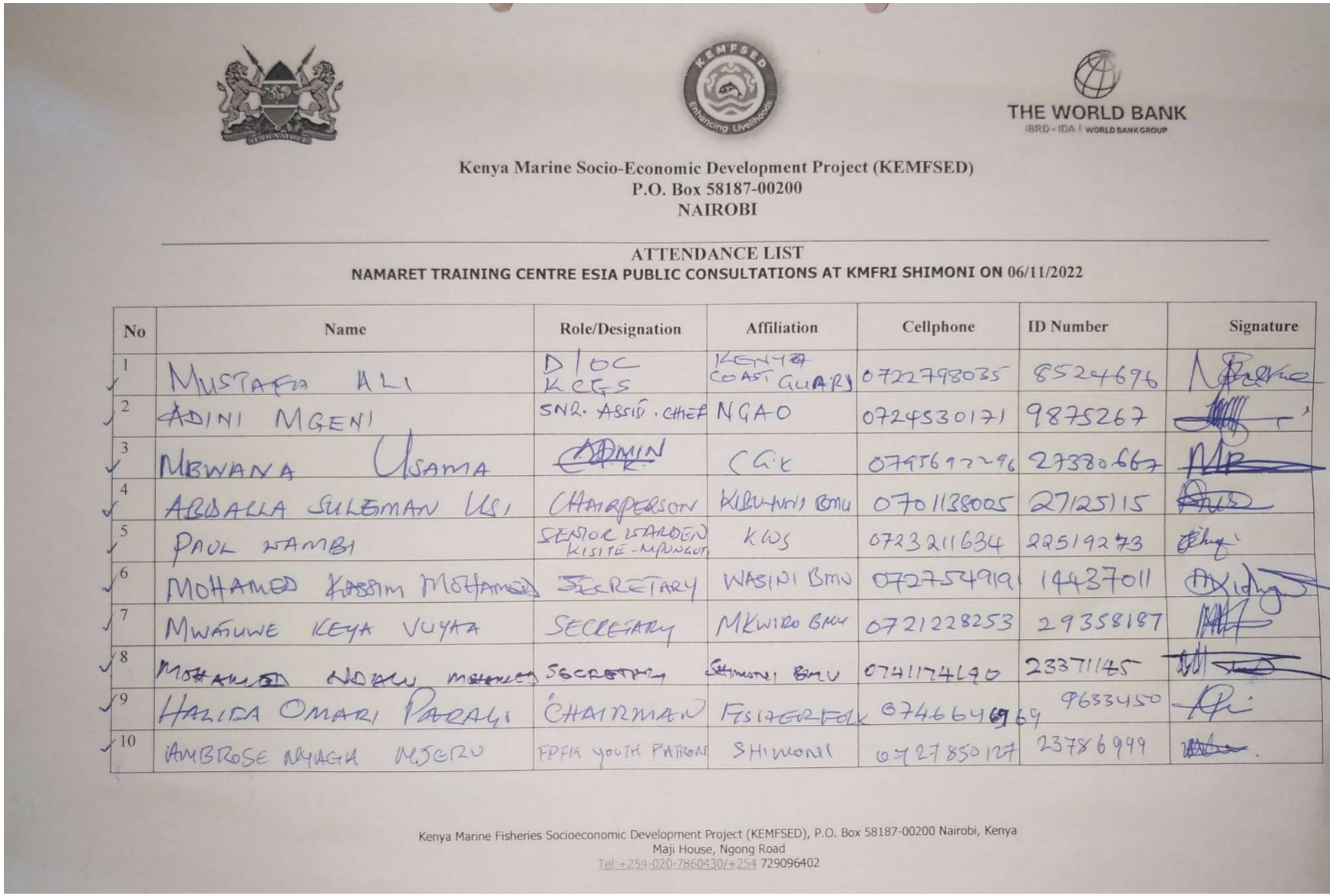
IV. Public Participation and Consultation Attendance List



Kenya Marine Socio-Economic Development Project (KEMFSED)
P.O. Box 58187-00200
NAIROBI

