THE REPUBLIC OF KENYA
KENYA PORTS AUTHORITY

Preparatory Survey for the Project for Infrastructure Development in Mombasa Special Economic Zone in the Republic of Kenya

PREPARATORY SURVEY REPORT

NOVEMBER 2022

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI Co., Ltd.
NIPPON KOEI Urban Space CO., LTD.

ED
JR
22-137

Exchange Rate as of December 2021 for Civil/Building works

1 USD = 113.48 JPY

1 KES = 1.0236 JPY

Exchange Rate as of May 2022 for Procurement of Equipment

1 USD = 121.02 JPY

1 EURO = 134.06 JPY

1 KES = 1.0586 JPY

PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Nippon Koei Co., Ltd. and Nippon Koei Urban Space Co., Ltd.

The survey team, from January 2019 to November 2022, held a series of discussions with the officials concerned of the Government of Kenya and conducted a field investigation. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Kenya for their close cooperation extended to the survey team.

November, 2022

SHIMOKAWA Takao
Director General,
Economic Development Department
Japan International Cooperation Agency

Summary

1. Outline of the Country

The country of Kenya is located in the East Africa and bordered by 5 countries of Somalia, Ethiopia, South Sudan, Uganda and Tanzanian. The country area is 583,000km^2 and the population is 47.6 million. The population is concentrated in Nairobi, Central and West regions. The population density of Nairobi is 6,274 person/km^2. Mombasa city is facing the Indian Ocean of the southeast of the Kenya and, in terms of having Mombasa Port as the doorway of the East Africa, it is taking the central role of the regional economy. The area, population and population density of Mombasa are approximately 220km^2, 1.2 million and 5,495 person/km^2, respectively.

The temperature in Mombasa is consistently high throughout the year. The temperature in dry season, namely from January to March, are relatively high and it slightly decreases in rainy season with less than 30 degrees Celsius. From 2004 to 2013, the average annual rainfall in Mombasa is approximately 960mm/year. The monthly average precipitation in rainy season and dry season are quite different: namely the former is 214mm/month in May and the latter is less than 5mm/month in February. According to the average monthly precipitation data, 45% of annual precipitation is observed from April to June and 30% of it is observed October and November.

Kenya maintains 4.6%~6.3% of the economic growth ratio since year of 2012. In 2018, the GDP reached USD 87.9 billon and the GDP per capita was USD 1,711. Kenya belongs as a low-income country by the classification of the World Bank. According to data in 2016, the GDP is shared 34% by the agriculture, forestry and fishery, 55% by the service sector, 10% by the manufacturing industry. The service sector is keeping about 50%, the agriculture, forestry and fishery are increasing and the manufacturing industry is reducing.

2. Background of the Project

Based on the request of the Kenyan Government, Japan International Cooperation Agency implemented the Mombasa Special Economic Zone Development Master Plan Project (Mombasa SEZ M/P (2015/9)) from January 2014 to August 2015 and formulated a master plan for Mombasa Special Economic Zone Development. At the Japan-Kenya Summit in August 2016, it was agreed that the Mombasa Special Economic Zone Development Project would be developed in cooperation with Japan and Kenya and the necessary infrastructure development will be considered through Loan Project and Grant Aid Project. The development required at the start of operation in Phase 1 of the three development phases envisaged in Mombasa SEZ M/P (2015/9), which are land development, wells, transmission and distribution pipes, elevated water tanks and drainage channels and construction of temporary road for land development, were decided to be developed through the Grant Aid Project.

The development of the necessary infrastructure was determined by “Mombasa SEZ Development Project” that was conducted prior to this Preparatory Survey, as Port, Internal Road and Power Supply by Loan Project and Rainfall Drainage, Water Supply, Land Development (for the part of development trigger area) by Grant Aid Project. After commencement of the Preparatory Survey, the demarcation of the project scope between Loan Project and Grant Aid Project was reviewed and planned on the assumption that the Grant Aid Project, including additional components of the Control Gate in Port Access Road, Administration Building and Access Road to Administration Building, starts prior to the Loan Project. After that, the project scopes between both projects were re-considered on the assumption that the both projects are implemented in parallel, and it is necessary to avoid the intervention in the construction works of the both projects. Based on the result of discussion and coordination between KPA and relevant Kenyan authorities, the project component of Grant Aid was determined as below.

Component	Grant Aid Project	Loan Project
Water Supply	1.Intake Facilities (3 wells) 2.Transmission Pipeline (Transmission Pipe (Well - BPS) 3.Booster Pumping Station (BPS) 4.Main Transmission Pipeline (BPS-Reservoir) 5.Distribition Pipeline (Kwale WSP) 6.Water Service Center 7.Connection pipeline (to Mombasa WSP)	1.Distribution Pipeline (SEZ-Substation) 2.Main Distribution Pipeline (SEZ) on the Port Access Road
Drainage	1.Bank Protection on the existing natural drain	1.Diversion Channel-1 2.Diversion Channel-2
Land Development	1.Earthwork 2.Admi. Building for FP operation. 3.Building Support Work (restroom building, bus roundabout, foot path & vehicle road around admi. building, car parks, street lighting apparatus, guardrail & fence, and other utilities)	1.Control gate for admi. worker, and access gates between admi. building premises and bus roundabout area 2.Security fence to segregate the port area (FP) from outside area
Road Construction	1.Temporary Road for D1 land development from the soil disposal area (FTZ-B area) till D1 land area	1.Entire Port Access Road of 4.3 km, including ancillary facilities such as traffic sign, street lighting apparatus, guard rail, etc. 2.Junction between Port Access Road and Admi. building access road, including ancillary facilities such as traffic sign, street lighting apparatus, guard rail, etc. 3.Waiting Bays located inside and outside of the Control Gate, including ancillary facilities such as traffic sign, street lighting apparatus, guard rail, etc. 4.Control Gate on Port Access Road, including ancillary facilities such as traffic sign, street lighting apparatus, guard rail, etc. 5.Admi. building access road from the junction with Port Access Road till D1 Land boundary
Port	-	1.Port
Cargo Handling Equipment	Reach stacker (for empty), forklift, terminal tractor, container chassis	1.Mobile harbour crane, reach stacker (for quay and yard)
Substation	-	2.Substation

3. Environmental and Social Considerations

1) Environmental and Social Impact Assessment

The Environmental and Social Impact Assessment (ESIA) Study for the Project was conducted according to JICA Guidelines for Environmental and Social Considerations (2010) and the Environment Management and Coordination Act (EMCA, 1999 and amendment in 2015) of Kenya. Followed by the submission of the ESIA report to National Environment Management Authority (NEMA) for approval, the EIA license for the Project was successfully issued to KPA in May 2022. In addition, the supplementary ESIA (S-ESIA) report was prepared in June 2022 in order to adjust with latest project schedule and scope because a part of project design was slightly modified from the original scope of the early stage of the preparatory survey.

2) Stakeholder Consultation

A series of consultation meetings for Abbreviated Resettlement Action Plan (ARAP) study and ESIA study were conducted from June to November 2019. Additional disclosure meetings were conducted in January and April 2022, following the development and approval of the KPA Dongo Kundu Compensation Policy in November 2021. The disclosure meetings were conducted using the brochure in Swahili language and included 3- high level meetings with National Government Officials, Member of County Assembly, Area Members of Parliament, and Village Elders and Project Affected Persons (PAPs) Committee, and village-level meetings with all the affected people within the SEZ. The compensation policy was largely accepted by the PAPs who showed concerns on provision of additional

infrastructures in the arranged resettlement sites, job opportunities and the timeline for the implementation of the project.

3) Land Acquisition and Resettlement

The Project affects 2.09 ha of private land in Kwale County and 55.76 ha of government land within the Mombasa SEZ in Mombasa County. 61 Project Affected Households (PAHs) totalling to 142 PAPs will be physically displaced. In general, a total number of the PAHs is 271 and PAPs is 540 including both physically and non-physically displaced. An ARAP study was conducted in November 2021 in line with the JICA Guidelines for Environmental and Social Considerations (2010) and updated in May 2022 following the development of the Compensation Policy and changes in the project scope. The updated ARAP was approved by KPA in May 2022.

4. Contents of the Project

1) Design Policy

Water Supply Component

Category	Item	Design Policy
Pipeline	Material	HDPE (Transmission pipe, Main transmission pipe, Distribution pipe, Connection pipe) GI (Water supply facilities except pipeline)
	Min. Design Flow Velocity	0.5m/s
	Max. Design Flow Velocity	3.0m/s
	Min. Hydraulic Gradient	Transmission pipe: LWL (well) ~ HWL (underground reservoir at booster pumping station) Main transmission pipe: LWL (underground reservoir at booster pumping station) ~ HWL (elevated tank at Mombasa SEZ Reservoir)
	Min. Dynamic Water Pressure	Not less than 0.04MPa
	Max. Hydrostatic Pressure	Not more than 0.74MPa
	Air Valve	Install at the protrusion point. In case there is no protrusion point, install the air valve at every 1km to 3km.
	Blow Off Valve	Install at the depression point.
	Earth Covering	Not less than 1.5m: road controlled by KeNHA Not less than 0.6m: all other roads
	Bend	Installation of thrust block
	Hydraulic Calc.	Hazen-Williams Formula
	Valve Chamber	RC chamber with steel cover
	River Crossing	Concrete encasement
	Road Crossing	Apply non-open cut method, or concrete encasement for open cut section
Pump	Intake Pump	Submersible pump (600m^3/day, 800m^3/day, 900m^3/day)
	Booster Pump	Horizontal volute pump (670m^3/day x 3nos.+210m^3/day x 1no.)
	Distribution Pump	Pump capacity (200m^3/day)
Reservoir	Booster Pumping Station	RC underground reservoir (V-100m^3 : W-5m x L-8m x D-2.5m), clearance from HWL to soffit level of top slab≧500mm
	Mombasa SEZ Reservoir	RC ground reservoir (V-1,000m^3 : D-20m x H-3.18m), Clearance from HWL to soffit level of top slab ≧500mm Elevated tank, RC foundation, H=15m, Steel tank (V-54.5m^3: W-3.66m × L-6.10m × D-2.44m)
Building	Control Room・Guard House・Water Kiosk	RC foundation, Concrete block wall, GCI sheet roofing (Control Room), RC roofing (Guard House and Water Kiosk), Steel window, Steel door
Others	Generator	Electricity supply for the pump and control house
	Cable	From the commercial power to pump and control house From the generator to pump and control house
	Crane	Fixed gantry crane for well pump Manual hoist for booster pump

Drainage Component

Facility	Item	Design Policy
Bank Improvement	Protection Method	Gabion
	Max. Side Slope	1:1.0
	Provision of Loss of Soil	Placing geotextile sheet underneath gabion

Land Development Component

Work Item	Description	Design Policy
Land Development	Concept	Designing of cutting and filling work, leveling, and related facilities. Permanent facilities, such as internal road, drainage, etc., are excluded.
	Development plan elevation	Development plan elevation is set according to the planned elevation of the front access road. A slope that can be drained to the seaside is provided on the development surface.
	Development flat area	Minimum area required for development.
Slope	Gradient	The gradient of slope is set to ensure stability.
	Step	Providing the step at appropriate positions to maintain stability on the slope.
	Slope protection	Cutting slope: Shot concrete, Filling slope: In-situ concrete frame and vegetation mat
	Slope drainage	Drainage is installed on slope and steps.
	Small dike	A small dike is installed on slope shoulder.
North Filled Area	Soft ground countermeasure	Considering countermeasures for a soft layer on the existing ground under the embankment.
	Wave breaker	Since the embankment faces the seaside, a wave breaker is considered at a toe of the slope.
	Underground drain	Underground drains are installed around the natural ground to discharge groundwater smoothly.
Drainage	Temporary drainage	In the D1 area, only embankment construction and leveling is performed. Therefore, a temporary drainage facility is provided on the development surface.
	Stepped drainage	Stepped drainage (permanent facility) is installed on the northern slope to connect with the temporary drainage facility, and rainwater is discharged to the seaside.
Other Facilities	Building support facilities	Restroom building, bus roundabout, foot path & vehicle road around admi. building, car parks, street lighting apparatus, guardrail & fence, and other utilities (water supply pipes, sewerage, drain ditches, sleeve pipes for electric and communication cables)
Earth Work	Soil disposal	Excavated soils should be utilized as earth fill material as much as possible. All remaining soil is to be disposed to FTZ-B area inside the SEZ.

Building Facilities

Design Policy
For the size setting, confirm the size of each room corresponding to the planned capacity and furniture layout, and design the facility. In this Project, the Administration Building, which has the total floor area of 866.32m^2 and is located in the D1 area of Land Development Component, will be the target of the cooperation.

Road Component

Facility	Item	Design Policy
	Road Classification	Temporary access road
	Number of Lanes	2 lanes
	Carriageway Width	3.5m
	Cross Slope	2.5%
	Horizontal Alignment	To avoid intervention to construction work of Port Access Road and the existing houses, other structures and cultivated land
	Vertical Alignment	Road surface elevation should be higher than the annual highest tide level
	Gradient	Not more than 8.0 %
	Pavement	Crushed stone placing
Cross	Design Flow	Road Cross Pipe Culvert: 2-year probable flow

Facility	Item	Design Policy
Structure	Design Flow Velocity	Less than 3m/sec
	Roughness Coefficient	PC concrete pipe: 0.015
	Design Flow Depth	80% of culvert height

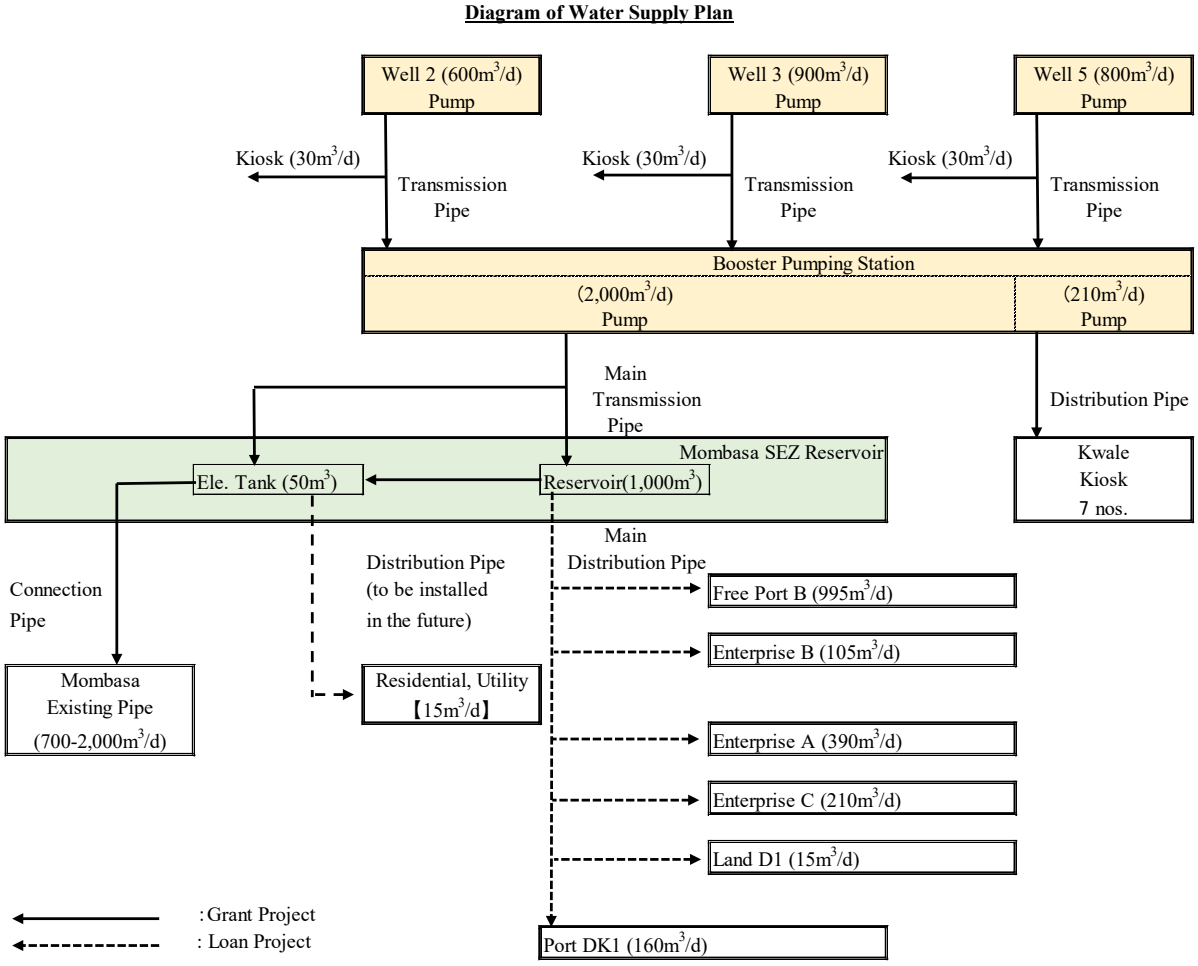
Procurement Policy of Cargo Handling Equipment

Procurement Policy
Equipment will be selected taking KPA's experiences of using similar equipment and easy procurement of spare parts and consumables into consideration as well as price. Therefore, the country of origin in procurement of equipment and spare parts is not limited to Japan and the third countries are acceptable as well. In addition, trial run, initial operation training and equipment management guidance to KPA by manufacturer(s) should be included in the procurement condition.

2) Basic Plan

Water Supply Component

The water supply plan in this Grant Aid Project is shown below.



Water Sources

Specifications of the well are shown below.

Item	Borehole Depth (m)	Casing Material	Casing Diameter (mm)	Statistic Water Level (m)	Dynamic Water Level (m)	Sustainable Discharge (m^3/hr)
Well No.2	80	Steel	203	48.5	59.5	25.2
Well No.3	80	Steel	203	43.8	65.3	38.5
Well No.5	63	uPVC	152	45.0	47.3	35.0

Transmission Pipe

Principal features of the transmission pipe are shown below.

Item	Transmission Pipe			Pump		
	Material	Diameter (mm)	Length (km)	Discharge (m^3/min.)	Head (m)	Power (kW)
Well No.2- BPS	HDPE	160	5.4	0.417	74	11
Well No.3- BPS	HDPE	160	1.4	0.625	77	15
Well No.5- BPS	HDPE	160	2.5	0.556	61	11

Booster Pumping Station

The specifications of booster pumps which are planned to be installed in the premises of CWWDA office in Tiwi are shown below.

Item	Discharge (m^3/min.)	Head (m)	Power (kW)	Nos
For SEZ	0.868	86	22	3
For Water KIOSK	0.146	147	7.5	2

Main Transmission Pipe and Distribution Pipe

Principal features of the main transmission pipe for water transmission to the Mombasa SEZ Reservoir and the distribution pipe for water supply to the water kiosks are shown below.

Item	Material	Diameter (mm)	Length (km)
Main Transmission Pipe / BPS - MSR	HDPE	280	16.1
Distribution Pipe / BPS – Water KIOSK	HDPE	90	14.4

Mombasa SEZ Reservoir

Construction of the Mombasa SEZ Reservoir is planned inside the east interchange in the intersectional area of the Mombasa South Bypass Road and the Port Access Road to be constructed in the future. The main facilities in the Mombasa SEZ Reservoir are a ground reservoir, an elevated tank and a water supply administration building. The principal features of the water supply administration building are given below.

	Room Name	Capacity/Use	Size/Floor Area
1	Ground Floor		
1)	Office	8 staffs	24m^2
2)	Water quality laboratory	Water quality test	16m^2
3)	Storage	Stock of equipment and chemical	8m^2
4)	Workshop/Electrical room	Maintenance service for water supply/ Distribution board	16m^2
5)	Toilet	Male 1, Female 1,	12m^2
6)	Tea serve kitchen	Sink, Outlet for Heater	4m^2
7)	External Corridor	Corridor	W=1.8m
2	Others		
1)	Apron	AC outdoor unit	W=1.5m

Connection pipe

A connection pipe is installed to transmit water to the existing water supply pipe of Mombasa WSP on Likoni Road. It is installed along the Mombasa South Bypass road. The principal features of the pipe are provided below.

Item	Material	Diameter (mm)	Length (km)
Connection Pipe	HDPE	225	5.7

Drainage Component

Planned drainage facilities are summarized below.

Facility	Structure Type	Material	Principal Features
1.River Bank Improvement	Gabion revetment	Gabion mat	B5.0 m, Max. Slope:1:1.0, H:2m~3m, 3 locations of river bank protection, total length of gabion mat: 2,250m (H=0.5m, B=1.2m)

Land Development Component

D1 land is located along side of the port access road and established as a part of Development Area D in the SEZ M/P. Considering the above condition, the shape of D1 land is determined on the basis of the SEZ development boundary, stagewise development boundary of the Area D and alignment of the port access road. The design includes earthworks and temporary facilities, such as drains and ponds. Permanent facilities, such as internal roads and drainage, are excluded. Considering the land development cost that is dependent on the cut volume, fill volume and slope protection area, 10 ha of the land area was determined as the most cost-effective area. In addition, an area for the administration building for free port operation and the external works, including restroom building, car park, bus roundabout for access to DK1 and other utilities (the total area of approximately 1,5 ha) was set up in the D1 area. The planned elevation of D1 area was set to FH (Formation Height) =18m in line with the highest elevation of the port access road on the front area, and a 1% drainage gradient is provided on the sea side.

Slope

The slope height of the reclaimed area is up to 15m on filling slope and 13m on cutting slope. Taking into account that the existing soil is shale and weathered rock that is liable to cause slaking, the design conditions of the slope structure and slope protection were determined as given below.

Item	Design conditions	Slope Protection Work
Cutting slope	Slope gradient 1:1.5, Small steps installed every 7m	Concrete shotcrete
Filling slope	Slope gradient 1:2.0, Small steps installed every 4m	Cast-in-place concrete crib and vegetation mat

Slope Drainage

The slope drainage facilities will be used to prevent slope erosion and stability degradation due to rainwater flowing down the filling slope and cutting slope. In-situ concrete channel of 300mm x 300mm will be installed through horizontal channel on steps and connected to vertical channels constructed at 20m interval with joint boxes on slope. Finally, water is discharged from a joint box in the foot of the slope through a discharge pipe.

Filling Area on the North Side

A complicated topography is currently observed at the north side of the D1 land that is located to the sea. The altitude of this area is about 3m and embankment is planned on this part. The soft layer with a thickness of 1m in the surface layer confirmed by the geological survey is replaced with good soil. Since the tide level is expected to rise above the bottom of the filling slope, a gravity retaining wall is constructed as a wave breaking work. An underground drainpipe should be installed to prevent rainwater from entering the embankment. Three perforated pipes of φ300 is installed between the existing ground and the embankment. Rainwater is discharged to the seaside.

Rainwater Drainage Facilities in D1 Area

In the D1 area, except for the layout of KPA administration building and the car park, future layout plan has not been decided. Therefore, temporary earth ditches are installed on the surface of the planned ground, and a temporary junction pond is installed on the sea side for discharging rainwater. The collected rainwater is discharged to the sea side from a stepped drainage (permanent facility) on the slope. A gabion is installed at the bottom to prevent erosion of the existing ground.

Relation between Wave Breaking Facilities and Tide Level

Since both High Astronomical Tide (HAT) and Mean Hight Water Springs (MHWS) are lower than the bottom level of the water breaking facilities, it is considered that there will be no significant impact such as scouring by waves.

Administration Building

The outline of the Administration Building is as follows: 2 stories, RC structure, floor area: 866.32m2. The room composition of the building is shown below.

	Room Name	Capacity	Size/Floor Area
1	Ground Floor		
1)	Entrance Hall	Main entrance	112m^2
2)	Office (1)	One Stop Service Center	201m^2
3)	Office (2)	Security / Maintenance and Fire alarm panel	28m^2
4)	Machine Room	PC server, Telephone exchange PBX	14m^2
5)	Toilet	Male 1, Female 1, Multi-purpose1	
6)	Tea Serve kitchen	Sink, Outlet for Heater	6m^2
7)	Staircase	Main stair	W=1,500mm
8)	Outdoor Stairs	Emergency stair	W=800mm
2	First Floor		
1)	Corridor	Both way width	W＝1,800mm
2)	Office (3), (4)	36 staffs	172m^2
3)	Office (5)	10 staffs	17m^2
4)	Office (6)	Director, Secretary, Waiting room	57m^2
5)	Toilet	Male 1, Female 1	
6)	Tea Serve kitchen	Sink, Outlet for Heater	6m^2
7)	Staircase	Main stair	W=1,500mm
8)	Outdoor Stairs	Emergency stair	W=800mm
3	Others		
1)	Flag poles+ Plaque	Outdoor	
2)	Garbage collection	Trash bucket rack, Sink	

Road Component

Temporary Road

A temporary access road was planned for securing an access to the D1 land development site. This access road connects directly the D1 land development site with the proposed soil disposal area (FTZ-B area) and the construction works in the Grant Aid Project can be proceeded without intervention from/to the works in the Loan Project. Therefore, the road alignment was established keeping sufficient distance from the Port Access Road and D1 Access Road to be constructed under the Loan Project. In addition, the alignment is selected so as to avoid impacts to the existing houses, facilities and cultivated lands as much as possible. As the road runs on the flat and low-lying area, the lowest road surface elevation is set at higher than the annual highest tide level. The particular design conditions are indicated below.

Facility	Length/Area	Road Width	Footpath	Pavement
Temporary Road	2.4km	7m (3.5m carriage way x 2 lanes)	No footpath	Crushed stone placing for the carriage way

Procurement of Cargo Handling Equipment

The summary of cargo handling equipment is as follows.

Equipment Name	Principal Features	
Reach Stacker (for empty container) Quantity: 4 nos.	Min. Lifting Capacity Stacking Capacity Boom Engine Wheel Base Truck Width Turning Radius	: 9 ton : 3 rows : two stage Telescopic Type std 5 high at 9.6 inches and 6 high 8.6 inches : six-cylinder turbocharged heavy-duty radiator and transmission oil cooler : 4.4～5.4m : 4.0～4.2m : 5.4～7.0m
Forklift (10 ton) Quantity: 3 nos.	Min. Lifting Capacity Wheel Base Overall Length Overall Width Turning Radius Max. Travel Speed Engine Torque at low rpm	: 10 ton load center 600~1,200 mm, mast height 4,700~5,700 mm : 2,900～3.300mm : 4,900～5,800mm : 2,490～2,550mm (front)、2,000～2,025 mm (rear) : 4,200～4,600mm : 28km/h (load), 30km/h (without load) : 6-cylinder turbo diesel, Type III specifications : over 590 Nm at 1,400-1,500 rpm
Forklift (5 ton) Quantity: 4 nos.	Min. Lifting Capacity Max. Overall dimensions Max. ground clearance Engine Min. Power Output Max. Lift Height Fork Carriage	: 5.0 ton at load center 600 mm : length 4.2~4.5m x height 2.4~2.7m x width 1.4~1.5m : 190～240 mm at wheel base center : water-cooled 4-cylinder in-line direct injection diesel engine : according to ISO1585 or EU2016/1628 stage V : 4 m : according to ISO2328, Type IVA
Terminal Tractor Quantity: 14 nos.	Engine Engine Output Torque at low rpm Muffler and Exhaust Stack Cabin Hydraulic System Pneumatic System Min. Lifting Capacity	: six-cylinder in-line direct injection turbocharged, low emission rating. (at least Tier III) : 150kW or more at 1,800-2,200 rpm : 800 Nm or more at 1,100-1,500 rpm : Vertical muffler and exhaust stack : single man in right-hand drive configuration : heavy-duty hydraulic system for steering and lifting 5th wheel plate : high-capacity air compressor for the system 450cm^3 or more : 32,000 kg
Container Chassis Quantity: 14 nos.	Min. Loading Capacity Dead Weight Total Length Total Width Total Height Max. Travel Speed Axle Load Load on 5th wheel	: 65 ton : 6.6～9.5 ton : 12.7～14.4m : 2.7～2.86 m : 1.50～1.89 m : 40km/h(load), 47km/h (without load) : 46～50 ton : 23～28 ton

Source：JICA Study Team

5. Implementation Schedule and Cost Estimation of the Project

The Project is implemented in one phase and in Mombasa and Kwale counties. Through the Project, Detailed design & Tendering and Construction & Inspection are planned to be implemented for 7.5 months and 22 months, respectively.

Based on the quotations that were collected in December 2021 for civil and building works and May 2022 for procurement of cargo handling equipment, the preliminary project cost was estimated. However, part of the cost burden of Japan is closed due to the confidentiality.

The expenses of Kenyan side required to implement the project was estimated equivalent to 355 million Japanese Yen (Refer to Table 2.5.2). In addition, the following annual expenses will be required for O&M.

Total Cost Burden of Kenya (Annual)

Item	Cost Burden of Kenya (Ksh mil.)	Yen Equivalent (Yen mil.)
Usage fee for water source	0.09 *1	0.09
Usage fee for electricity	11.0 *1	11.3
Usage fee for telecommunication	0 *2	0
O&M costs for water supply component	0 *3	0
O&M costs for land development component	0 *4	0
O&M costs for cargo handling equipment	83.96*5	85.94
Total	95.05	97.33

*1: Cost estimated applying annual price escalation rate of 6% for the cost at Sep. 2019.

*2: New expenses will not be incurred unless KPA decides to install cable telephone system because use of mobile phone provided to the employees by KPA will be a main communication measure.

*3: Cost will be covered by water tariff to be collected from water users by CWWDA, that will take over the water supply facilities from KPA after completion of the project.

*4: KPA's cost burden will not be incurred because any entity to which KPA rent out the FP in D1 area (actual user of the FP) will bear the cost.

*5: It is currently assumed that KPA, which is project execution organization, is responsible for O&M of all equipment to be procured under the Grant Aid Project.

Exchange Rate shall be Ksh 1 = Yen 1.0236 on December 2021,

Source: JICA Study Team

6. Project Evaluation

The Project is justified for implementation under the Grant Aid Scheme from the following aspects:

1) The Grant Aid Project contributes to Kenya's Vision 2030 and is consistent with its policies. The economic policy indicated in Kenya's Vision 2030 aims to develop the economy in Mombasa as the logistic base towards the East countries. Accordingly, the expansion of existing port and the construction of south bypass road and bridge are in progress. In parallel with the construction of port and road, the development of infrastructure in Mombasa SEZ by the Grant Aid Project meets the economic policy of Kenya.
2) Implementation of the Grant Aid Project is unlikely to have any negative environmental impact. The natural environmental impact from the Project is not assumed practically, and the social impact of noise, mine dust and vibration by the operation of the construction machine from the Project is possible to minimize by the measure. In this project, neither a large-scale land acquisition nor resettlement of a large number of local residents are presumed, and it is planned to provide timely compensation and assistance to the residents affected by the project.
3) The implementation of the Grant Aid Project is corresponding to the purpose for development of the current project for port expansion and road construction.

4) Operation and maintenance by Kenya's budget and human resources is possible and does not require excessively advanced technology. The content of the Grant Aid Project is similar of the facilities in Kenya, and the budget, human resource and O&M of the Project is adequate scale.

The project consists of four components including water supply, drainage, land development and road, and in addition procurement of cargo handling equipment. The following are shown in the qualitative and qualitative effectiveness of the project.

1) Land for Freeport D1 is developed, and it is possible to attract enterprises in the land of 10ha.
2) Water of 2,000m^3/d from three wells is secured, and it is possible to supply for the stage 2 of Phase 1 in accordance with the development plan in Mombasa SEZ. Also, it is effective for land development of about 180ha for port, free port, enterprise area, residential area and etc.
3) Out of the total water extraction of 2,300 m^3/day from the wells developed in the Project, 300m^3/day is supplied for the residents near the wells and along the distribution pipeline in Kwale. All the remaining water volume of 2,000 m^3/day will be eventually used to meet the water requirement in the SEZ which will increase by development stage. It is, therefore, possible to supply part of the water (2,000m^3/day in the maximum) to the Mombasa WSP, according to the water requirement at the development stage.
4) By implementing the Grant Aid Project based on the Mombasa SEZ M/P and in parallel with the Loan Project, the early realization of the Mombasa SEZ will be expected. The Project is also expected to contribute to Kenya's economic development and the possibility of becoming a middle-income country in 2030, and to promote the development of Mombasa SEZ.
5) Infrastructures including water supply, drainage and land development to be developed under the Grant Aid Project are used as basic infrastructure for the development of Mombasa SEZ.
6) Cargo handling equipment will be used for cargo handling both in FP to be developed in D1 area and new port terminal (DK1), and thus those equipment will contribute to enhancing the function of D1 area that is used as FP.

Therefore, this project is justified for having a high validity and effectiveness.

PREPARATORY SURVEY FOR THE PROJECT FOR INFRASTRUCTURE DEVELOPMENT IN MOMBASA SPECIAL ECONOMIC ZONE IN THE REPUBLIC OF KENYA

PREPARATORY SURVEY REPORT

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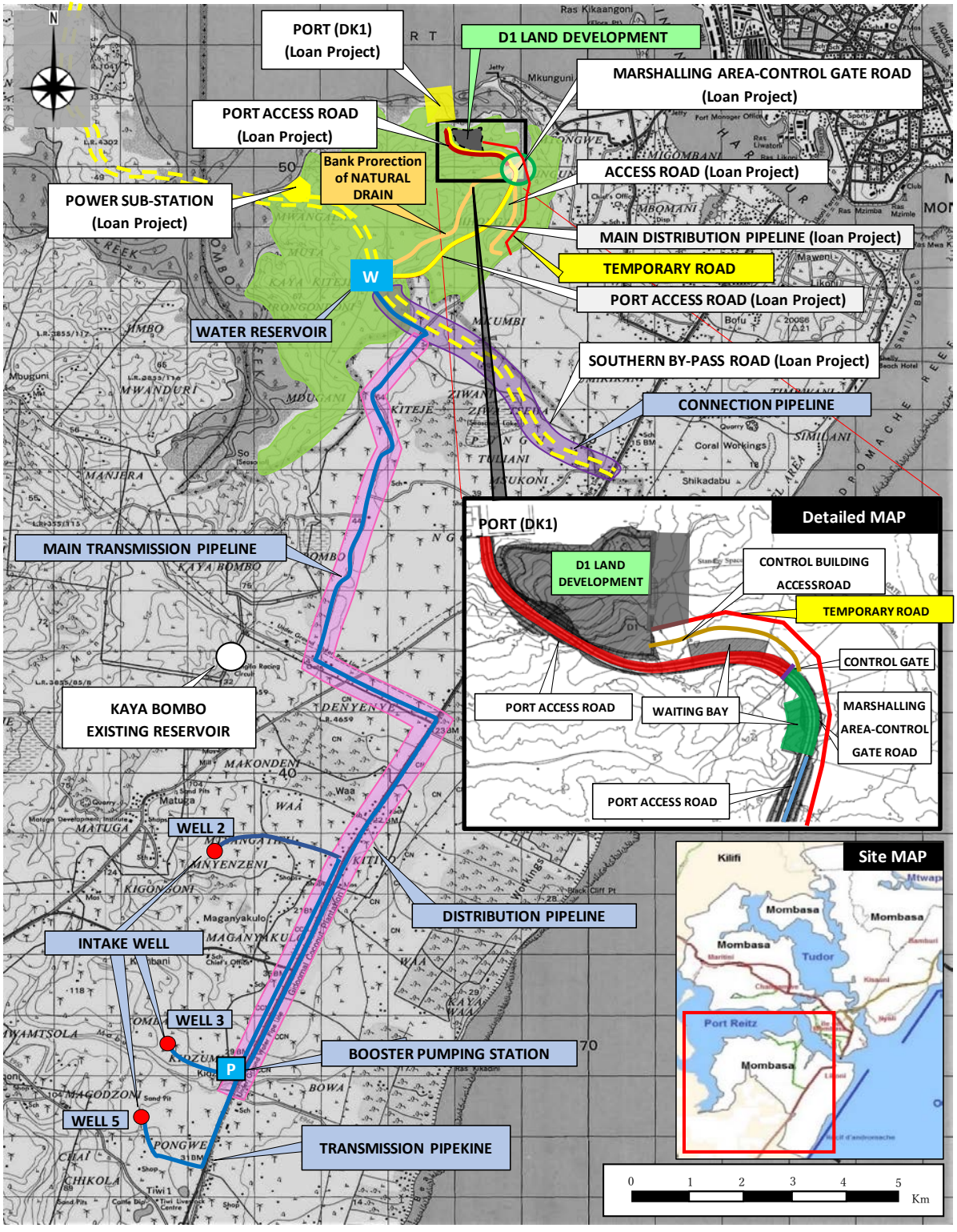
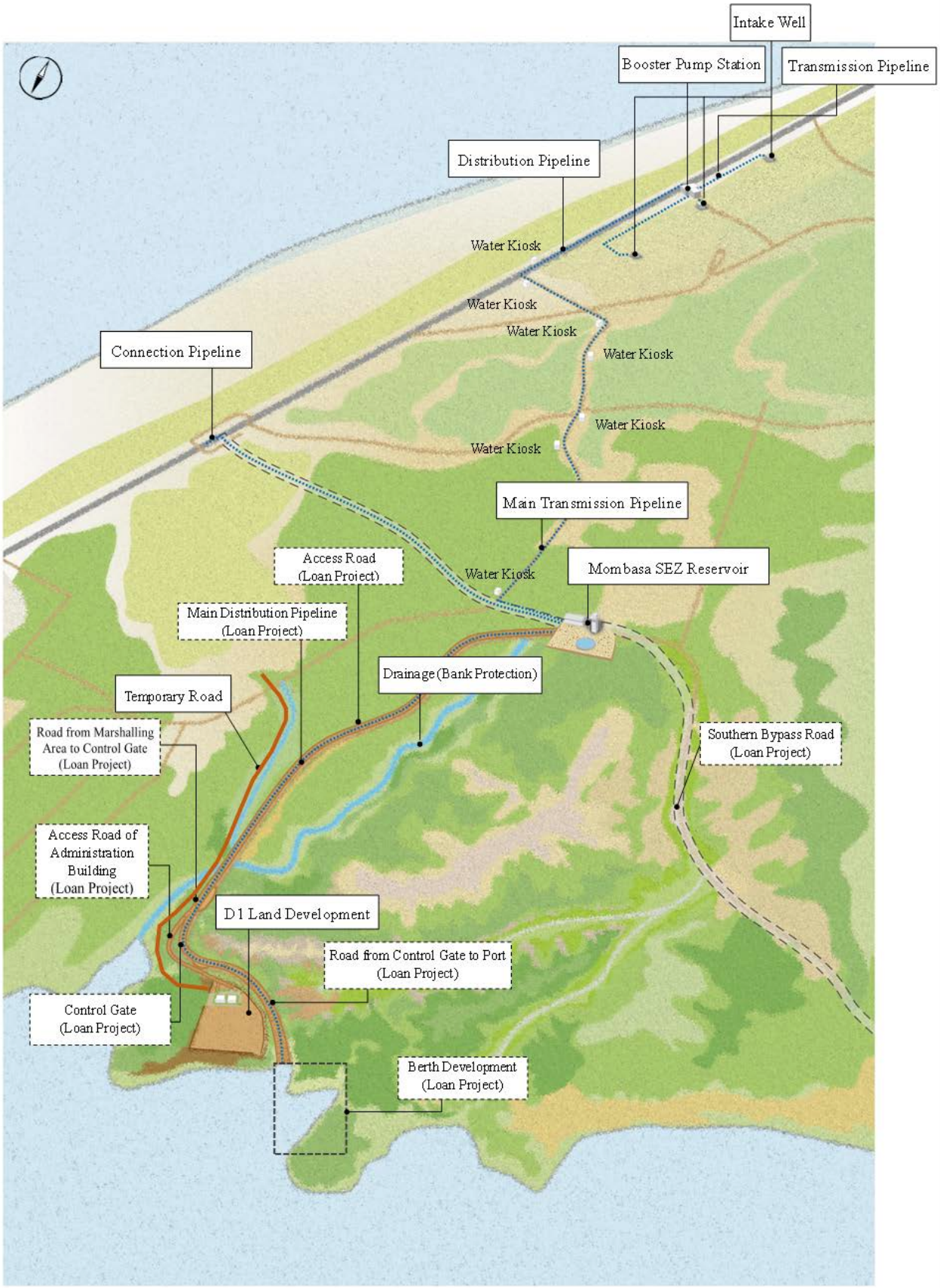
Appendix