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ATTENDANCE LIST
NAMARET TRAINING CENTRE ESIA PUBLIC CONSULTATIONS AT KMFRI SHIMONI ON 06/11/2022

No	Name	Role/Designation	Affiliation	Cellphone	ID Number	Signature
1	MUSTAFA ALI	D/OC KCGS	KENYA COAST GUARD	0722798035	8524696	
2	ADINI MGENI	SNR. ASSIS. CHIEF	NGAO	0724530171	9875267	
3	MBWANA USAMA	ADMIN	CGK	0795697796	27380667	
4	ABDALLA SULEIMAN ULI	CHAIRPERSON	KUBUNAWI BMU	0701138005	27125115	
5	PAUL WAMBI	SENIOR WARDEN KISITE-MPUNGUTI	KWS	0723211634	22519273	
6	MOHAMED KASSIM MOHAMED	SECRETARY	WASINI BMU	0727549191	14437011	
7	MWAFUWE KEYA VUYATA	SECRETARY	MKWIRO BMU	0721228253	29358187	
8	MOHAMED NOOR MOHAMED	SECRETARY	SHIMONI BMU	0741174190	23371145	
9	HALIDA OMARI PARAGI	CHAIRMAN	FISHERFOLK	0746469769	9633450	
10	AMBROSE NYAGA MUGERU	FPFIA YOUTH PATRON	SHIMONI	0727850127	23786999	

Kenya Marine Fisheries Socioeconomic Development Project (KEMFSED), P.O. Box 58187-00200 Nairobi, Kenya
Maji House, Ngong Road
Tel: +254-020-7860430/+254 729096402

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No	Name	Role/Designation	Affiliation	Cellphone	ID Number	Signature
1	ISHMAEL M. ONGERA	F.O	C.G.K	0718447283	33174063	
2	HUSSEIN IUNA	IMAM	SHIMONI	0705154292	22518816	
3	ABDALLAH B. HAMOLE	CHAIRMAN	SHIMONI	0769069598	23880433	
4	PETER NYALE	V/ELDER	SHIMONI	0712336406	10830303	
5	BAKARI M. ZONGA	IMAM	SHIMONI	0746399224	4619248	
6	YUSUF A. HATIBU	CHAIRMAN	SHIMONI	0799499108	4618869	
7	MWARABU DOSA OMAR	SECRETARY	ANZUWANI BMU SHG	0791601641	30270041	
8	GEORGE WAFULA	Ag. OCS	SHIMONI P/STN	0720579772	25184890	
9	Stephen Mwangi	SRS (KMFRI)	KMFRI	0722796229	5548533	
10						

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No	Name	Role/Designation	Affiliation	Cellphone	ID Number	Signature
1	SAMUEL MWANGI	C/MAN	CHURCH	0727605906	11366357	
2	ATHUMANI FADHILI ALI	ASS-SECRETARY ACTIVITY.	SHIMONI DEVELOPMENT	0721114559	13630891	
3	Patricia Kamende	CO-FOUNDER	PRIDE OF SHIMONI GIRLS	0723996828	21708844	
4	MWAKAJE ALI MOHAMED	MEMBER SHIMONI WOMEN GROUP	SHIMONI WG	0714171488	12488228	
5	QUEREN A. SAMUEL	SECRETARY TABLE BANKING	SILC WOMEN GROUP	0700891280	23201492	
6	BINNY K. BUNDI	V/ELDER/FACADA	FAITH AND COMMUNITY OUTREACH	0791212104	25563439	
7	Nazo Yar Mohamed	WASIM G.	WASIM WG	0721876251	14491260	
8	ALI MAZURI	TEACHER SHIMONI PRIMARY	SHIMONI PRIMARY	0716808894	27308017	
9	MBWANA MOHAMED	YOUTH LEADER SHIMONI	WAKIFUNDI SHG	0708716836	28874987	
10	Badi SEIF	P.W.D	Mkifundi P.W.D	0712311234	8412272	

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P.O. Box 58187-00200
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No	Name	Role/Designation	Affiliation	Cellphone	ID Number	Signature
1	LAZARUS KUBASU	SSS	NPCU	0724881380	21908612	[signature]
2	Jerry Masua	Lands	NPCU	0720254587	13321078	[signature]
3	ENG. S. ANGWENYI	PE	NPCU	0723858256	25119470	[signature]
4	James Mwaluma	DOCS	KMFRI	0711926614	7128148	[signature]
5	David Mirera	AD mariculture	KMFRI	0722046270	13479653	[signature]
6	Godfrey Wabomba	ESS	NPCU	0721712640	22549710	[signature]
7	DAVID MWAGURE	DRIVER	NPCU	0718428122	21084254	[signature]
8	Arch Benard Otoh	Architect	NPCU	0726748801	28140433	[signature]
9	Amos Oyaro	Electromechanical Engineer	SDPW	0723388261	33149175	[signature]
10	Mwanamkuu Khamisi	ADA	KMFRI	0722445029	9987425	[signature]

Kenya Marine Fisheries Socioeconomic Development Project (KEMFSED), P.O. Box 58187-00200 Nairobi, Kenya
Maji House, Ngong Road
Tel:+254-020-7860430/+254 729096402

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NAIROBI

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No	Name	Role/Designation	Affiliation	Cellphone	ID Number	Signature
1	Mchasa Issa	Adm	KMFRI	0704974253	30097987	
2	Daniel Ochoro	Lab	KMFRI	0721616510	13745394	
3	Grace Nduku	FO-KeFS	KeFS	0716294071	31130150	
4						
5						
6						
7						
8						
9						
10						

V. Code of Conduct

IMPLEMENTATION OF ESHS AND OHS STANDARDS, PREVENTING GENDER BASED VIOLENCE AND VIOLENCE AGAINST CHILDREN

I …… acknowledge that I will adhere to the Environmental Social Health and Safety (ESHS) requirements; Occupational Health and Safety (OHS) requirements and statutes preventing Gender-Based Violence (GBV) and Violence Against Children (VAC).

I agree that while working on the project I will: -

a) Attend and actively partake in training courses related to **ESHS, OHS, HIV/AIDS GBV, and VAC** as requested by the employer
b) I will wear **Personal Protective Equipment (PPE)**at all times when at work site or engaged in project related activities
c) Implement Occupational Health Safety management plan
d) Take all practical steps to implement the contractors Environmental and Social Management Plan (C-ESMP)
e) Adhere to zero alcohol policy during work activities and refrain from the use of narcotics or other substances which impair faculties at all times
f) Consent to police background checks.
g) Treat women, children (persons under the age of 18yrs) and men with respect regardless of race, colour, language, religion, political or other opinion, Nation, ethnic or social origin property, disability birth or other status
h) Not use language or behaviour towards women, children, or men that is inappropriate, harassing, abusive, sexually provocative demeaning or culturally inappropriate;
i) Not engage in sexual harassment for instance making unwelcome sexual advances, requests, for sexual favours and other verbal or physical conduct of sexual nature, including subtle acts of such behaviour e.g. *(Looking at somebody up and down, kissing, howling or smacking sounds, hanging around somebody, whistling and catcalls, giving personal gifts, making comments about somebody's sexual life);*
j) Not engage in sexual favours for instance making promises or favourable treatments depending on sexual acts or other forms of humiliating, degrading or exploitive behaviour;
k) Not participate in sexual conduct or activities with children including grooming or contact through digital media. Mistaken belief regarding the age of the child or consent from a child is not a defense or an excuse.
l) Unless there is full consent by all parties involved, I will not have interactions with members of the surrounding communities, this includes relationships involving the withholding or promises of actual provision of benefits (e.g., monetary or non-monetary) to community members in exchange for sex. Such sexual activity is considered "non-consensual" within the scope of this code of conduct

m) Consider reporting through the Project Site Agent, ESH officer or to my supervisors any suspected or actual GBV, and VAC by a fellow worker, whether employed this company or not, or any breaches of this code of conduct

With regard to children under 18 years

i. Whenever possible ensure that another adult is present when working in the proximity of children
ii. I will not invite unaccompanied children not related to my family into my house unless they are at immediate risk of danger or physical danger
iii. I will not use any computers, mobiles phone, videos or digital cameras or any other medium to exploit or harass children or to access children phonography or use of children images for work related purposes
iv. Refrain from physical punishment or discipline of children
v. Refrain from hiring children for domestic or other labour related work
vi. Comply with all relevant local legislations including labour laws in relation to child labour and world Bank Safeguards Policies on child labour