Location Map of Surveyed Area



Conceptual Drawing at Completion

	
Current Status of Intake Well	National Road NR-A14 (Main Transmission Pipeline will be installed by the road)
	
Existing Natural Waterway (Downstream)	Erosion at Existing Natural Waterway
	
Location of D1 Land Reclamation (Ridge)	Location of D1 Land Reclamation (South side)
	
Status of Typical Road around the Surveyed Area	Existing Control Gate around the Surveyed Area

Photos during the Survey

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ABBREVIATIONS

A/P	Authorization to Pay
B/A	Bank Agreement
CWWDA	Coast Water Works Development Agency
DCIP	Ductile Cast Iron
E/N	Exchange of Note
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
FDI	Foreign Direct Investment
FH	Formation Hight
FP	Free Port
FTZ	Free Trade Zone
G/A	Grant Agreement
GI	Galvanized Iron
HDPE	High Density Polyethylene
HAT	Highest Astronomical Tide
ILO	International Labor Organization
JICA	Japan International Cooperation Agency
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Road Authority
KPA	Kenya Ports Authority
KRA	Kenya Revenue Authority
MGB	Mombasa Gate Bridge Project
MHWS	Mean Highest Water Springs
MICE	Meeting, Incentive, Convention, Exhibition
MoRTP	Ministry of Roads, Transport and Public Works
Mombasa SEZ D/M (2019/6)	Design Mission for Mombasa Special Economic Zone Development Project
Mombasa SEZ M/P (2015/9)	Mombasa Special Economic Zone Development Master Plan Project
NEMA	National Environment Management Authority
NT	National Treasury
O&M	Operation & Maintenance
ODA	Official Development Assistance
OSHA	Occupational Safety and Health Act
P/Q	Pre-Qualification
PES	Payment for Ecosystem Services
PIT	Project Implementation Team
PPE	personal protective equipment
PPP	Public Private Partnership
RAP	Resettlement Action Plan
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
SEZA	Special Economic Zone Authority
SPV	Special Purpose Venture
TOR	Terms of Reference
WHO	World Health Organization
WK	Water Kiosk
WRA	Water Resources Authority
WSP	Water Service Provider

Chapter 1 BACKGROUND OF THE PROJECT

1-1 Background, History and Overview of Grant Aid Project

Based on the request of the Kenyan Government, Japan International Cooperation Agency (JICA) implemented the Mombasa Special Economic Zone Development Master Plan Project (Mombasa SEZ M/P (2015/9)) from January 2014 to September 2015 and formulated a master plan for Mombasa Special Economic Zone Development. In Mombasa SEZ M/P (2015/9), infrastructure such as power, water and sewage, drainage, roads, ports, land labelling are considered and proposed to be developed for the development of Special Economic Zone (SEZ) (hereinafter, these Mombasa Special Economic Zone development projects as a whole are referred to as "Mombasa Special Economic Zone development project").

At the Japan-Kenya Summit in August 2016, it was agreed that the Mombasa Special Economic Zone Development Project would be developed in cooperation with Japan and Kenya and the necessary infrastructure development will be considered through Loan Project and Grant Aid Project. The development required at the start of operation in Phase 1 of the three development phases envisaged in Mombasa SEZ M/P (2015/9), which are land labelling, wells, transmission and distribution pipes, elevated water tanks and drainage channels and construction of access roads in bonded areas, were decided to be developed through the Grant Aid Project.

This Preparatory Survey is based on the results of Mombasa SEZ M/P (2015/9) and the "Design mission for Mombasa special economic zone development project" (Mombasa SEZ D/M (2019/6)) conducted from December 2016 to June 2019. The purpose of the survey is to confirm the necessity, relevance and feasibility, design an appropriate outline as a Grant Aid Project, formulate a project plan, and estimate the preliminary project cost.

Furthermore, Technical Assistance for Mombasa SEZ (DK SEZ) Development Promotion in Kenya (Technical Assistance related to ODA Loan) was conducted for the period from June 2020 till February 2022 in order to support SEZA that has insufficient experiences in SEZ operation and management.

Infrastructure required for Mombasa SEZ is consists of; Port, Internal Road, Rainfall Discharge, Power Supply, Water Supply, and Land Grading for the locator. In other hand, due to the huge difference on the quality of Wastewater from Industrial Park (manufacture) or Freeport (FP), therefore it was recommended to develop wastewater system by the zone developer. Also, due to necessity of the external connection and could not be developed independently, the Telecommunication system will be developed by the existing service provider.

The respective development scopes of the necessary infrastructure for the Loan Project and the Grant Aid project were proposed by "Mombasa SEZ D/M (2019/6)" as below.

- Loan Project: Port, Internal Road, Power Supply
- Grant Aid Project: Stormwater Drainage, Water Supply, Land Grading (as the area of development trigger for contributing to development of the entire Mombasa SEZ area)

Demarcation of the project scope between Loan Project and Grant Aid Project was reviewed soon after implementation of the Preparatory Survey due to the following reasons.

1. Review soon after commencement of the Preparatory Survey

- The port access road was planned to be used as temporary access road for land development and drainage works under the Grant Aid Project, and installation of main distribution pipe is further planned in part of the port access road, however since earlier commencement of the Grant Aid Project than completion of the port access road was presumed, it was decided to implement the temporary access part of the port access road and installation of the main distribution pipe on the road under the Grant Aid project.
- In order to use the D1 land development area as FP, it is necessary to locate the port control gate so that D1 Area can be located inside the perfect bounded zone. Based on this concept, the location of the port control gate was identified at the place around 1.1 km inland side from the DK1 terminal. Land development for the foundation of the control gate area was to be made under the Grant Aid project and the gate facilities were to be built under the Loan Project.
- In order to secure an access to the SEZ administration building for KPA employees and visitors without passing the port control gate, the administration building access road that is to be constructed separate from the port access road was planned. The road body and the subgrade were to be developed under the Grant Aid Project. Subsequent to the Grant Project, under the Loan project the road structure was to be completed by constructing the road base and other ancillary facilities, including traffic signs, street lighting apparats, guardrail and so on.

2. Further Review on Scope Demarcation for Parallel Implementation

The scope demarcation mentioned in the above item 1. was discussed on the assumption that the commencement of the Grant Aid Project is much before that of the Loan Project. However, the commencement timings of both projects are currently assumed at almost same through implementation of survey for social environmental impact to the residents in the project area and the compensation method. In order to avoid the intervention in the construction works and to

clearly demarcate the responsibility on the work quality, the project scopes between both projects were re-considered.

Based on the result of discussion and coordination between KPA and relevant Kenyan authorities, the project component of Grant Aid was determined as below.

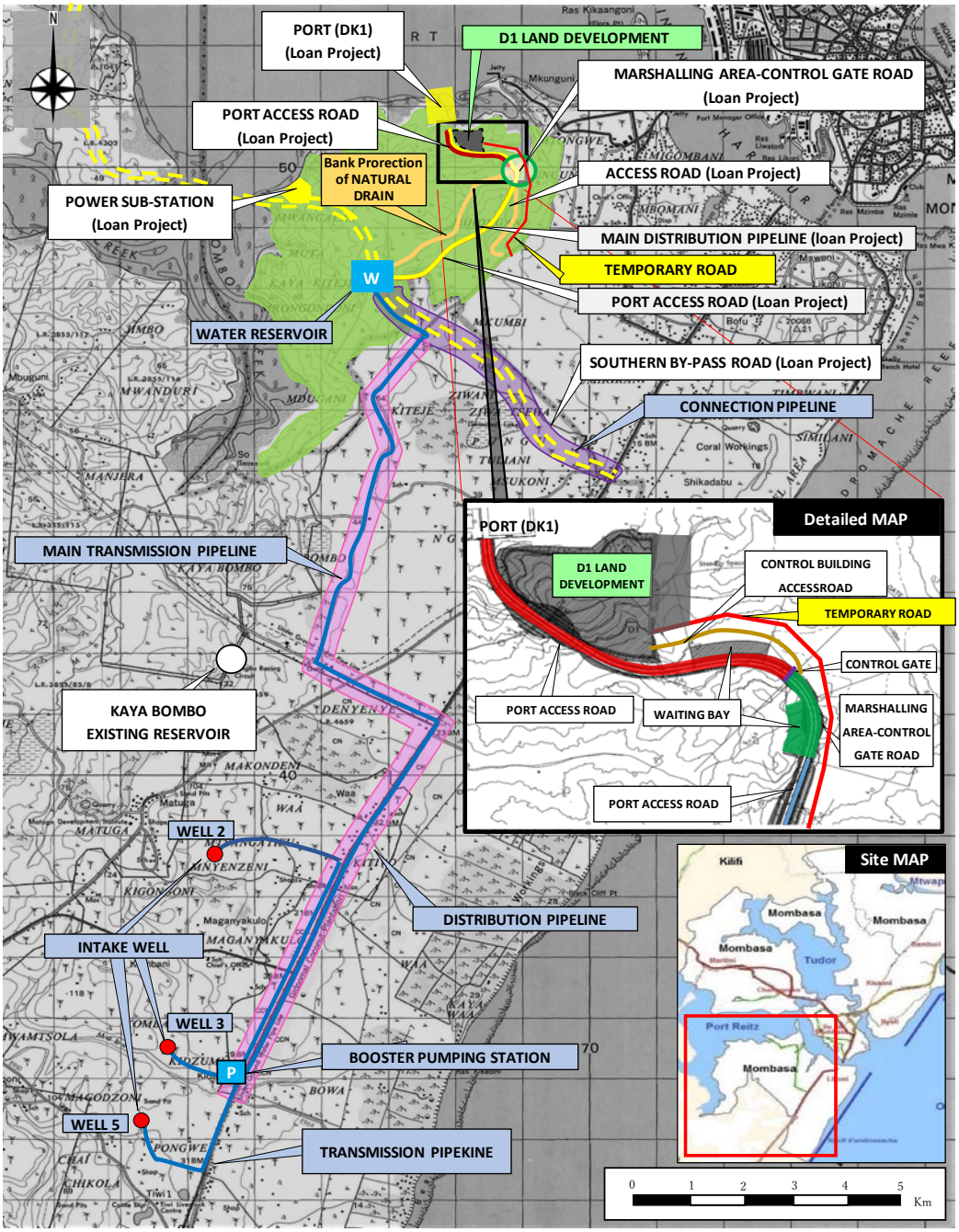
Table 1-1-1 Major Changes on Grant Aid Project and Demarcation with Loan Project

①Booster Pumping Station	
Changes at initial stage of Survey:	Location change due to land acquisition issue, including additional facilities for Kwale community distribution
Final scope:	Implementation under Grant Aid Project
Impact to Loan Project:	None
②Kaya Bombo Existing Reservoir	
Changes at initial stage of Survey:	Cancelled due to clarification of demarcation between AFD
Final scope:	Excluded from scope of Grant Aid Project
Impact to Loan Project:	None
③Main Transmission Pipeline	
Changes at initial stage of Survey:	Additional distribution pipeline and water kiosk for Kwale (water resource site) community
Final scope:	Implementation under Grant Aid Project
Impact to Loan Project:	None
④Water Reservoir	
Changes at initial stage of Survey:	Additional water quality test lab based on the discussion result
Final scope:	Implementation under Grant Aid Project
Impact to Loan Project:	Necessary additional work in Power Supply Loan Project Necessary future distribution pipe connection to Power Sub-Station
⑤Connection Pipeline	
Changes at initial stage of Survey:	Additional for utilization of surplus water until full development of SEZ
Final scope:	Implementation under Grant Aid Project
Impact to Loan Project:	None
⑥Temporary Road (Part of port access road)	
Changes at initial stage of Survey:	Additional work for installation of main distribution pipe due to uncertain period for road construction by Loan Project
Final scope:	Excluded from scope of Grant Aid Project
Impact to Loan Project:	To be constructed under Loan Project as permanent port access road
⑦Road between Waiting Bay and Control Gate	
Changes at initial stage of Survey:	Additional work due to construction of waiting bay
Final scope:	Excluded from scope of Grant Aid Project
Impact to Loan Project:	To be constructed under Loan Project as permanent port access road

⑧Control Gate	
Changes at initial stage of Survey:	Additional facility due to application of D1 land development to FP and only land development of installation area of Control Gate
Final scope:	Deletion from Grant Aid Project
Impact to Loan Project:	Land development of installation area of Control gate and Installation of Control Gate by Loan Project
⑨Access Road inside Bounded Area	
Changes at initial stage of Survey:	Additional work for increase of road section under KPA's control due to relocation of the port control gate
Final scope:	Excluded from scope of Grant Aid Project
Impact to Loan Project:	To be constructed under Loan Project
⑩D1 Area Development	
Changes at initial stage of Survey:	Additional management building inside the custom boundary as result of discussion on operation method of the custom bounded area, and reduction of the development area
Final scope:	Increase of development area, administration building and the external works of the administration building including car park, restroom building, bus roundabout, foot path and vehicle road around the administration building, street lighting apparatus, guardrail & fence and other utilities
Impact to Loan Project:	Facilities to be constructed under the Loan Project (Port) Security fence to separate the Free Port Zone from outside area, gate for KPA employees and visitors to pass the security fence, access gate between bus roundabout/parking area and management building premises
⑪Access Road to Management Building	
Changes at initial stage of Survey:	Additional work due to construction of Management Building in the D1 area
Final scope:	Excluded from scope of Grant Aid Project
Impact to Loan Project:	Construction of the access road from junction with the port access road up to D1 area boundary
⑫Temporary Road for D1 Development Work	
Changes at initial stage of Survey:	Not included in the initial scope of the Grant Aid Project
Final scope:	New scope under the Grant Aid Project
Impact to Loan Project:	None
⑬Procurement of Cargo Handling Equipment	
Changes at initial stage of Survey:	Not included in the initial scope of the Grant Aid Project
Final scope:	To be procured under Grant Aid Project
Impact to Loan Project:	None

Source: JICA Study Team

Location map of the project components in terms of the final scope is given below.



Source: JICA Study Team

Figure 1-1-1 Location Map of the Project Component

1-2 Executing Agency

At the beginning, the executing agency were planned to be Ministry of Industry, Trade and Cooperatives and Ministry of Water and Sanitation. However, considering Operation and Maintenance (O&M) aimed at supporting the business of the Mombasa SEZ, it was proposed that one Ministry took the responsibility of Mombasa SEZ. As the candidate, Ministry of Industry, Trade and Cooperatives, KPA, CWWDA and Mombasa city were considered. Finally, considering the characteristics of Mombasa SEZ and the Kenyan target "Vision 2030," KPA was proposed as the first candidate because the function of Mombasa SEZ was FP and the D1 Area was owned by KPA. This idea was discussed between JICA and KPA and Minutes of Discussions was signed in April 2019.

On the other hand, from the viewpoint of the scope of construction and maintenance of the facilities to be developed by the Grant Aid Project, the following components (ref. Table 1-2-1) will be transferred to the appropriate organizations after the completion of the construction to avoid the twisting of the implementing agency in Kenya.