Use of children images for work related purposes

a) When photographing or filming a child, assess and endeavour to comply with local tradition or restriction for reproducing personal images
b) Before photographing or filming a child, must obtain informed consent from the child, parent or guardian of the child. As part of this, I must explain the use of the photograph or the film.
c) Ensure photographs films videos and DVDs present children in a dignified and respectful manner and not in the vulnerable and submissive manner. Children should be adequately clothed and not in poses that could be seen as sexually suggestive.
d) Ensure file labels do not reveal identifying information about a child when sending images electronically

NON-RETALIATION ON REPORTING CODE VIOLATIONS

- No one will be victimized for reporting the violation of this code of conduct.
- A reward will be offered for genuine reporting of this code violations as deemed fit by the Management.

Sanctions

I understand that if I breach this individual code of conduct, my employer will take disciplinary action which could include: -

- Informal warning
- Formal warning
- Additional training
- Loss of one week's salary

- Suspension from employment (without payment of salary) for a period of one month
- Termination of employment (without benefits)
- Report to the police if warranted

I……ID No …… do hereby acknowledge that I have read the forgoing individual code of conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS OHS GBV and VAC issues, I understand that any action inconsistent with this individual code of conduct or failure to act as mandated by this individual code of conduct may result in disciplinary action and my on-going emolument

Signature……

Name……..

VI. Technical Clauses for Contractor Implementation

CLAUSES TO BE IMPLEMENTED BY THE CONTRACTOR AND ALL SUB-CONTRACTORS AS A REQUIREMENT UNDER THE CONTRACT.

1. The Contractor shall not commence any works or mobilization unless a notice of no-objection by the Joint Project Supervision Committee (JPSC) as guided by the World Bank to the Contractor, on measures the Contractor proposes to manage environmental and social risks and impacts and Code of Conduct for Contractor's Personnel is submitted and approved as part of the Contract.
2. Code of conduct shall be prepared adopted and shall embody the commitment of the Contractor (including sub-contractors and day workers) to conduct construction related activities in accordance with all applicable laws, rules and regulations with high ethical standards. The Contractor, workers and its subsidiaries shall comply with the Code of Conduct in a manner consistent with high ethical standards. Failure to observe the Code of Conduct may subject a worker to disciplinary action by the contractor, up to and including termination. Furthermore, violation of the Code may also be in violation of the law and may result in civil and /or criminal penalties for the worker, supervisors and/or the firm. The Contractor employees, Managers and Directors shall take all responsible steps to prevent a violation of the Code, to identify and raise potential issues, and to seek additional guidance when necessary, if any questions regarding the best course of action in a particular situation on the Code one should therefore promptly contact the project proponent for assistance
3. The Contractor shall also ensure that the Code of Conduct is visibly displayed in multiple locations on the site and any other place where the works will be carried out, as well as in areas outside the site accessible to the local community and project affected people. The posted Code of Conduct shall be provided in languages comprehensible to Contractor's Personnel, Employer's Personnel and the local community.
4. The County safeguards officer (ESSO) will be responsible for organizing environmental training of all the Engineer's and Contractor's staff. It is required that this training is coupled with the site safety training that the Contractor should include in his own site safety and health management plan. The Contractor shall ensure that the KEMFSED Project Engineer is informed of all staff that will work on the site and their general responsibilities and shall make sure that they are available to attend briefing sessions arranged by the ESSO on the environmental mitigation measures that are to be in place on the site. The Contractor shall facilitate the ESSO as shall be requested.
5. The wages paid to staff employed by the contractor shall be fair and reasonable having regard to those commonly paid in the trade or industry in which such staff are employed and undertake to comply with such requirements relating to hours of work and conditions of labour as are or may from time to time be laid down in the legislation of Kenya.
6. Without prejudice to their obligations under Kenyan Employment Act, the Contractor shall keep proper wages books and time sheets showing the wages paid and the time worked by the staff under their employment in and about the carrying out of this Contract and such wages books and time sheets shall be produced whenever required for inspection by any officer authorized by the Contracting authority.

7. The Contractor shall recognize the freedom of his employees to associate. The Contractor shall at all times during the continuance of the contract display a copy of this Article in full on his site office notice boards for the information of his employees.
8. Due precautions shall be taken by the contractor, and at his own cost, to ensure the safety of his staff and labor and in collaboration with and to the requirements of the local health authorities, to ensure that medical staff, first aid equipment and stores, sick bay and suitable ambulance service are available when required throughout the period of the contract and that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements. The contractor shall undertake safety and health risk assessment and develop safety and health management plan which shall be reviewed and approved by the supervising engineer before any works can commence.
9. Burning of waste materials will not be permitted on site but instead the waste disposed of in authorized dumpimg sites as per the requirements of NEMA within the county. Hazardous materials such as tires, plastic rubber products, used oil products, or other hazardous materials shall be disposed of by contractors' licensed to handle such waste.
10. The Contractor shall comply with applicable National laws, orders and regulations concerning the prevention, control and abatement of excessive noise. Any activity producing high-intensity impact noise will not be performed during the night
11. The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage, of solid matter, contaminants, debris, and other pollutants and wastes into streams, flowing or dry watercourses, sea, and underground water sources. Other pollutants may include: concrete, oil and other petroleum products. Excavated materials or other construction materials shall not be stockpiled or deposited near or on stream banks, sea shorelines or other watercourse perimeters where they can be washed away by high water tide or storm runoff or can in any way encroach upon watercourse itself.
12. The Contractor shall comply with applicable laws and regulations concerning the prevention and control of air pollution. Notwithstanding the above in conduct of construction activities and operation of equipment, the contractor shall utilize such practicable methods and devices as are reasonably available to control prevent and otherwise minimize atmospheric emissions or discharges of air contaminants. The emission of dust into the atmosphere shall be strictly controlled during the preparation, handling and storage of concrete and aggregates, and the contractor shall use such methods and equipment as are necessary for the collection and disposal or prevention of dust during these operations.
13. The Contractor's methods of storing and handling cement and lime shall also include means of eliminating atmospheric discharges of dust. Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.
14. The contractor to take all measures necessary including sensitization and awareness among workers and the public to avoid or minimize the spread of communicable diseases such HIV/AIDS, TB, STIs and non-communicable diseases associated with the execution of the works, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. This includes taking measures to avoid or minimize their

transmission. The Contractor shall ensure that condoms are provided as part of the HIV/AIDS control program to all staff.

15. The contractor shall prepare procedures for prevention, preparedness and response activities to be implemented in the case of an emergency. The procedures to establish and maintain a safe working environment without risk to health at all workplaces, machinery, equipment and processes under the control of the Contractor. Any allegation, incident or accident, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Employer's Personnel or Contractor's Personnel shall be promptly, but not later than 24 hours,be reported by the contractor to the Employer.
16. The contractor to conduct training for workers on first aid, safety and health, appropriate use of PPE and on grievance redress mechanism with details of the training to be provided, records to be kept.
17. The Contractor shall require that its sub-contractors execute the Works in accordance with the Contract, including complying with the relevant environmental and social safeguards requirements as captured in the ESIA report, ESMP and the SEA/SH Prevention and Response Obligations or as shall be guided from time to time depending in changes in circumstances or updating C-ESMP.
18. The contractor and all subcontracts relating to the works shall be bound by appropriate national and World Bank policies' consequences of failing to comply with SEA/SH prevention and response obligations.
19. The contractor shall be required to give fair and reasonable opportunity to sub-contractors from the county where such opportunities arise.
20. The Contractor where applicable to source staff and labor with appropriate qualifications and experience from within the county or sub-county. Where applicable from the general project implementation area (from Coastal Counties)
21. The Contractor shall have and maintain throughout the contract period, a valid an insurance cover against liability for claims, damages, losses and expenses arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel working on the project.
22. The contractor and all the associated sub-contractors to put in place a policy prohibiting any form of child labor and where such cases arise the contractor to meet appropriate sanctions or legal action as per the national laws and World Bank policies prohibiting such cases.
23. The contractor to provide appropriately or reasonably long-term contracts to workers and avoid as much as possible using casual laborers.
24. The contractors to put in place measures to avoid, prevent, control and manage covid-19 infection among workers and the community during engagement. The contractor to prepare the guidelines cognizance of Ministry of health and World Bank Covid-19 guidelines as well as appropriate PPE use on site.
25. The contractor to take all necessary measures to ensure that in the process of sourcing of material or executing the works does not perpetuate the spread of invasive plant or animal species. And that all measures shall be taken including measures to avoid, prevent, minimize or manage such incidences.
26. The contractor shall commit to adhere to implementation of all safeguards requirements as per KEMFSED project documents, ESIA report, C-ESMP or as shall be reviewed and