Table 1-2-1 Project Components to be Transferred to Other Organizations

Component	Facilities	Organization for O&M and Reason for Transfer
Water supply	1. Intake wells (3 wells)	[Organization] CWWDA [Reason] With KPA as the implementing agency of the Grant Aid Project, the design of a system to physically secure 2,000 m^3/day on a priority basis for the Mombasa SEZ was realized.
	2. Transmission pipelines (from intake wells to booster pumping station)	
	3. Booster pumping station	
	4. Main transmission pipeline (from booster pumping station to reservoir)	
	5. Distribution pipeline (for water supply to Kwale County)	
	6. Reservoir	
	7. Main distribution pipeline (inside SEZ installed under the Loan Project))	
	8. Connection pipelines (for water supply to Mombasa County)	

Source: JICA Study Team

As the below alternative ideas, the concrete operating way of D1 Area have been discussed with KPA.

(1) KPA would lend the land as landowner.
(2) KPA would operate FP by themselves.
(3) KPA would establish joint venture with a private company. KPA would invest the land following PPP law.
(4) KPA would establish Special Purpose Venture (SPV). KPA would lend the land.

1-3 Environment

Natural conditions such as meteorological, topographical, and geotechnical conditions at site shall be carefully checked for the design of facilities and structures of the project. In addition, the construction material, construction method, and construction schedule shall be selected and proposed considering the site conditions. For the above point of view, the natural conditions were carefully investigated in this study as summarized below.

1-3-1 Temperature

The temperature in Mombasa is consistently high throughout the year. The temperature in dry season, namely from January to March, are relatively high and it slightly decreases in rainy season with less than 30 degrees Celsius as shown in Table 1-3-1.

Table 1-3-1 Average Monthly Temperature in Mombasa

(℃)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
32.3	32.8	33.1	31.7	29.5	29.1	28.3	28.6	29.3	30.3	31.2	31.9
23.5	24.0	24.4	24.0	22.8	21.7	20.9	20.8	21.1	22.4	23.3	23.5

Upper: Highest, Lower: Lowest

Source: Moi International Airport Meteorological Station

1-3-2 Precipitation

The target area in Mombasa is facing with Indian Ocean and is affected by Monsoon. There are dry season and rainy season there due to the impact of Monsoon. According to the precipitation data at Mombasa airport from 2004 to 2014, the average annual rainfall in Mombasa is approximately 960mm/year, which is less than that of Japan (1,700mm/year) and south east Asian countries. The monthly average precipitation in rainy season and dry season are quite different: namely the former is 214mm/month in May and the latter is less than 5mm/month in February. According to the average monthly precipitation data shown in Table 1-3-2, 45% of annual precipitation is observed from April to June and 30% of it is observed October and November. It shows that the heavy rain with high rainfall intensity is expected during the rainy season. Therefore, this precipitation pattern shall be considered to design and to select the construction method for the earthwork.

Table 1-3-2 Average Monthly Precipitation in Mombasa

(mm)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
22.9	9.9	46.9	114.3	214.4	98.3	52.3	49.4	47.7	170.5	104.4	34.2	961.9

Source: Moi International Airport Meteorological Station

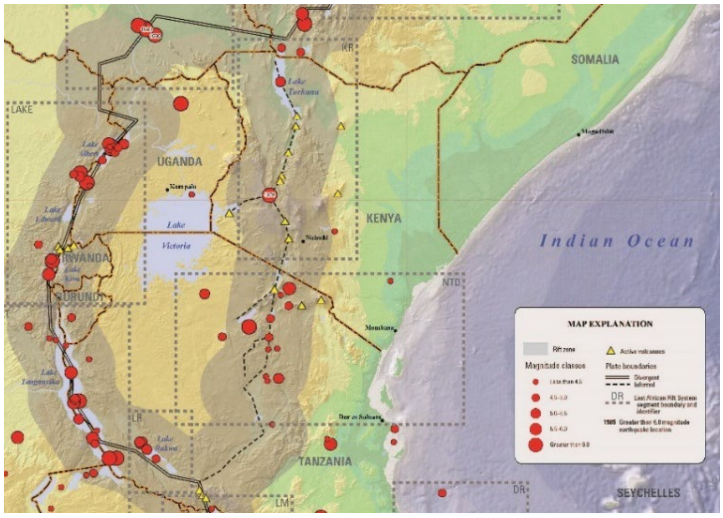
1-3-3 Wind

There is strong wind in Mombasa from April to October and its average speed is 5.4m/sec. In July, it is windiest in a year; the speed is 7.0m/sec. In the other season, it is normally mild wind. The fastest wind speed in Mombasa in 100 years is 30.3m/sec.

The metallic material of the building near the port faced to sea and estuary in Mombasa is rusty due to the sea breeze with salt from north side. On the other hand, the existing facility inside the Mombasa port is not rusty because it has been maintained well due to the rust prevention way. In this project, the rust prevention measures same as the facility inside Mombasa port must be taken for the planned facility.

1-3-4 Earthquake

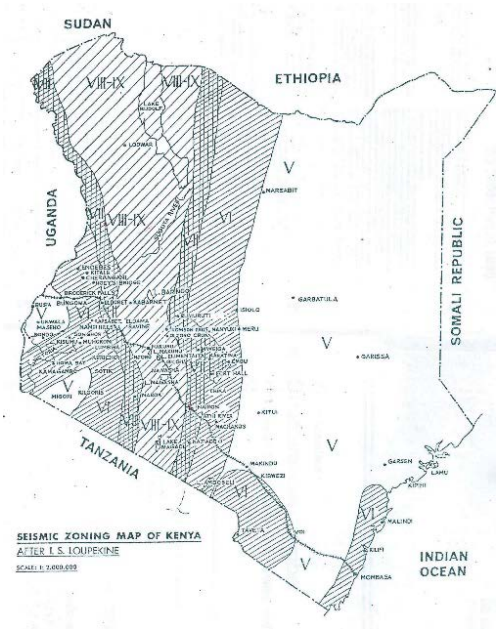
United States Geological Survey made the below figure about the earthquake from 1990 to 2013 in East Africa (Figure 1-3-1). Though there is no earthquake record in Mombasa, the seismic force is regulated in the structural standard.



Source: Seismic of the Earth 1900-2013 East African Rift, US Geological Survey

Figure 1-3-1 Earthquake Record in East Africa

In Kenya, Seismic external force is divided in four categories: from V to VIII-IX (Figure 1-3-2). Mombasa is categorized in VI area, meaning that the seismic external force is weaker.



Source: Code of Practice for the Design & Construction of Building & other Structures in relation to Earthquakes

Figure 1-3-2 Seismic External Force in Mombasa

1-3-5 Topography

In this Project, route surveying was conducted for the area where pipelines are to be laid and plane surveying was conducted for the areas where Booster Pump Stations and Mombasa SEZ Reservoir are to be constructed respectively. In SEZ, profile leveling was conducted for some major existing natural waterways. A plane survey was carried out along the assumed area of temporary road with 50m width, in order to design the road alignment and profile. Though the plane surveying was conducted in "Preparatory survey for Mombasa SEZ" for D1 Area, the additional surveying was taken to collect necessary topographical information. Table 1-3-3 shows the contents of each surveying carried out in this study.

Table 1-3-3 Contents of Topographic Survey

Location	Detail	Area	Length	Height (Min/Max)
Booster Pump Station	Plane Surveying	20m x 40m	-	+33m/+34m
Mombasa SEZ Reservoir	Plane Surveying	200m x 240m	-	+35m/+51m
D1 Area	Plane Surveying	80,000m^2	-	+1m/+38m
Assumed area for temporary road (50m width)	Plane Surveying	125,000m^2	2.5km	+3m/+40m
Natural Waterway	Route Surveying	-	2.5km, 2.1km	+6m/+33m
Well ~ Booster Pump Station	Route Surveying	-	5.5km, 1.4km, 2.5km	+20m/+40m, +34m/+44m, +29m/+44m
Booster Pump Station ~ Mombasa SEZ Reservoir	Route Surveying	-	16.0km	+19m/+64m
Mombasa SEZ Reservoir ~ Port	Route Surveying	-	4.3km	+4m/+51m

Source: JICA Study Team

The topography of Kwale County where the water supply facilities are constructed in the Project is relatively gentle land, but it has a large variety of surface features in SEZ. Based on the result of the said topographic survey, topography related with each component of the Project can be described in Chapter2.

1-3-6 Geology

Geological Survey was conducted at the points where the below construction is to be conducted; Booster Pump Station, Mombasa SEZ Reservoir, Land Development, Road, Marshaling Area and Culvert. Survey item and the survey points are shown in Table 1-3-4.

Table 1-3-4 Result of Geological Survey

Item	Location				
	Booster Pump Station	Mombasa SEZ Reservoir	D1 Area	Road from Control Gate to Port	Temporary Road
N value	29-41	17-41	13-50	9-32	2-50
Grain Size (The Others) (%)	-	100	60-100	93-100	
Grain Size (Gravel) (%)	-	0	0-40	0-7	
Liquid Limit (%)	-	27	33-48	28-45	24-43
Plastic Limit (%)	-	10	16-20	11-21	8-24
Moisture Content (%)	-	11	3-19	12-34	6.3-16.7
Specific Gravity (t/m^3)	-	2.6	2.4-2.7	2.4-2.6	2.5-2.7
Wet Density (t/m^3)	-	-	1.8-2.1	1.5	1.6-1.9
Compaction OMC (%)	-	-	19-24	20-22	12-22
Compaction MOD (t/m^3)	-	-	1.55-1.69	1.58-1.63	
Tri-axial Compression (UU) (kg/cm^2)	-	0.11	0.25-0.40	-	-

Item	Location				
	Booster Pump Station	Mombasa SEZ Reservoir	D1 Area	Road from Control Gate to Port	Temporary Road
Tri-axial Compression (UU) (degree)	-	21	15-19	-	-
Slaking Ratio	-	-	18-1	-	-
CBR	-	-	-	19-23	-

Source: JICA Study Team

The ground has generally sufficient bearing capacity for the structure. And there are deposits of shale in D1 Area. Based on the result of geological survey, geological condition about each facility can be described in Chapter 2.

1-4 Environment and Social Consideration

1-4-1 Environment and Social Impact Assessment

1-4-1-1 Overview of the project facilities with potential impacts on the environment and society

Potential impacts of the proposed project on the environment and society would not be significant. Areas subject to the potential impacts are limited, and there would be no large-scale impacts. The proposed project is classified as Category B according to JICA Guidelines for Environmental and Social Considerations (2010) since these potential impacts would be readily addressed by the ordinary mitigation measures.

The proposed project itself will be explained in another Chapter. This section describes the environmental and social components to be affected by the facilities constructed under the Grant Aid project.

Details of the project facilities are summarized in Table 1-4-1 below.

Table 1-4-1 Project Facilities with Potential Impacts

Component	Scope of Environmental and Social Considerations
Water supply	• Intake Facilities (3 wells) • Transmission Pipeline • Booster Pumping Station (BPS) • Main Transmission Pipeline (BPS Reservoir) • Distribution Pipeline (Kwale WSP) • Water Service Center • Connection pipeline (to Mombasa WSP)
Drainage	• Bank Protection on the existing natural drain
Land development	• Earthwork • Building Support Work, including car parks, an outside toilet, utility lines, etc. • Admi. Building for Free Port operation

Component	Scope of Environmental and Social Considerations
Road Construction	• Temporary Road for D1 land development from the soil disposal area (FTZ-B area) till D1 land area
Others	• Embankment works in Free Port B with the surplus soil to be generated from the land development and road construction • Temporal yard and contractor camp site for construction works

WSP: Water Service Provider
Source: JICA Study Team

In this project, ten (10) water kiosks in total will be constructed in Kwale County in addition to four water kiosks in the resettlement sites of Mombasa SEZ to respond to the strong demand by local communities. Locations of individual facilities was identified for ease of access by local people to obtain water. Maintenance of each facility would be conducted by each community with the water charge collected from local people, as in the case of water kiosks in the area.

1-4-1-2 Preparation of Environmental and Social Impact Assessment Study Report

The Environmental and Social Impact Assessment (ESIA) Study for the Project was conducted according to JICA Guidelines for Environmental and Social Considerations (2010) and the Environment Management and Coordination Act (EMCA, 1999 and amendment in 2015) of Kenya. Followed by the submission of the ESIA report to National Environment Management Authority (NEMA) for approval, the EIA license for the Project was successfully issued to KPA in May 2022. In addition, the supplementary ESIA (S-ESIA) report was prepared in June 2022 in order to adjust with latest project schedule and scope because a part of project design was slightly modified from the original scope of the early stage of the preparatory survey. Though the preparation of S-ESIA report is not stipulated by regulations in Kenya, KPA is preparing to submit it to NEMA. This report under the section of "1-4-1 Environment and Social Impact Assessment" summarizes the results of the ESIA and S-ESIA. The conditions of EIA license are summarized in Table 1-4-2.

Table 1-4-2 Conditions in EIA License

Item	Summary
General Conditions	• The license shall be valid for 24 months • The proponent shall submit an Environmental Audit report in the first year of operations to confirm the efficacy and adequacy of the Environmental Management Plan. • The proponent shall comply with NEMA's orders and related regulations.
Construction Phase	• The proponent shall obtain the requisite approvals from the County Governments of Kwale and Mombasa, Water Resource Authority, Coast Water Works Development Agency and all other relevant Authorities prior to commencement of works. • The proponent shall ensure that all construction works adhere to relevant regulations and EMP. • The proponent shall ensure that the drainage improvement works do not divert the natural water causeway and their design capacities shall be adequate to contain the projected highest flood

Item	Summary
	flow. • The proponent shall ensure relocation, compensation and restoration of livelihoods for any project affected persons (PAPs) and develop a consultative plan for emerging issues and grievance redress mechanisms (GRM) as shall be prescribed in the Resettlement Action Plan (RAP). • The proponent shall continually consult with the County Governments of Kwale and Mombasa to ensure that pertinent issues relating to equitable sharing of the abstracted water are resolved amicably to ensure project sustainability. • The proponent shall undertake separate EIA for the ten community water kiosks. • The proponent shall take adequate measures against excavated debris, other wastes and soil erosion etc. • The proponent shall ensure that activities are undertaken during the day between 0800hrs and 1800hrs and on Saturday between 0800hrs to 1300hrs. No work shall be undertaken on Sundays.
Operation Phase	• The proponent shall adhere to the conditions issued by the Water Resource Authority for in-water works and water use permits. • The proponent shall maintain the drainage improvement infrastructure to ensure un-obstructed water flow. • The proponent shall ensure that operation works adhere to all relevant regulations and have adequate facilities for pollution control and environmental protection. • The proponent shall ensure that rain water harvesting facilities are provided to supplement surface and ground water.

Source: EIA License for the Project, NEMA, May 2022

1-4-1-3 Present Status of the Environment and Society

(1) Natural environment

1) Climate

The Mombasa coastal area has a precipitation of about 1,000 mm per year, with the highest rainfall from April to May, followed by October to November. Temperatures do not fluctuate significantly throughout a year, with the minimum temperatures of 10 °C to 22 °C and the maximum temperatures of 28 °C and 33 °C. Usually, temperatures are high in February and October and the lowest temperature is recorded in July.

2) Natural Vegetation

Natural environment of the project area including SEZ has deteriorated and changed due to the development activities for many years, and the majority is farmlands and bare lands, with scattered natural vegetation. There remain some forests in Kwale County, and there occur the wildlife such as mammals and birds in the protected area. This protected area is about 19,200 ha of forests and pastures, and registered as Shimba Hills National Reserve. It was officially designated as a National Reserve in 1968 under Wildlife Conservation and Management Act to protect animals and plants. This protected area is far from the project site, and the proposed

project would have no impact on it. Although common animals and plants were recognized at the project site, there was no precious animal or plant observed there. As for vegetation, there are generally limited tree covers except in the forests, and there grow mainly agricultural crops, mangos, eucalyptus, coconuts, and cashew nuts.

3) Air Quality

Results of the EIA surveys for a port of Mombasa SEZ D/M (2019/6) are drawn below from the final report of Mombasa SEZ D/M (2019/6).

Air qualities were surveyed for PM10, NO2 and SO2 in June 2017 at 5 locations in and around the proposed main road for the port and SEZ. PM10 was measured by the gravimetric analysis, and SO2 and NO2 were measured by the passive sampler. Samples were collected and analyzed by SGS Kenya Ltd. certified by NEMA. Table 1-4-3 presents the collections method of air quality samples. Figure 1-4-1 shows the survey locations. summarizes results of the survey.