issued from time to time in the cause of implementing the proposed sub-project activities and should anticipate for the associated cost.

VII. List of Indicators for Monitoring

NO.	ASPECT	LIST OF POTENTIAL INDICATORS TO BE MONITORED
1.	Occupational Health and Safety (*accidents and Injuries*)	▪ Site safety risk assessment and prevention action plan ▪ Trained workers on safety and first aid skills ▪ First aid facility and injury reporting mechanism put in place ▪ Appropriate use of personal protective equipment (PPE) *(Reflective jackets, helmets, face masks, ear plugs gloves, safety boots, etc.)* ▪ Trained workers on appropriate use of PPE. ▪ Sanitation facilities provided on site for human waste disposal ▪ Incident register and safety/health incidents recorded ▪ Updated contractor WIBA insurance policy ▪ Watering points for worker on site with clean water ▪ Memorandum of Understanding with nearby health centre. ▪ Covid-19 management rules/guidelines on site ▪ Adequate covid-19 PPE and use by all persons on site. ▪ Trained workers on covid-19 rules and requirements.
2.	Public health and safety (*accidents and Injuries*)	▪ Use of safety signs at strategic places with high risks to public. ▪ Hording off working sites ▪ Speed limit measures in place ▪ Awareness creation and sensitization activities for the public
3.	Visual/ aesthetic Impacts	• Backfilling of soil cuttings • Landscaping of the project site
4.	Leakages and spills	▪ Recorded incidents of hazardous waste leakage or spills. ▪ Site-specific incident management or response plan. ▪ Oil trap measures at contractors yard
5.	Excessive Noise	• Noise regulation measures on construction equipments. • Construction equipment and Machine servicing records • Records of public notices for high noise level activities • Appropriate use of noise PPE by workers • Measures in place to reduce unnecessary hooting and speeding. • Records of regular measurement of noise levels
6.	Air pollution	• Identified potential sources of air pollution on site • Dust control measures adopted on site • Any complaints registered on dust nuisance • Measures put in place to control effect of wind on material being transported
7.	Solid Waste generation	• Site-specific waste management plan • Measures of waste avoidance, reduction, reuse and recycle put in place. • Designated waste transfer station on site. • Records of approvals from NEMA and County Government on waste management and disposal

NO.	ASPECT	LIST OF POTENTIAL INDICATORS TO BE MONITORED
8.	Increased Water consumption for construction	• No. of sensitization and awareness creation among construction workers • Measures to conserve water during structure curing. • Records of response to leakage in the water system. • Alternative water sources
9.	Risk of Spread of HIV/AIDS	• No. of HIV/AIDS prevention meetings • No. of workers having access to safe sex (condoms-Male and female) • Installed HIV testing services or an MoU with an existing government health facility in the area. • No. of supported infected workers with ARVs • Peer counseling services put in place
10.	Grievances	• Grievance redress committees put in place • Contractor staff grievance structures put in place • Sensitization and awareness creation on the GM • No. of grievances and status of their resolution (Grievance log)
11.	Effects of Immigrant workers	▪ No of local workforce and proportion relative to the total workforce ▪ Community engagement plan in place ▪ Signed Codes of Conduct by all workers ▪ Sensitization meeting on local social and cultural practices on acceptable behavior ▪ Sexual Harassment and Non-Discrimination Policy ▪ Labour Management Plan (LMP)
12.	Child Labour and Protection	▪ Records of employees including copies identification cards ▪ Records of child sexual relations offenses reported to the police. ▪ Recruitment policy prohibiting child labour put in place ▪ Review of employee records
13.	Gender Equity, Sexual Harassment and abuse amongst workers in the workplace	▪ Sexual Harassment and Non-Discrimination Policy ▪ No of women and men employed ▪ No of sanitation facilities per sex ▪ Records of reported harassment cases ▪ Trained and sensitized employees on appropriate behavior ▪ Signed code of conduct against SH ▪ Gender action plan
14.	Gender-based violence at community level	▪ Implemented measures to prevent GBV at community level ▪ No. of community engagement and consultation with women and girls; ▪ No. of sub-project activities identified to be of high GBV risk at community level. ▪ Referral mechanisms are in place in the event of GBV at Community level
15.	Sexual exploitation and abuse (SEA)	▪ SEA management action plan ▪ Signed code of conduct (CoC) by all workers and sub-

NO.	ASPECT	LIST OF POTENTIAL INDICATORS TO BE MONITORED
		contractors ▪ Workers trained on CoCs and responsibilities ▪ Project-level IEC materials put in place ▪ Survivor-centred mechanisms put in place ▪ Multi-sectoral referral and assistance plan put in place ▪ Disciplinary procedures at the project put in place ▪ Confidential community-based complaints mechanisms in place ▪ PSEA awareness-raising done ▪ community-level IEC materials put in place ▪ No of community outreach to women and girls about social risks and their PSEA-related rights; ▪ Integration of SEA in job descriptions, employments contracts, performance appraisal systems, ▪ Whistle-blower protection and investigation and disciplinary procedures put in place ▪ No. of training of project staff on SEA conducted
16.	Spread of COVID-19 amongst community members during consultation processes	• electronic channels adopted for engagement of stakeholders • Measures to observe social distance put in place • Covid-19 PPE use on site • Use of Covid-19 PPE during community engagement • Traditional Communication channels adopted • No. of stakeholders per meeting, • No of digital platform adopted • Online services of community engagement put in place • feedback and suggestion platforms for participants, • size of groups attending meetings
17.	Spread of COVID-19. During construction at work sites	• Approved SOPs in line with World Bank and ministry of health guidelines in place, • No of routine fumigation of shared area and shared tools, • Sanitizing and hand washing area and facilities put in place • Isolation area, • proper use of covid-19 PPE, • visual inspection of social distance and • rapid covid-19 screening measures put in place
18.	Spread of invasive species	• Ensuring cleanliness of the project construction vehicles accessing or leaving the site to reduce spread of *Prosopis juliflora* currently on site. • Create awareness among the workers

VIII. GRIEVANCE LOG FORMS

GRIEVANCE LOG FORM: **GRIEVANCE NO:**.....

Name of Complainant	**Gender:**		**Age:**	
	Male		**18 – 35** **36 – 65** **65 - Above**	
	Female		**18-35** **36 -65** **65 - Above**	
Contact Information	**Phone No:**		**E-mail:**	
Location of the Complainant County	County	Sub-County	Ward	Village
Signature of the Complainant	Or if he chooses to be anonymous		Reason for staying anonymous	
Description of the Complaint (s)				
Resolution of the Complaint	**Yes**		**No:**	
Referral	**Yes**		**No:**	
If referred: **Who was it referred and what is position or title of the referral**	**Contact of the referrals**		**E-mail of the referral**	
Resolution Communicated to the Complainant	**Yes**		**No**	