Table 1-4-3 Collections of the Air Quality Sample

	Collection Method	Collection Period	Collection Height
PM10	Portable air sampler (MiniVol™ TAS)	24 hours	1.5-2 m above ground level
NO2	Passive NOx sampler	6 days	1.5-2 m above ground level
SO2	Passive SOx sampler	6 days	1.5-2 m above ground level

Source: Mombasa SEZ D/M (2019/6)

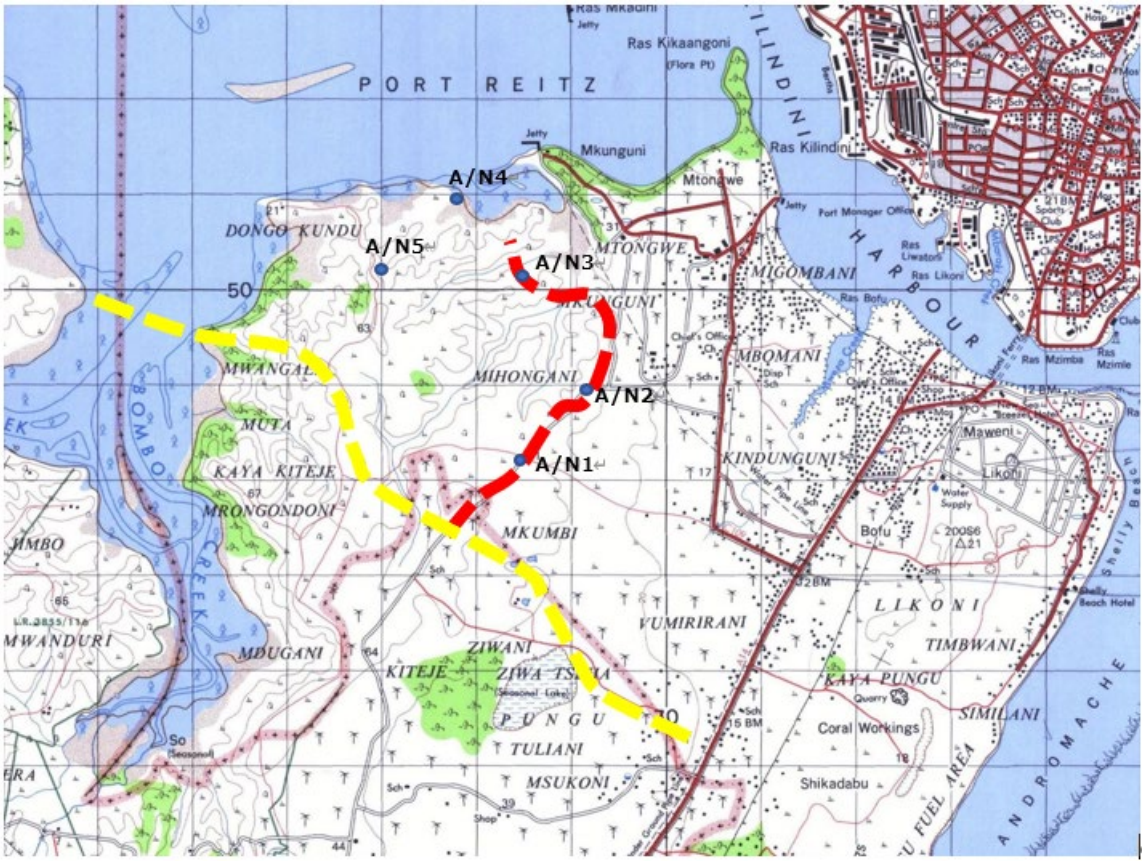
Table 1-4-4 Results of the Air Quality Survey (EIA for Mombasa SEZ D/M (2019/6))

	DL	Results (μg/m³)					Kenyan standard*1	WHO guideline*2
		A/N1	A/N 2	A/N 3	A/N 4	A/N 5		
NO_2	-	0.0020	0.0004	0.0005	0.0005	0.0003	80 μg/m³	40 μg/m³
SO_2	0.001 μg/m³	BDL	BDL	BDL	BDL	BDL	80 μg/m³	20 μg/m³
PM10	-	74	7	10	29	10	100 μg/m³	50 μg/m³

*1: Environmental Management & Co-ordination Act (Air Quality) Regulations, 2014 (residential, rural and other areas) 24-hour average

*2: WHO Ambient Air Quality Guideline values, NO_2: annual average, SO_2 and PM_{10}: 24-hour average

Source: Mombasa SEZ D/M (2019/6)



Source: JICA Study Team, Mombasa SEZ D/M (2019/6)

Figure 1-4-1 Locations of the Air Quality Survey (EIA for Mombasa SEZ D/M (2019/6))

Concentrations of NO_2 and SO_2 were below Kenyan standards and WHO guidelines at all locations. Concentrations of PM_{10} were below Kenyan standards at all locations, but its concentration exceeded the WHO guideline only at A1. A1 faces an unpaved road, so dusts generated by driving vehicles and motorcycles may be responsible for this. Air qualities in the project area are good generally.

An additional survey was conducted in February 2020, and its survey locations and the results were summarized in Figure 1-4-2 and Table 1-4-5. The highest level of air pollution was detected at around the intersection of Mtongwe Road and A14 with heavy traffics.

Source: JICA Study Team

Figure 1-4-2 Locations of the Air Quality Survey (February 2020)

Table 1-4-5 Air Quality Survey Results (February 2020)

Location		Results of Analyses						
		SO_2 ($\mu g/m^3$)	**NO_X ($\mu g/m^3$)**	**TVOC ($\mu g/m^3$)**	**CO (mg/m^3)**	**$PM_{2.5}$ ($\mu g/m^3$)**	**PM_{10} ($\mu g/m^3$)**	**Pb ($\mu g/m^3$)**
Mwangala 2.3Km west of land reclamation site		BDL	BDL	BDL	-	-	28	0.0001
Mtongwe Rd -A14 junction		15	BDL	87	4	31	103	0.0001
Tiwi Booster Station Site		0.021	0.03	12.8	BDL	18.2	37.4	Not released
Land Development site		0.024	0.02	11	BDL	16	33	
Ziwani Lake junction of MSBR		BDL	BDL	BDL	3	17	17	0.0001
NEMA limits for controlled areas*	Annual average	15	15	-	-	-	50	0.50
	1 hr	-	-	-	2.0 (CO/CO_2)	–	-	-
	8 hrs	-	-	-	1.0 (CO/CO2)	-	-	-
	24 hrs	30	30	30	-	-	75	0.75

* Environmental Management & Co-ordination Act (Air Quality) Regulations, 2014 (controlled areas)

Measurement Date: February 2020

SO2: Sulfur Dioxides, NOX: Nitrogen Oxides, TVOC: Volatile Organic Compounds, CO: Carbon Monoxides, Pb: Lead, BDL: Below Detection Limit

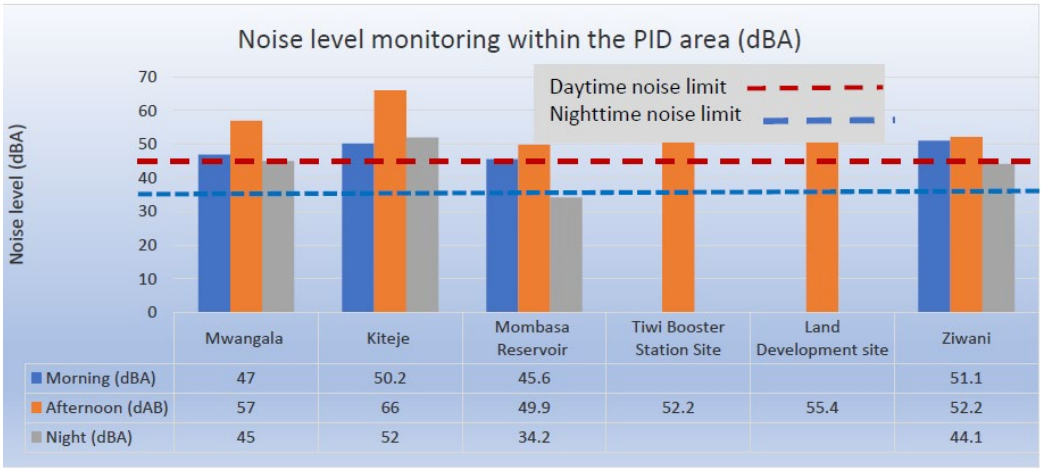
Source: JICA Study Team

4) Noise

Locations and the results of the noise survey are summarized in Figure 1-4-3 and Figure 1-4-4. Out of the survey locations, Tiwi Booster Station Site is located in the vicinity of the intake well and the booster pumping station, while Kiteje Site is near the main transmission pipeline. Noise levels at both locations were over Kenyan standards.

Source: JICA Study Team

Figure 1-4-3 Locations of the Noise Survey



	Mwangala	Kiteje	Mombasa Reservoir	Tiwi Booster Station Site	Land Development site	Ziwani
Morning (dBA)	47	50.2	45.6			51.1
Afternoon (dAB)	57	66	49.9	52.2	55.4	52.2
Night (dBA)	45	52	34.2			44.1

Source: JICA Study Team

Figure 1-4-4 Results of the Noise Survey

5) Marine Water Quality and Sediment Quality

In the EIA for a port of Mombasa SEZ D/M (2019/6), the water quality and sediment quality were surveyed around it. Results of this survey are drawn below from the final report of Mombasa SEZ D/M (2019/6).

As a part of the baseline survey for EIA, water qualities were surveyed at 7 locations in Port Reitz and along Mombasa coast during the rainy season (May 2017) and the dry season (February 2018). Surveyed parameters are the water temperature, salinity, pH, turbidity, suspended solids (SS), dissolved oxygen (DO), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), total-nitrogen (T-N), total phosphorus (T-P), total petroleum hydrocarbon (TPH), and coliform bacteria. Water temperatures and pH were measured on site with the water quality meter (YSI Professional Plus), and the other parameters were analysed by SGS Kenya Ltd. certified by NEMA. Water samples were collected from the surface layer and the bottom layer by a Niskin water sampler. Figure 1-4-5 shows the survey locations. As for locations W6 and W7, samples were collected within a lagoon during the rainy season due to the rough sea while they were collected at the outside of lagoon during the dry season (W6D and W7D). Results of the water quality survey were summarized in Table 1-4-6.

Source: JICA Study Team, Mombasa SEZ D/M (2019/6)

Figure 1-4-5 Locations of the Marine Water Quality Survey(EIA for Mombasa SEZ D/M (2019/6))

Table 1-4-6 Results of the Marine Water Quality Survey(EIA for Mombasa SEZ D/M (2019/6))

	Season		Unit	DL	W1	W2	W3	W4	W5	W6	W7	Analysis method	Reference Standard*
Depth	Wet	-	m	-	16.3	5.6	21.1	18.1	32.2	2.7	2.5	-	-
	Dry				16.8	5.9	23.8	18.3	28.0	20.1	13.3		
Temp.	Wet	S	℃	-	27.6	27.5	27.2	27.0	27.0	27.5	27.5	In situ measurement (YSI Professional Plus)	-
		B			27.4	27.6	27.5	27.2	27.0	28.2	27.7		
	Dry	S			27.5	27.4	27.3	27.2	27.4	27.4	27.5		
		B			27.4	27.6	27.3	27.3	27.2	28.3	27.4		
pH	Wet	S	-	-	8.13	8.21	8.31	8.38	8.37	8.37	8.31	In situ measurement (YSI Professional Plus)	7.8-8.3
		B			8.28	8.19	8.25	8.36	8.36	8.38	8.31		
	Dry	S			8.06	8.09	8.23	8.31	8.16	8.27	8.25		
		B			8.06	8.09	8.23	8.31	8.16	8.27	8.25		
Salinity	Wet	S	‰	0.01	28.49	25.55	26.98	39.31	39.16	38.49	38.35	APHA 2510B	-
		B			37.82	33.47	38.95	38.79	39.47	38.49	38.77		
	Dry	S			36.10	36.12	35.75	35.39	35.27	35.42	34.74	APHA 2520B	
		B			36.42	36.44	35.94	35.40	35.11	35.28	35.30		
DO	Wet	S	mg/l	-	0.2	0.2	0.2	<0.2	<0.2	<0.2	<0.2	APHA EXT	> 2 mg/l
		B			0.9	0.2	0.2	<0.2	<0.2	<0.2	<0.2		
	Dry	S			5.6	5.0	5.9	5.8	5.8	5.5	5.7	In situ measurement (YSI Professional Plus)	
		B			4.0	4.1	4.2	4.5	4.05	3.9	4.0		
Turbidity	Wet	S	NTU	0.048	7.10	3.44	3.71	2.41	2.28	5.57	2.68	APHA 2130B	-
		B			6.78	3.50	2.76	3.10	2.73	2.82	2.99		
	Dry	S			7.18	4.38	2.92	1.04	1.49	1.79	1.20		
		B			11.60	9.80	2.50	1.05	1.00	0.88	1.04		
TSS	Wet	S	mg/l	-	1	2	2	1	2	2	1	APHA 2540C	-
		B			2	2	2	2	1	4	2		
	Dry	S			<5	<5	<5	<5	<5	<5	<5	APHA 2540D	
		B			<5	<5	<5	<5	<5	<5	<5		
T-P	Wet	S	mg/l	0.01	3.90	3.10	0.80	0.99	1.96	0.84	0.74	APHA 3120	<0.09
		B			0.6	0.2	0.6	1.12	0.77	0.7	1.4		
	Dry	S			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA 3120 B	
		B			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		

	Season		Unit	DL	W1	W2	W3	W4	W5	W6	W7	Analysis method	Reference Standard*
T-N	Wet	S	mg/l	0.02	1.26	2.38	1.68	0.50	0.70	0.07	1.10	APHA 4500-Norg	<1.0
		B			1.96	1.4	2.17	6.8	0	0.7	0.4		
	Dry	S			1.18	2.13	1.51	0.84	1.12	0.90	1.29	APHA 4500-N B	
		B			1.57	1.23	1.96	3.75	0.62	1.01	0.56		
BOD	Wet	S	mg/l	1	27.0	18.6	24.1	51.3	129.6	43.1	29.0	APHA 5210B	-
		B			21.6	35.1	23.49	40.5	67.5	33.75	32.4		
	Dry	S			43.2	54.0	37.8	64.8	59.4	59.4	70.2		
		B			48.6	32.4	59.4	37.8	43.2	43.2	37.8		
COD	Wet	S	mg/l	7	444.96	477.92	494.4	703.84	717.12	690.96	671.97	APHA 5220B	-
		B			510.88	560.32	527.36	730.4	677.28	697.2	710.48		
	Dry	S			542.92	650.72	376.32	854.56	2587.20	854.56	533.12		
		B			125.44	2108.96	1160.32	2203.04	638.96	35.28	1160.32		
TPH	Wet	S	mg/l	0.05	1.66	1.58	1.51	1.21	1.58	2.47	1.18	SGS TW56	-
		B			2.18	1.67	1.55	1.31	1.14	1.02	1.21		
	Dry	S			0.41	0.49	0.74	0.63	0.66	0.83	0.57	EPA 8015C	
		B			0.73	1.72	0.59	0.82	0.54	0.55	0.65		
Coliforms	Wet	S	MPN/100 ml	0	>1,800	>1,800	>1,800	>1,800	1,600	240	130	ISO 9308-2	<1,000
		B			>1,800	>1,800	>1,800	1,600	920	>1,800	33		
	Dry	S			920	1600	140	27	540	110	110		
		B			>1,800	>1,800	33	8	11	>1,800	920		

*: Japanese water quality standards for the conservation of living environment (coastal waters)

DL: Detection limit, S: surface, B: bottom

Source: Mombasa SEZ D/M (2019/6)

Overview of the water quality is provided below on the basis of the survey results.

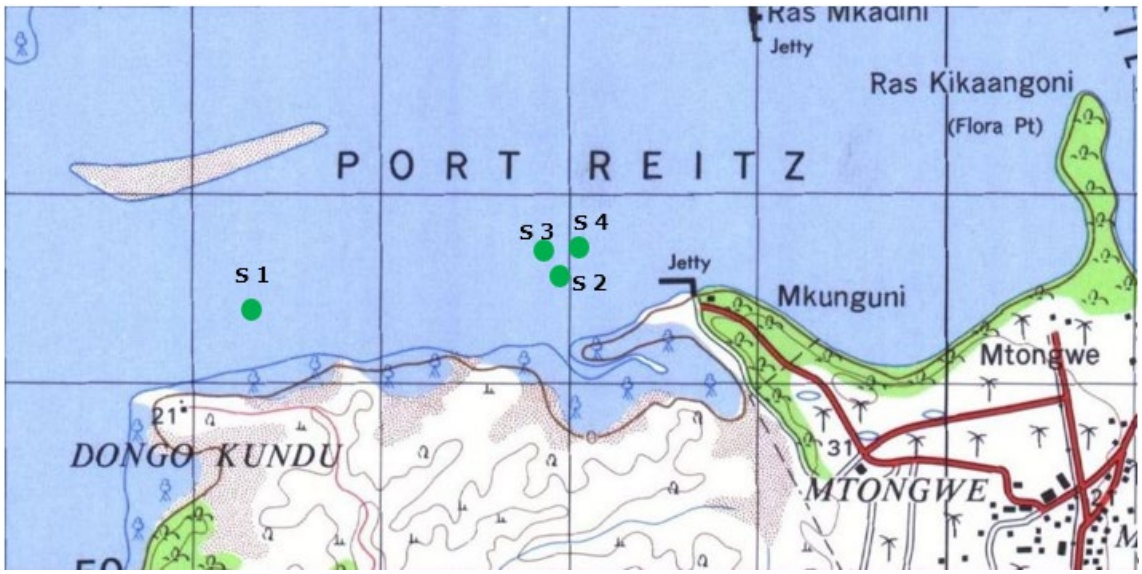
- Turbidity, T-P, TPH and coliform bacteria are higher in the rainy season than in the dry season, to suggest influences of the river water.
- Higher turbidity, nitrogen, phosphorus and coliform bacteria in Port Reitz than in the coastal water may be attributed to its enclosed environment.
- As an indicator of potential pollution by the port activities, TPH was surveyed, but there is no significant difference between Port Reitz and the coastal water, and it is suggested that the port activities would not lead to noticeable oil pollution.

If we compare the above results with the marine water quality standards in Japan;

- pH generally satisfied the marine water quality standard in Japan at all locations.
- DO during the rainy season was <0.2-0.9 mg/l, and this is much lower than the marine water quality standard in Japan. There may have been problems with the collection or analysis of samples. During the dry season, DO satisfied the marine water quality standards in Japan at all locations.
- TP exceeded the marine water quality standard in Japan at all locations during the rainy season, and it is suggested that this would be attributed to river water. During the dry season, TP satisfied the marine water quality standard in Japan at all locations.
- TN exceeded the marine water quality standard in Japan at all locations within Port Reitz (W1-3) during the rainy season and dry season. This would be mainly attributed to its enclosed environment. As for the locations in costal water (W4-7), TN generally satisfied the marine water quality standard in Japan, but TN was high for the bottom layer both during the rainy season and dry season for W4. It is not known why this has occurred.
- Coliform bacteria exceeded the marine water quality standard in Japan at all locations within Port Reitz (W1-3) except at several locations during the dry season. Among the locations in costal water (W4-7), coliform bacteria would exceed the marine water quality standard in Japan at W4, W5 and W6, and it is suggested that the discharge from sewage has impacts on the costal water beyond Port Reitz.

Sediment qualities were surveyed in May 2017 at 4 locations in and around the proposed dredging site of Mombasa SEZ D/M (2019/6). Surveyed parameters were the particle size distribution, total organic carbon, water content, heavy metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Ag, Zn), polycyclic aromatic hydrocarbon (PAH), total petroleum hydrocarbon (TPH), and polychlorinated biphenyl (PCB). Sediment samples were collected by divers from the surface

of seafloor with a core sampler, and they were analyzed by SGS Kenya Ltd. Certified by NEMA. Figure 1-4-6 shows the survey locations, and Table 1-4-6 shows results of the bottom sediment quality survey.



Source: JICA Study Team, Mombasa SEZ D/M (2019/6)

Figure 1-4-6 Locations of the Bottom Sediment Quality Survey (EIA for Mombasa SEZ D/M (2019/6))

Table 1-4-7 Results of the Bottom Sediment Quality Survey (EIA for Mombasa SEZ D/M (2019/6))

	Unit	DL	S1	S2	S3	S4	Australia*1	Canada*2	Analysis method
Depth	m	-	4.1	5	7.8	7.5	-	-	-
Moisture	%	-	51.2	67.96	44.92	45.1	-	-	ICARDA
TOC	%	-	1.3	0.52	1.78	1.17	-	-	ICARDA 5.5
As	mg/kg	0.01	2.99	<0.01	2.13	0.05	$ISQG_L$: 20 $ISQG_H$: 70	ISQG: 7.24 PEL: 41.6	EPA 3050B
Cd	mg/kg	0.02	0.06	<0.02	0.11	<0.02	$ISQG_L$: 1.5 $ISQG_H$: 10	ISQG: 0.7 PEL: 4.2	EPA 3050B
Cr	mg/kg	0.08	20.36	17.21	11.53	24.43	$ISQG_L$: 80 $ISQG_H$: 370	ISQG: 52.3 PEL: 160.0	EPA 3050B
Cu	mg/kg	0.04	15.3	15.3	9.82	15.21	$ISQG_L$: 65 $ISQG_H$: 270	ISQG: 18.7 PEL: 10.8	EPA 3050B
Hg	mg/kg	0.01	<0.01	<0.01	<0.01	<0.01	$ISQG_L$: 0.15 $ISQG_H$: 1	-	D/SGS TW-12
Pb	mg/kg	0.06	7.44	11.46	2.75	9.66	$ISQG_L$: 50 $ISQG_H$: 220	ISQG: 30.2 PEL: 112	EPA 3050B
Ni	mg/kg	0.04	14.59	8.87	8.47	16.22	$ISQG_L$: 21 $ISQG_H$: 52	-	EPA 3050B
Ag	mg/kg	0.03	0.23	2.85	0.06	0.47	$ISQG_L$: 1 $ISQG_H$: 3.7	-	EPA 3050B
Zn	mg/kg	0.09	37.44	51.15	23.36	38.45	$ISQG_L$: 200 $ISQG_H$: 410	ISQG: 124 PEL: 271	EPA 3050B
PAHs	mg/kg	0.05	<0.05	1.05	<0.05	<0.05	$ISQG_L$: 4 $ISQG_H$: 45	ISQG: 124 PEL: 271	SGS TW65
PCBs	mg/kg	0.01	<0.01	ND	<0.01	<0.01	$ISQG_L$: 0.023 $ISQG_H$: NA	ISQG: 0.0215 PEL: 0.189	SGS TW64
TPH (C6-C30)	mg/kg	0.05	1.51	4.46	1.51	1.55	-	-	SGS TW65

*1: Australian and New Zealand Guidelines for Fresh and Marine Water Quality, $ISQG_L$: Interim Sediment Quality Guideline-Low, $ISQG_H$: Interim Sediment Quality Guideline-High

*2: Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, ISGG: Interim sediment quality guidelines, PEL: Probable effect level

DL: Detection limit, S: surface, B: bottom

Source: Mombasa SEZ D/M (2019/6)

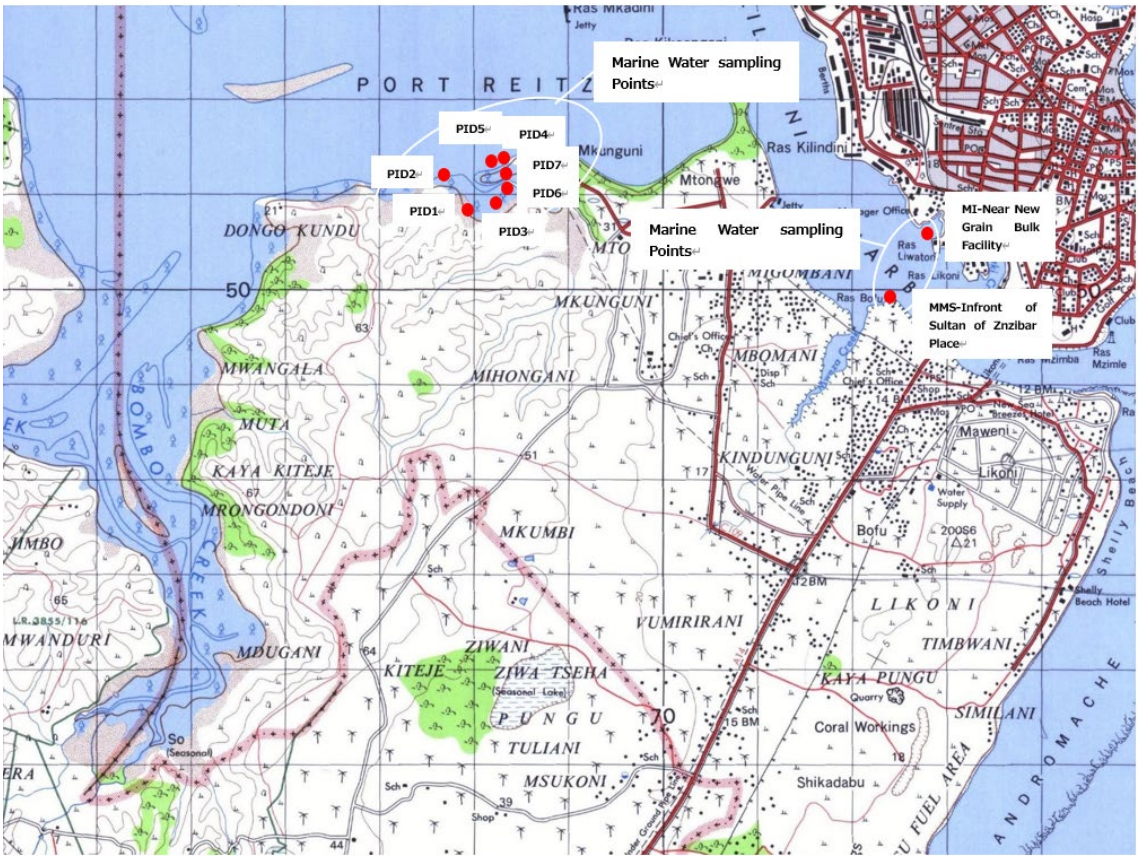
There are no bottom sediment quality standards in Kenya, so the results were compared with the standards in Australia and Canada. Except for silver, all parameters were below the lowest limit of Australian and Canadian standards. As for silver, only at S3, it was above the lowest limit of Australian standard although it was below the highest limit of Australian standard. There is no explanation available at the moment, the very fact that its value was low at the other locations suggest that the silver pollution is not worsening in general. All of these indicate that the bottom sediment at the proposed dredging site is not polluted noticeably.

Results of the additional survey on water and bottom sediment at the locations in Figure 1-4-7 are;

- Analyses of the marine water quality as shown in Table 1-4-8 confirmed more than 1,800 MPN of coliform bacteria in 250ml at both sides of Likoni Strait.
- Colour and turbidity suggest slightly more contamination for Mombasa Island than

the southern part of Mombasa mainland, but they are sufficiently lower than Kenyan (NEMA) standards at both locations, to indicate their soundness.

- No oil and grease was detected. This implies that there is no pollution even in Likoni Strait, or the exit from or entrance to a marine port.
- High conductivity, which is typical to marine water, was detected at these locations to collect samples.
- Compared to Mombasa Island under urbanization and the southern part of Mombasa mainland relatively yet to be urbanized, water pollution levels in underdeveloped SEZ area would be low.



Source: JICA Study Team

Figure 1-4-7 Locations of the Marine Water Quality and Bottom Sediment Quality Survey

Table 1-4-8 Results of Analyses on Marine Water

Parameter	Unit	PID ESIA Samples							MGB ESIA Samples		NEMA Standard
Parameter	*Units*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*MI*	*MMS*	
Total coliform	MPN/								>1800 (>720/100ml)	>1800 (>720/100ml)	500
pH		7.59	6.96	7.51	7.64	7.72	7.65	7.48	8.94	7.99	6--9
Temperature	°C	34.7	31.4	32.1	31.6	31.3	31.3	31.9	NA	NA	30
Colour	U hazen								15	10	100
Dissolved Oxygen	mg/l								8.7	9.3	NA
Turbidity	NTU								3.88	3.27	50
Oil & Grease	Mg/l								<0.1	< 0.1	5
Conductivity	µS/cm	54300	54400	53900	54200	54358	54280	54460	54600	54400	NA
TDS	(ppm)	26988	27038	26789	26938	27017	26978	27068			
TSS	mg/l								5	<500	NA
COD	mg/l								409.8	358.5	NA

* PID: Project for Infrastructure Development in Mombasa Special Economic Zone
* PID samples were collected in June 2019, and MGB samples were collected in 2018.
Source: JICA Study Team, ESIA Study Report for the Mombasa Gate Bridge Construction Project

Table 1-4-9 summarizes results of the analyses on contaminants of the sediment.

Table 1-4-9 Contaminations of the Sediment

Parameter	Measurement		Reference		
	MI	MMS	Canada		Australia and New Zealand
			ISQG	PEL	ISQG
Copper (mg/kg)	1.16	3.24	35.7	197	65-270
Lead (mg/kg)	3.14	1.19	35	91.3	50-220
Chromium (mg/kg)	3.6	8.21	37.3	90	80-370
Nickel (mg/kg)	1.65	4.92	NGV	NGV	21-52
Silver (mg/kg)	0	0	NGV	NGV	1-3.7
Zinc (mg/kg)	9.59	5.25	123	315	200-410

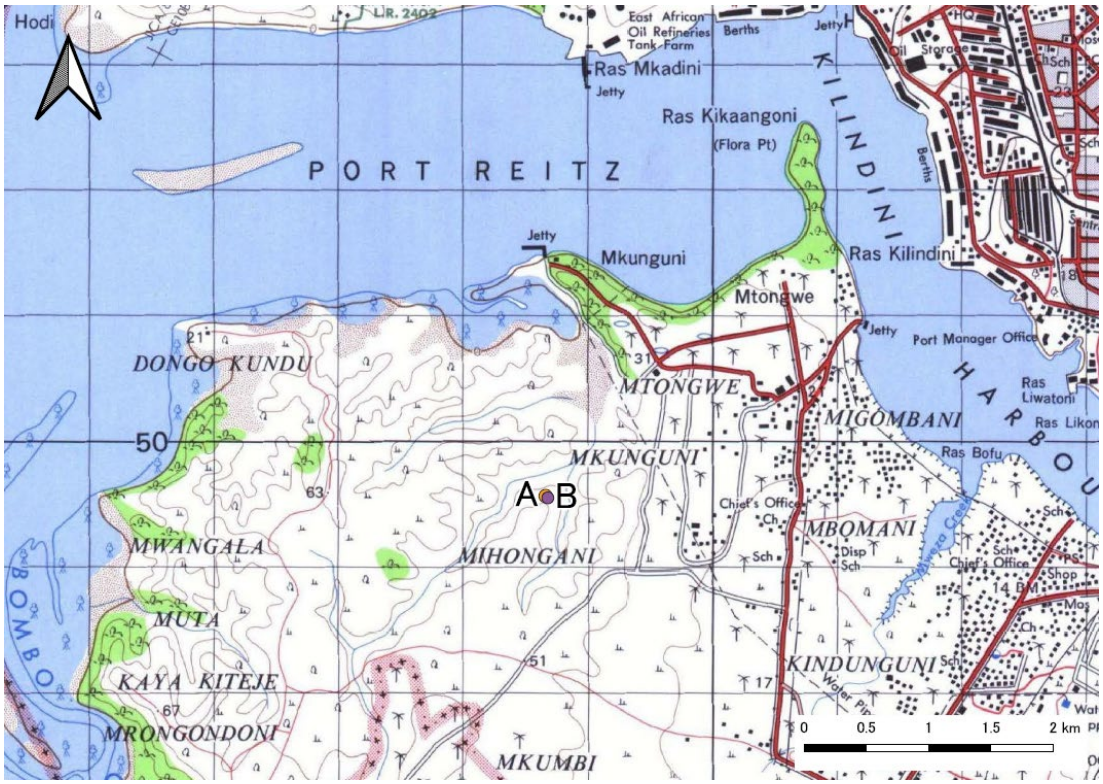
MI: Mombasa Island, MMS: Mombasa Mainland South, ISQG: Interim Sediment Quality Guidelines, PEL: Probable Effect Level, ND: Not Detected, NGV: No Guide Value
Source: ESIA Study Report for the Mombasa Gate Bridge Construction Project(July 2018)

Table 1-4-9 confirms that the heavy metals detected at Likoni Strait have lower concentrations than Canadian and Australian/New Zealand guidelines. These heavy metals detected in the survey water are commonly used for electrodeposition, but there is no such operation in the surrounding areas. Their low concentrations may suggest their natural origin.

6) Inland water quality

In the outside of SEZ, there is no river with constant water flows. The inland water quality survey in the SEZ area was undertaken at a natural stream along the proposed temporary road alignment (Figure 1-4-8). Though there is not water environmental standard in Kenya to be

applied for the sampled water body, the test results were compared with NEMA standards for sources of domestic water and recreational waters for reference as shown in Table 1-4-10.



Source: JICA Study Team

Figure 1-4-8 Locations of the Inland Water Quality Survey

Table 1-4-10 Results of the Inland Water Quality Survey

#	Parameters	Units	NEMA Standards for sources of domestic water *	NEMA Standards for recreational waters**	Sample No. A	Sample No. B
1	Total Coliform Count	MPN/100 ml	Nil/100 ml (E.coli)	500 (counts/100 ml)	>1800	>1800
2	Colour	HU	-	100	15	15
3	Oil and greases	mg/l	5	5	<0.1	<0.1
3	Total suspended Solids (TSS)	mg/l	30	-	27	18
4	Turbidity	NTU	50	50	39.50	15.10
5	Dissolved Oxygen	mg/l	N/A	-	5.78	5.86
6	Chemical Oxygen Demand (COD)	mg/l	N/A	-	29.85	7.46
7	BOD 5@50°C	mg/l	N/A	-	17.69	4.06

#	Parameters	Units	NEMA Standards for sources of domestic water *	NEMA Standards for recreational waters**	Sample No. A	Sample No. B
8	Water Temperature (taken on site)	°C	30	30	27.5	27.8
9	pH(taken on site)	-	6.5 – 8.5	6-9	7.2	7.4

Sampling Date: 10 May 2022
* Quality Standards for Sources of Domestic Water, Water Quality Regulations, 2006
** Quality Standards for Recreational Waters, Tenth Schedule, Water Quality Regulations, 2006
Source: SGS Kenya Ltd., Analysis Report MA22-02237, May 2022

Overview of the island water quality result is provided below.

- Total Coliform Count: The levels in both samples exceeded the reference criteria of NEMA standards which is an indication of contamination e.g. faecal waste. Livestock were observed grazing in the vicinity of the project area, which is assumed as one of possible pollution sources.
- Colour, Oil and Grease, TSS and Water Temperature: The levels were within the NEMA allowable limits which are refereed as the reference criteria.
- Relatively high COD and BOD in Sample No. A is a likely indication of interaction with organic pollutants.

7) Flora survey

According to our surveys, 5,567 trees of 65 species would be affected by the proposed project as shown in Table 1-4-11. Two species in the storage of surplus soil are classified as NT (Near Threatened) in the Red List of IUCN, and permission is required from KFS (Kenya Forest Service) to clear them. All the others are classified as Least Concern (LC). In Mbuta area in SEZ, where embankment works will be conducted to create a land for Free Port B, the largest number of trees, or 4,372 trees, would be affected. Native trees have been replaced with fruit trees such as coconut, cashew, mango and citrus trees to produce economic benefits by development.

Coastal areas along the Indian Ocean in Mombasa and Kwale County used be covered with forests. As the development took place, the present Kaya was protected for religion and the original rich vegetation are remaining there. It is valuable not only as a cultural heritage but also for the conservation of vegetation. As a part of the flora survey, Kayas were surveyed. There are more than 13 Kayas in the whole Dongo Kundu area. Four Kayas are around the proposed project site as shown in Table 1-4-10, but they are apart from the proposed project site and there would be no impact on them. (Refer to Figure 1-4-9 for the locations of Kayas). People in the area along the Indian Ocean in Kenya have been using Kayas for the worship and ceremony of their indigenous religion at a corner of the forest, and they regard it as a

sacred place. It is regarded as taboo to clear a tree in Kayas, and there remains various vegetation because of this. Kenyan Government designate the major Kayas as national monuments to protect them. Kayas are maintained by elders appointed by the area. It is said that human activities such as agricultural developments are responsible for the deterioration of Kayas.