IX. WATER QUALITY RESULTS

CHEMICAL ANALYSIS REPORT

SAMPLE No: 136/2022 **DATE SAMPLED:** 28/02/2022 **DATE SUBMITTED:** 01/03/2022

SOURCE: Well – Shimoni (KMFRI) **SUBMITTED:** Sydney

PURPOSE OF SAMPLING: Check Quality

No.	PARAMETERS	UNITS	RESULTS	KS EAS 12:2014 STANDARDS
1.	pH	pH Scale	7.5	6.5 – 8.5
2.	Turbidity	NTU	1.36	Max 5
3.	Conductivity	µs/cm	5430	Max 1500
4.	Total Hardness	mg/l	800	Max 300
5.	Chloride	mg/l	1480	Max 250
6.	Total Alkalinity	mg/l	206	Max 300
7.	Magnesium	mg/l	68.32	Max 100
8.	Calcium	mg/l	210.6	Max 150
9.	Total Dissolved Solids	mg/l	2715	Max 700
10.	Salinity	mg/l	2442	Max 250
11.	Colour	Hazen	2.5	Max 15
12.	Others	Smell	-	Non-Objectionable

COMMENTS :

As per the analysed parameters, the water **is not chemically** suitable for domestic purposes due to its high mineral content.

J. Nguru
WATER QUALITY OFFICER

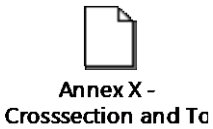
COAST WATER WORKS DEVELOPMENT AGENCY
02 MAR 2022
WATER QUALITY SECTION
P. O. Box 90417-80100, MOMBASA

P.O. Box 90417-80100
Mombasa Kenya

Tel: No. 041 - 2315230

Email: info@cwwda.go.ke
Website: www.cwwda.go.ke

ANNEX X. TOPOGRAPHICAL SURVEY MAP FOR SEAWATER INTAKE



Click the icon to access Topographical survey map

ANNEX XI. MINUTES FOR WAYLEAVE NEGOTIATIONS BETWEEN KMFRI AND SHIMONI PRIMARY BOARD

Click the icon to access minutes for wayleave

ANNEX XII. WATER ABSTRACTION PERMIT

The Chief Executive Officer
Water Resources Management Authority
P.O. Box 45250 – 00100
NAIROBI

Form: WRMA 001A
Catchment: _____
WRMA ID: _____
File: _____

Water Resources Management Authority

APPLICATION FOR WATER PERMIT

(To be submitted in triplicate) *(Rules 23,24,71,72)*

Type of Water Use	Surface Water				Groundwater		Effluent Discharge	Swamp Drainage
	Diversion	Abstraction	In-stream Works	Storage	Shallow well	Borehole		
Tick Box		✓		✓				
Attach Form	1B	1B	1B	1C	1D	1D	1E	1F

PARTICULARS OF APPLICANT	DETAILS		
1 Full name of applicant(s) (in Block Letters)	KENYA MARINE & FISHERIES RESEARCH INSTITUTE		
2 Category of Applicant - Individual, Group [Association, Society] Company, Institution	INSTITUTION		
3 ID Number of Applicant (Incorporation or Certificate of Incorporation or Registration for Groups or Companies	SCIENCE AND TECHNOLOGY ACT CAP 250		
4 PIN Number (where available)	P051100906E		
Physical Address where water is to be used		**Contact Address of Applicant**	
5 L.R. Number(s)	KWALE/SHIMONI VILLAGE/	11 Box Number	P.O. Box 81651
6 Village(s) Ward(s)	555/93	12 Town	MOMBASA
7 Sub-location(s)		13 Post Code	80100
8 Location(s)		13 Telephone Contact (Landline)	020-2021560/1
9 Division(s)		14 Telephone Contact (Mobile)	0712003853
10 District(s)		15 Email Contact	director@kmfri.co.ke

WATER RESOURCE DETAILS	
16 Name of Body of Water or Aquifer where water is to be diverted, abstracted or stored	SHIMONI CHANNEL
17 Is the point of diversion or storage in a Protected Area or a Groundwater Conservation Area? (Yes/No)	NO
18 Sub-catchment Number	
19 Class of Water Resource	
20 Name of Body of Water or Aquifer where effluent is to be discharged	
21 Sub-catchment Number (Effluent)	
22 Class of Water Resource (Effluent)	
23 Category of Application (Class of Permit)	
MIXING WATERS	
24 State the authorization(s) and permits already issued in respect of the water use on the land described in No. 4 HERE, state "Nil" if YES, list authorization or permit number(s)	NEMA CERTIFICATE

Note: Shaded Areas to be filled in by WRMA Officials