Table 1-4-11 Trees to be Affected by the Proposed Project

SN	Common Name	Botanic Name	Tree Tally by Project Site								
			Water supply component in [illegible]	Water Reservoir-SEZ	Land formation site-SEZ	Contractor site-SEZ	Land Development -SEZ	Drainage Improvement-SEZ	Temporary Road Kms	Total count by Species	IUCN Status
1.	Coconut	*Cocos nucifera*	56		847	10	11	14	13	951	LC
2.	Cashew nut	*Anacardium occidentale*	58	5	511	18		10	2	604	LC
3.	Mango	*Mangifera indica*	52	7	440	14	9	14	9	545	LC
4.	Casuarina	*Casuarina equisetifolia*	37		291			4	6	338	LC
5.	Neem	*Azadirachta indica*	87		70	2	61	9	16	245	LC
6.	Mitomoko	*Annona cherimola*	8		208			11	5	232	LC
7.	Eucalyptus	*Eucalyptus globulus*	7		221			3		231	LC
8.	Mkonge	*Agave sisalana*			227		3		6	236	LC
9.	Mkunazi	*Ziziphus mucronata*	17		159		11	10		197	LC
10.	Banana	*Musa sps*			140		27		6	173	LC
11.	Orange	*Citrus sp.*	8		178		4	6	4	200	LC
12.	Pawpaw	*Carica papaya*	2		110				6	118	LC
13.	Mbambakofi	*Afzelia quanzensis*	4		100		36		2	142	LC
14.	Mngongo	*Sclerocarya birrea*	4		46		25	3		78	LC
15.	Mzambarau	*Syzygium Cumini*	1		105			1		107	LC
16.	Madagascar thorn	*Madagascarthorn*	6		67					73	LC
17.	Guava	*Psidium guajava*	10		60	4		4		78	LC
18.	Mparawanda	*Markhamia zanzibarica*					83		7	90	LC
19.	Mkone	*Grewia plagiophylla*			59		8	3	9	79	LC
20.	Sennar	*Senna siamea*			71			6		77	LC
21.	Mkoma	*Punica granatum*			9		12	7	8	36	LC
22.	Lemon	*Citrus limon*	5		61					66	LC
23.	Mzungi	*Moringa oleifera*			42			7		49	LC
24.	Mtingiri	*Fraxinus excelsior*					50		1	51	LC
25.	Mfenesi	*Arcrocarpus heterophyllus*			48				2	50	LC
26.	Mchangoma	*Flacourtia indica*			44					44	LC
27.	Miyaa	*Rafian palm*					33		6	39	LC
28.	Mtsani	*Mimusops obtusifolia*			36				2	38	LC
29.	Mkuyu	*Ficus sycomorus*			26			5	3	34	LC
30.	Mkwaju	*Termarindus indica*			25		3	5	2	35	LC
31.	Umbrella tree	*Terminalia mantaly*	5		25			2		32	LC
32.	Msabuni	*Piliostigma thonningii*			28					28	LC
33.	Aloevera	*Aloe vera spp.*			20					20	LC

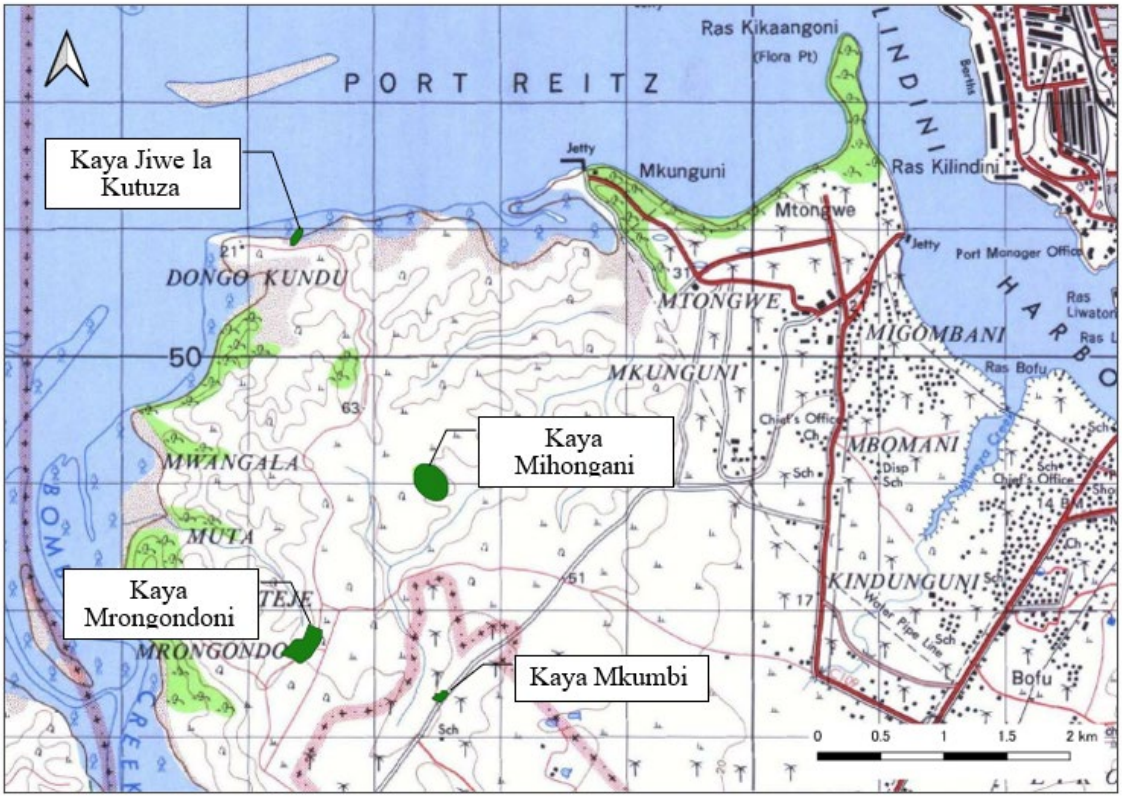
SN	Common Name	Botanic Name	Tree Tally by Project Site								
			Water supply component in [illegible]	Water Reservoir-SEZ	Land formation site-SEZ	Contractor site-SEZ	Land Development -SEZ	Drainage Improvement-SEZ	Temporary Road Kms	Total count by Species	IUCN Status
34	Mdungu	*Zanthoxylum chalybeum*	1		21					22	LC
35	Mbokwe	*Annona senegalensis*	3		14			5	7	29	LC
36.	Mwangavilla	*Terminalia spinosa*			20				1	21	LC
37.	Ashok	*Saraca asoca*	14		1			2		17	LC
38.	Mbuyu	*Adansonia digitata*	2		7		1		2	12	LC
39.	Rukina	*Leucaena leucocephala*			9			4	6	19	LC
40.	Mstafeli	*Annona muricata*	1		3			8	5	17	LC
41.	Mchumbu/Mnyumbu	*Lannea schweinfurthii var. acutifoliolata*	1		2					3	NT
42.	Acasea Simea	*Cassia siamea*	9							9	LC
43.	Mkungu	*Terminalia catappa*	7		1		4			12	LC
44.	Mgoza	*Sterculia africana*			2			2		4	LC
45.	Mgundi	*Acacia nilotica*			1		5		1	7	LC
46.	Chitadzi	*Ormocarpum kirkii*			2		1			3	LC
47.	Gravellea	*Grevillea robusta*	3		1					4	LC
48.	Mvule	*Milicia excelsa*			5					5	NT
49.	Mdunga tundu	*Dovyalis abyssinica*					5		2	7	LC
50.	Dracaena	*Dracaena sp.*	1	3						4	LC
51.	Mdiryo	*Ficus sps*			4					4	LC
52.	Mshilingi	*Gmelina Arborea*	1							1	LC
53.	Chamama	*Thevetia peruviana*	3							3	LC
54.	Mfudu	*Vitex payos*			2					2	LC
55.	Mkao	*Melia volkensii*						1	1	2	LC
56.	Msufi	*Ceiba pentandra*	1							1	LC
57.	Calianda	*Calliandra calothyrsus*	1							1	LC
58.	Mbambara	*Commiphora africana*			1					1	LC
59	Mchindu	*Phoenix reclinata*			1					1	LC
60	Mbirimbi	*Averrhoa bilimbi*			1					1	LC
61	Mhoe	*Thespesia populnea*					1		3	4	LC
62.	Mchekeche	*Piliostigma thonningii*					1		1	2	LC
63.	Mzabibu	*Eriobotrya japonica*							3	3	LC
64.	Moringa	*Moringa oleifera*	6							6	LC
65.	Palm/Tende	*Palm Sp.*	24							24	LC
		Total Count	**445**	**15**	**4372**	**48**	**394**	**146**	**147**	**5567**	
		Tally of species	**33**	**3**	**49**	**6**	**24**	**25**	**46**	**65**	

Source: JICA Study Team

Table 1-4-12 Overview of Kayas in the Survey Area

Name	Location	Nearby Project Site	Conservation Status
Kaya Mkumbi	Kiteje	Water pipelines (in Kwale County)	Deteriorating
Kaya Mihongani	Dongo Kundu	Water distribution pipes in SEZ	Good
Kaya Jiwe la Kutuza	Dongo Kundu	Land development site in SEZ	Deteriorating
Kaya Mrongondoni	Dongo Kundu	SEZ Reserver	Preserved

Source: JICA Study Team



Source: JICA Study Team

Figure 1-4-9 Locations of Kayas

8) Mammal, reptiles and amphibians

At the proposed project site, species classified to LC in the Red List of IUCN were observed, but there was no rare species recognized.

9) Birds

One species of storks (Woolly-necked stork) classified to “vulnerable” in the Red List of IUCN was observed in the proposed project area. Apart from this, 8 species listed in the international conventions on migratory birds were observed. These species are shown in Table 1-4-13 below.

Table 1-4-13 Observed Bird Species to Require Special Attentions

SN	Common Name	Scientific Name	IUCN Red List Status		Convention on Migratory Birds	
1	Roseate tern	*Sterna dougallii*	Least Concern	Unknown	CMS	AEWA
2	Sooty gull	*Larus hemprichii*	Least Concern	Decreasing	CMS	AEWA
3	Wahlberg's eagle	*Aquila walbergi*	Least Concern	Stable	CMS	Raptors
4	Egyptian goose	*Alopochen aegyptiacus*	Least Concern	Decreasing	CMS	AEWA
5	Wood sandpiper	*Tringa glareola*	Least Concern	Stable	CMS	AEWA
6	African spoonbill	*Platalea alba*	Least Concern	Stable	CMS	AEWA
7	Sacred ibis	*Threskiornis aethiopicus*	Least Concern	Stable	CMS	AEWA
8	Great white egret	*Ardea alba*	Least Concern	Unknown	CMS	AEWA
9	Woolly-necked stork	*Ciconia episcopus*	Vulnerable	Decreasing	-	-

AEWA: Agreement on the Conservation of African-Eurasian Migratory Water Birds
CMS: Convention on the Conservation of Migratory Species of Wild Animals
Raptors: Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia
Source: JICA Study Team

10) Mangrove ecosystems

The present status around the proposed land development area is shown in Figure 1-4-10. A land will be developed at further inland to mangroves. There are mangrove communities throughout Dong Kundu coast, although their density may vary. *Avicenia marina*, *Ceriops tagal* and *Rhizophora mucronata* were recognized. All of these are classified to Least Concern in the Red List of IUCN. There occurs no rare species. Although mangroves are not subject to clearing in the proposed project, they are national forests under Forest Conservation and Management Act 2016, and it is required to obtain permission from Kenya Forest Service to clear them. Table 1-4-14 summarizes mangroves identified in the survey.

As a benthic organism, only calling crabs were observed and no other organism was recognized. No aquatic organism or fish/seashell in the Red List of IUCN was observed.

Table 1-4-14 Identified Mangrove Species and Their IUCN Category

Species	IUCN Category
Avicenia marina	Least Concern (LC)
Ceriops tagal	Least Concern (LC)
Rhizophora mucronata	Least Concern (LC)

Note: The Project area does not traverse mangrove forests.
Source: JICA Study Team

Note: The Project area does not traverse mangrove forests.
Source: JICA Study Team

Figure 1-4-10 Mangrove Forests to be in Seawater at the High Tide

11) Socio-economic survey

Kenya's administrative districts are comprised of County, Sub-County, Location, Sub-Location, and Village (see Table 1-4-15). The project area is located in Mombasa County and Kwale County and covers through the following 18 Villages.

Table 1-4-15 Distribution of PAPs by Jurisdiction

County	Sub-County	Locations	Sub-locations	Villages
Kwale	Matuga	Tiwi	Simkumbe	Chai
				Pongwe
		Waa	Kombani	Chidzumu
				Majengo Mapya
			Matuga	Dzangadzangani
				Mzangatifu
				Mwamshipi
				Gwirani
			Kitivo	Maganyakulo
		Ng'ombeni	Ng'ombeni	Maida
				Madibwani
			Kiteje	Bombo
				Kiteje Ziwani
				Mkumbi
				Kiteje 1
Mombasa	Likoni	Mtongwe	Mtongwe	Mrongondoni
				Mbuta
				Dongo Kundu

Note: Only three villages in MSEZ are affected by the grant project: Mrongondoni, Mbuta and Dongo Kundu villages
Source: JICA Study Team

Kenyan coastal areas are dominated by the Digo tribe in Mizikenda community, with low population density in rural areas, scarce in areas away from roads, and high in areas along the main A7 road.

Temperatures are high in the coastal area, and there are fertile soils. These are suitable for agriculture if water is available for agricultural production. The area is full of fruits, such as mango, orange, coconut and papaya, and food crops, such as cassava, corn, potatoes and legumes.

Dongo Kundu's Kaya has not been designated in the official gazette, but its importance is confirmed for aspects other than culture and religion, such as the springs for domestic water supply for local residents.

The main livelihood in the project area is self-sufficient agriculture in both Mombasa County and Kwale County, but there are some shops scattered along A7 road.

Results of the socio-economic survey on PAPs are shown below.

- Genders of the asset owners: 68.9% are men and 31.1% are women
- Marriage status of the property owners: 83.6% are married, 16.4% are single or unmarried
- Religions of the property owners: 96.7% are Muslims and 3.3% are Christians
- Lengths of residence of the household heads: 16.4% have been living for less than 10 years, 21.3% for 10-20 years, 16.4% for 20-30 years, 14.8% for 30-40 years, 6.6% for 40-50 years, and 24.6% for longer than 50 years
- Education levels of the asset owners: 19.7% received no formal education, 54.1% completed the primary education, 14.8% received the secondary education, and 11.5% completed the post-secondary education
- Occupations of the asset owners: 31.1% are casual workers, 52.5% are farmers, 9.8% are involved in commercial activities, and 6.6% are employees
- Revenue: 32.1% are with a monthly income of less than 10,000 Ksh, 26.4% are with 10,000 to 20,000 Ksh, 18.9% are with 20,000 to 30,000 Ksh, 3.8% are with 30,000 to 40,000 Ksh, 5.7% are with 40,000 to 50,000 Ksh, and 13.2% are with more than 50,000Ksh.

12) Cultural heritage

There are no cultural heritages in the project affected areas. The nearest UNESCO world heritage is Fort Jesus located on Mombasa Island (Figure 1-4-11). Since it is away from the project area, it will not be affected.

Source: UNESCO, JICA Study Team

Figure 1-4-11 The Location of Fort Jesus, the World Heritage

1-4-1-4 Environmental and Social Considerations System and its organization in Kenya

(1) Environmental Policy in Kenya

Kenya's National Environment Policy 2013 established the following goals to integrate the development and environmental protection.

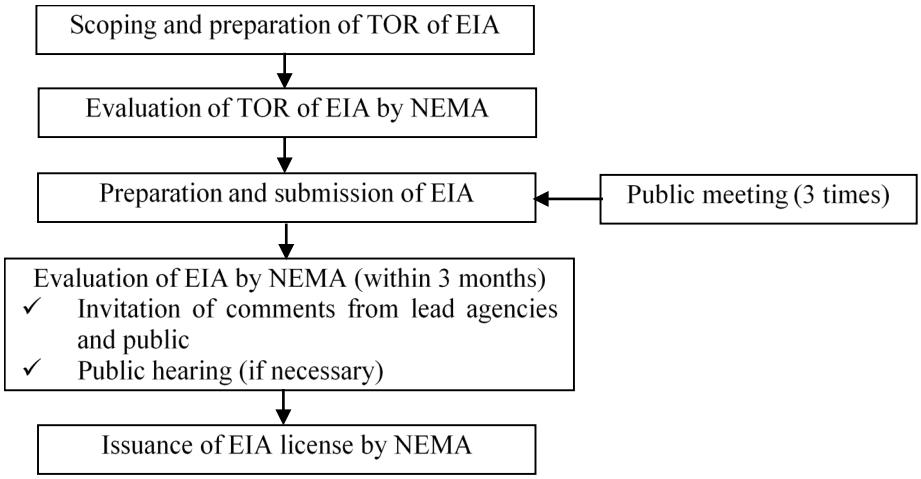
- Sustainable management of the environmental and natural resources with a comprehensive approach.
- Strengthening the legal and institutional framework to effectively manage the environment and natural resources.
- Sustainable management of the terrestrial and aquatic ecosystems.
- Use of environmental management tools such as SEA (Strategic Environmental Assessment), EIA, environmental audit, payment for ecosystem services (PES), and promotion and support of the research and capacity building.

- Promote and strengthen the cooperation and partnership systems to protect and sustainably manage the environment and natural resources.
- Address issues such as the poverty reduction, gender, HIV & AIDS.
- Promotion and strengthening of the multilateral environmental agreements.

(2) EIA system

EIA licenses need to be obtained in accordance with the Environmental Management and Co-ordination Act (EMCA) 1999 in order to implement an infrastructure development project in Kenya. To obtain an EIA license, EIA is required for a project with potential high risk by its impacts, and the EMCA's Secondary Schedule specifies the degree of risk for each project type.

Procedure of EIA is specified in the Environmental (Impact Assessment and Audit) Regulations 2003. According to this, a competent authority of EIA is the National Environment Management Authority (NEMA), and NEMA is responsible for the review, information disclosure, and issuance of licenses for EIA. Figure 1-4-12 shows a flow of EIA procedure.



*: Public meetings are required three times, but according to NEMA, if topics of the meetings overlap, it is allowed to have public meetings only twice.
Source: Environmental (Impact Assessment and Audit) Regulations 2003

Figure 1-4-12 EIA Procedure

Table 1-4-16 shows results of the gap analysis between the EIA system in Kenya and the JICA Guidelines for Environmental and Social Considerations (2010). Kenya's EIA system requires the information disclosure, public participation, and consideration of alternatives, and there is no significant gap from the JICA Guidelines for Environmental and Social Considerations (2010).

Table 1-4-16 Results of the Gap Analysis

	JICA Environmental Guideline	Kenyan legislation	Gaps and Project's policy to fill them
General	Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan.	Projects that require EIA are listed in the Second Schedule of EMCA. The proposed project requires EIA at its planning stage. As per Article 16 of the Environmental (Impact Assessment and Audit) Regulations, 2003 (hereafter "the EIA regulations", it is necessary to consider alternatives and mitigation measures.	In the Project, alternatives and mitigation measures are considered at its planning stage.
Information disclosure	EIA reports must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them.	There is no specific regulation on the language in EIA report, but usually it is required to prepare it in English, which is the official language in Kenya. There is no regulation on the language or format for explanation to local residents.	The EIA report will be prepared in English. Explanation and written materials for local residents will be provided in Kiswahili, which is the locally common language.
	EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports need to be available at all times for perusal by project stakeholders such as local residents and making their copy must be permitted.	As provided in Article 21 of the EIA regulation, the public have access to the EIA report and have the opportunity to submit comments on it during the EIA evaluation period There is no specific regulation on the availability period of the EIA report and permission to make its copy.	While there is no specific regulation on the availability period of the EIA report and permission for its copy, the EIA report will be disclosed continuously through KPA website.
Consultation	For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans.	Article 17 of the EIA regulation requires public consultation meetings 3 times during the EIA preparation stage. However, there is no specific regulations on the information disclosure and when public consultation meetings shall be held.	While there are no specific regulations on the information disclosure and when consultation meetings with stakeholders shall be held, the proposed project will explain and consult with various stakeholders (ex., local government and residents) about the project plan at an earlier stage as possible.

	JICA Environmental Guideline	Kenyan legislation	Gaps and Project's policy to fill them
	In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared.	Article 17 of the EIA regulation requires public consultation meetings 3 times during the EIA preparation stage. It is required to submit the minutes of meeting to NEMA.	No notable gap.
	Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared.	As for consultation with stakeholders such as local residents, public hearings shall be held during the EIA preparation stage and also, as required, during the EIA evaluation period.	While there are no specific regulations on when consultations with stakeholders shall be held, public consultation meetings will be held at the scoping stage and the draft report stages.
Assessment items	The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.	Second Schedule of the EIA regulation specifies the items to be considered such as: Natural environment (e.x., biodiversity, wildlife, wetland, water resource, hydrology, vulnerable ecosystem) Social environment (e.x., economy, society, health, immigration/emigration, social infrastructure, culture, landscape, amenity, land use)	Specific items required under the JICA Guidelines for Environmental and Social Considerations will be surveyed and considered.

	JICA Environmental Guideline	Kenyan legislation	Gaps and Project's policy to fill them
	In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.	Article 18 of the EIA regulation requires considerations of the secondary impacts and cumulative impacts, but it does not mention impacts of associated projects that are indivisible from the proposed project, and it is not required to consider impacts throughout the life cycle of the proposed project.	Impacts of the proposed project will be considered throughout its life cycle, including its pre-construction, construction and operation stages. To develop SEZ, two sub-projects are under implementation with the financial support by Japan's loan packages. These are regarded as indivisible parts of the Project. They are (1) the power supply component and (2) the port and road component. EIA of these 2 sub-projects was conducted in 2019 as a part of the Preparatory Surveys for Mombasa SEZ Development Project under the support by JICA and approved by NEMA. Their implementation schedule, especially for the resettlement and compensation will be shared with KPA for their appropriate and efficient implementation. There will be considerations to prevent obstacles against the livelihood restoration and maintenance of PAPs.
Monitoring, grievance redress	Project proponents should take efforts to make results of the monitoring available to local stakeholders to the project.	There is no regulation on disclosure of monitoring results.	KPA is requested to disclose the monitoring results at its website.
	When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	As provided in Article 39 of the EIA regulation, the public may petition NEMA to cause an audit to be carried out on any project.	Apart from NEMA, KPA will establish its Project Implementation Team, which include environment and social officers, to address any grievances.

	JICA Environmental Guideline	Kenyan legislation	Gaps and Project's policy to fill them
Ecosystem and biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	The Second Schedule of the EIA regulation requires the assessment of impacts on vulnerable ecosystem.	While there are no specific regulations on the ecosystem and biota, the Project will confirm the presence and status of critical natural habitats and forests through field surveys and expert consultations. If any are identified, the Project will consider to avoid impacts on them as much as possible.
Indigenous Peoples	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	The 2010 Kenya Constitution protects the rights (ex., land title, political participation) of minority communities.	While there are no specific regulations on indigenous peoples, the Project will confirm the presence and status of indigenous peoples through field reconnaissance and interviews. If any are identified, the Project will consider to avoid impacts on them as much as possible.

Source: JICA Study Team

(3) Actions to be taken by the SEZ project as a whole

To develop SEZ, two sub-projects will be implemented. These are (1) the power supply project and (2) the port and road project. EIA of these 2 sub-projects was conducted in 2019 as a part of the Preparatory Surveys for Mombasa SEZ Development Project under the support by JICA, and approved by NEMA. Their implementation schedule, especially for the resettlement and compensation have been shared with KPA for their appropriate and efficient implementation. There will be considerations to prevent obstacles against the livelihood restoration and maintenance of PAPs. As for the other sub-projects, they should be closely monitored to determine the orders of various construction works, to establish the temporary yard, and to conduct explanations to local people.

(4) National environmental and emission standards referred

1) Air quality

As for the air quality, quality standards are established for 12 substances under Environmental Management and Coordination (Air Quality) Regulations 2014. These standards are described in Table 1-4-17.

Table 1-4-17 Ambient Air Quality Tolerance Limits in Kenya

Pollutant	Time weighted Average	Ambient Air Quality Tolerance Limits		
		Industrial area	Residential, Rural & Other area	Controlled areas
Sulphur oxides (SOX);	Annual Average	80 g/m3	60 g/m3	15 g/m3
	24 hours	125 g/m3	80 g/m3	30 g/m3
Oxides of Nitrogen (NOX);	Annual Average	80 g/m3	60 g/m3	15 g/m3
	24 hours	150 g/m3	80 g/m3	30 g/m3
Nitrogen Dioxide	Annual Average	150 g/m3	0.05 ppm	-
	24 Hours	100 g/m3	0.1 ppm	-
Suspended Particulate matter (SPM)	Annual Average	360 g/m3	140 g/m3	70 g/m3
	24 hours	500 g/m3	200 g/m3	100 g/m3
Respirable Particulate Matter (<10m) (RPM)	Annual Average	70 g/m3	50 g/m3	50 g/m3
	24 hours	150 g/Nm3	100 g/Nm3	75 g/Nm3
PM2.5	Annual Average	35 g/m3	-	-
	24 hours	75 g/m3	-	-
Lead (Pb)	Annual Average	1.0 g/Nm3	0.75 g/Nm3	0.50 g/m3
	24 hours	1.5 g/m3	1.00 g/m3	0.75 g/m3
Carbon monoxide (CO)/ carbon dioxide (CO2)	8 hours	5.0 mg/m3	2.0 mg/m3	1.0 mg/m3
	1 hour	10.0 mg/m3	4.0 mg/m3	2.0 mg/m3
Hydrogen Sulphide	24 hours	150g/m3	-	-
Non-methane hydrocarbons	instant Peak	700ppb	-	-

Pollutant	Time weighted Average	Ambient Air Quality Tolerance Limits		
		Industrial area	Residential, Rural & Other area	Controlled areas
Total VOC	24 hours	600 g/m3	-	-
Ozone	1-Hour	200 g/m3	0.12 ppm	-
	8 hour (instant Peak)	120 g/m3	1.25 ppm	-

Note: The detailed conditions of ambient air quality tolerance limits should be confirmed with Environmental Management & Co-ordination Act (Air Quality) Regulations, 2014.

Source: Environmental Management & Co-ordination Act (Air Quality) Regulations, 2014

2) Noise and vibration

As for the noise and vibration, various standards are established in Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009. As for vibration, a vibration standard (0.5 cm/sec) is established for the boundary of the construction site. The Japan Vibration Control Law establishes the permissible vibration of 75dB for the boundary of designated construction sites such as pile driving sites. These standards are described in Table 1-4-18 and Table 1-4-19.

Table 1-4-18 Maximum Permissible Noise Levels in Kenya

Zone	Sound Level Limits dB(A) (Leq,14 h)	
	Day	Night
Silent Zone	40	35
Places of worship	45	35
Residential : Indoor Outdoor	 45 50	 35 35
Mixed residential (with some commercial and places of entertainment)	55	35
Commercial	60	35

Day: 6.01 a.m. – 8.00 p.m. (Leq, 14 h)

Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)

Source: Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009

Table 1-4-19 Maximum Permissible Noise Levels for Constructions Sites in Kenya

Facility	Maximum Noise Level Permitted (Leq) in dB(A)	
	Day	Night
(i) Health facilities, educational institutions, homes for disabled etc.	60	35
(ii) Residential	60	35
(iii) Areas other than those prescribed in (i) and (ii)	75	65

Day: 6.01 a.m. – 6.00 p.m. (Leq, 14 h)

Night: 6.01 p.m. – 6.00 a.m. (Leq, 14 h)

Source: Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009

3) Water quality

As for the water quality, standards for domestic water and those for effluents are established under Environmental Management and Coordination (Water Quality) Regulations 2006. These standards are described in Table 1-4-20 and Table 1-4-21.

Table 1-4-20 Environmental Quality Standards for Sources of Domestic Water in Kenya

Parameter	Guide Value (max allowable)
pH	6.5 – 8.5
Suspended solids	30 (mg/L)
Nitrate-NO_3	10 (mg/L)
Ammonia –NH_3	0.5 (mg/L)
Nitrite –NO_2	3 (mg/L)
Total Dissolved Solids	1200 (mg/L)
Scientific name *(E.coli)*	Nil/100 ml
Fluoride	1.5 (mg/L)
Phenols	Nil (mg/L)
Arsenic	0.01 (mg/L)
Cadmium	0.01 (mg/L)
Lead	0.05 (mg/L)
Selenium	0.01 (mg/L)
Copper	0.05 (mg/L)
Zinc	1.5 (mg/L)
Alkyl benzyl sulphonates	0.5 (mg/L)
Permanganate value (PV)	1.0 (mg/L)

Nil means less than limit of detection using prescribed sampling and analytical methods and equipment as determined by the Authority.

And any other parameters as may be prescribed by the Authority from time to time

Source: Environmental Management & Co-ordination Act (Water Quality) Regulations, 2016

Table 1-4-21 Standards for Effluent Discharge into Environment in Kenya

Parameter	Max Allowable(Limits)
1,1,1-trichloroethane (mg/l)	3
1,1,2-trichloethane (mg/l)	0.06
1,1-dichloroethylene	0.2
1,2-dichloroethane	0.04
1,3-dichloropropene (mg/l)	0.02
Alkyl Mercury compounds	Nd
Ammonia, ammonium compounds, NO_3 compounds and NO_2 compounds (Sum total of ammonia-N times 4 plus nitrate-N and Nitrite-N) (mg/l)	100
Arsenic (mg/l)	0.02
Arsenic and its compounds (mg/l)	0.1
Benzene (mg/l)	0.1
Biochemical Oxygen Demand (BOD 5days at 20 °C) (mg/l)	30
Boron (mg/l)	1.0
Boron and its compounds – non marine (mg/l)	10
Boron and its compounds –marine (mg/l)	30
Cadmium (mg/l)	0.01
Cadmium and its compounds (mg/l)	0.1
Carbon tetrachloride	0.02
Chemical Oxygen Demand (COD (mg/l)	50
Chromium VI (mg/l)	0.05
Chloride (mg/l)	250
Chlorine free residue	0.10
Chromium total	2
cis –1,2- dichloro ethylene	0.4
Copper (mg/l)	1.0
Dichloromethane (mg/l)	0.2
Dissolved iron (mg/l)	10
Dissolved Manganese(mg/l)	10
E.coli (Counts / 100 ml)	Nil
Fluoride (mg/l)	1.5
Fluoride and its compounds (marine and non-marine) (mg/l)	8
Lead (mg/l)	0.01
Lead and its compounds (mg/l)	0.1
n-Hexane extracts (animal and vegetable fats) (mg/l)	30
n-Hexane extracts (mineral oil) (mg/l)	5
Oil and grease	Nil
Organo-Phosphorus compounds (parathion,methyl parathion,methyl demeton and Ethyl parantrophenyl phenylphosphorothroate, EPN only) (mg/l)	1.0
Polychlorinated biphenyls, PCBs (mg/l)	0.003
pH (Hydrogen ion activity----marine)	5.0-9.0
pH (Hydrogen ion activity--non marine)	6.5-8.5
Phenols (mg/l)	0.001
Selenium (mg/l)	0.01
Selenium and its compounds (mg/l)	0.1
Hexavalent Chromium VI compounds (mg/l)	0.5
Sulphide (mg/l)	0.1
Simazine (mg/l)	0.03
Total Suspended Solids, (mg/l)	30
Tetrachloroethylene (mg/l)	0.1
Thiobencarb (mg/l)	0.1
Temperature (in degrees celious) based on ambient temperature	± 3
Thiram (mg/l)	0.06
Total coliforms (counts /100 ml)	30
Total Cyanogen (mg/l)	Nd
Total Nickel (mg/l)	0.3
Total Dissolved solids (mg/l)	1200
Colour in Hazen Units (H.U)	15
Detergents (mg/l)	Nil
Total mercury (mg/l)	0.005
Trichloroethylene (mg/l)	0.3
Zinc (mg/l)	0.5
Whole effluent toxicity	
Total Phosphorus (mg/l)	2 Guideline value
Total Nitrogen	2 Guideline value

And any other parameters as may be prescribed by the Authority from time to time

Remarks

Standard values are daily/monthly average discharge values. Not detectable (nd) means that the pollution status is below the detectable level by the measurement methods established by the Authority.

Source: Environmental Management & Co-ordination Act (Water Quality) Regulations, 2016

(5) Environmental permits to be obtained for the proposed project

Table 1-4-22 summarizes the environmental legislation to be observed in the proposed project and the environmental permits to be obtained for it.

Table 1-4-22 Environmental permits for the proposed project

Category	Legislation	Relevance to the Project
Natural Environment	Environmental Management and Coordination (Wetlands, Riverbanks, Lake Shores and Sea Shore Management) Regulation 2009	Prescribes the conservation and management of wetlands. Permission is required to collect resources from wetlands.
	Wildlife Conservation and Management Act 2013	Designate nature reserves and the wild animals and plants to be protected.
	Forest Conservation and Management Act 2016	Prescribes the conservation and management of forests. Permission is required from KFS for deforestation.
	Water Act 2002	Prescribes the conservation and use of water resources. Permission is required from WRA for intakes of water from its resources.
	National Museums and Heritage Act 2006	Prescribes protection of Kayas.
Social environment	Land Act 2012	Provides the land acquisition procedures and compensation payments.
	Fisheries (Beach Management Units) Regulations, 2007	Prescribes the role and authority of the Beach Management Unit (BMU).
	Occupational Safety and Health Act 2007	Stipulates the occupational safety and the site registration for construction.
	Employment Act 2007	Prescribes the employment of children. Employment of children younger than 13 years old is prohibited. Employment of children of 13 years old to 16 years old is permitted for light works unless they impair the health and growth of children.
	HIV and AIDS Prevention and Control Act 2006	Prescribes HIV/AIDS education and tests.
Pollution	Environmental Management and Coordination Act (Air Quality) Regulations 2014	Provides air quality standards, emission standards for facilities, exhaust gases from vehicles and emission permits.
	Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009	Establishes general noise standards, noise/ vibration standards at the boundary of construction sites, restrictions on night works, vehicle noise standards, and noise / vibration permits.
	Environmental Management and Coordination (Water Quality) Regulations 2006	Establishes effluent standards, standards for domestic water, and wastewater discharge permits.
	Environmental Management and Coordination (Waste Management) Regulations 2006	Provides the permit and method of transportation, treatment and disposal of waste.

Category	Legislation	Relevance to the Project
	Environmental (Prevention of Pollution in Coastal Zone and other Segments of the Environment) Regulations 2003	Regulates discharges of the sewage and ballast water from vessels.

Source: JICA Study Team

(6) International convention

Following are relevant international conventions ratified by Kenya. They are referred when there are no national or clear standards in Kenya.

- Convention on Biological Diversity
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- United Nations Framework Convention on Climate Change
- Convention concerning Minimum Age for Admission to Employment
- Stockholm Convention on Persistent Organic Pollutants
- The Convention on the Conservation of Migratory Species of Wild Animals

1-4-1-5 Comparison of alternatives

In order to avoid or minimize potential impacts of the proposed project, following alternatives were compared and considered.

(1) Desalination of seawater

Large-scale desalination plants can produce sufficient water also for the industrial use, to make up water shortage and to significantly reduce burdens on the freshwater resources. Desalination plants can be constructed close to the demand center along the coast, so they do not require a long pipeline. Construction of a desalination plant in SEZ requires the installation of pipes for 8.68km from the desalination plant in coast to a water reservoir in SEZ. Up to 70% of pipelines for the delivery of water from Tiwi to SEZ would be saved by this. The present technology for desalination requires a substantial amount of fossil fuels, so the unit price of water would be higher. It would cost 1.45 USD to produce $1m^3$ of freshwater. Breakdowns of this USD 1.45 are 60.7% for energy and 39.3% for initial investment (Source: Coast Water Service Board - Water Supply Master Plan 2013). To meet 2,000 m^3/day of water demand in SEZ, operation of a desalination plant needs Ksh 290,000 and 20 MW of electricity. 20 MW is equivalent to 9% of the peak electricity demand per day of the whole Mombasa County. In addition to the issues for its operation, installation of a desalination plant and associated facilities may provide indirect loads on the environment.

(2) Utilization of rainwater

Given the seasonal fluctuations of rainfall in Mombasa, rainwater will be stored during the rainy season from April to June, except for the dry season of about eight months from July to March. 384,000 m^3 of water need to be stored to meet the daily demand of water in SEZ for 8 months, when the evaporation and permeation losses are considered. This requires construction of a water reservoir with a depth of 10m in an area of 10 ha. A much wider land needs to be secured than the installation of all pipelines for the project, and the land acquisition including the compensation and relocation would be a major problem. In addition, the uncertainty of water security due to unstable rainfalls by the climate change would also pose a potential risk, and this is not recommended.

(3) Minimization of the environmental loads

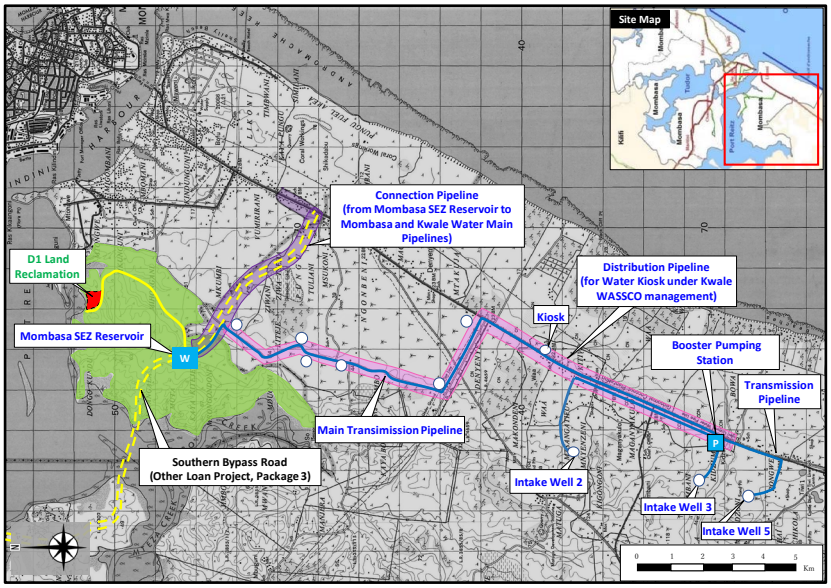
1) Mwache Dam

The project will be postponed in line with the significantly delayed development of Mwache Dam (scheduled to be completed in 2023). Delay of SEZ development may provide an obstacle to Kenyan economy and its goal to become a middle-income country by 2030.

2) Route adjustment

Figure 1-4-13 shows the current route and the alternative route. Their feasibility is higher than the desalination, rainwater utilization and Mwache Dam options mentioned above. In the alternative route, facilities would be installed within lands for the existing road as many as possible, to reduce the private land to be acquired down to 0.57 ha from 2.09 ha for the current route. In addition, the alternative route could be laid on the road under KeNHA with extra space for additional road, and this is advantageous for the maintenance of facilities. On the other hand, the current route would use several roads under KeNHA, CWWDA and KCG, respectively.

However, the alternative route would result in the loss of support by the local residents and KCG, which is required to realize the proposed project. Among the 10 planned water kiosks, only four would be installed in the alternative route. Therefore, the alternative route is very likely to be rejected by the local community. Since the route selection for water supply requires not only technical considerations, including the maintenance cost, but also the social considerations, the current route would be the most suitable one.



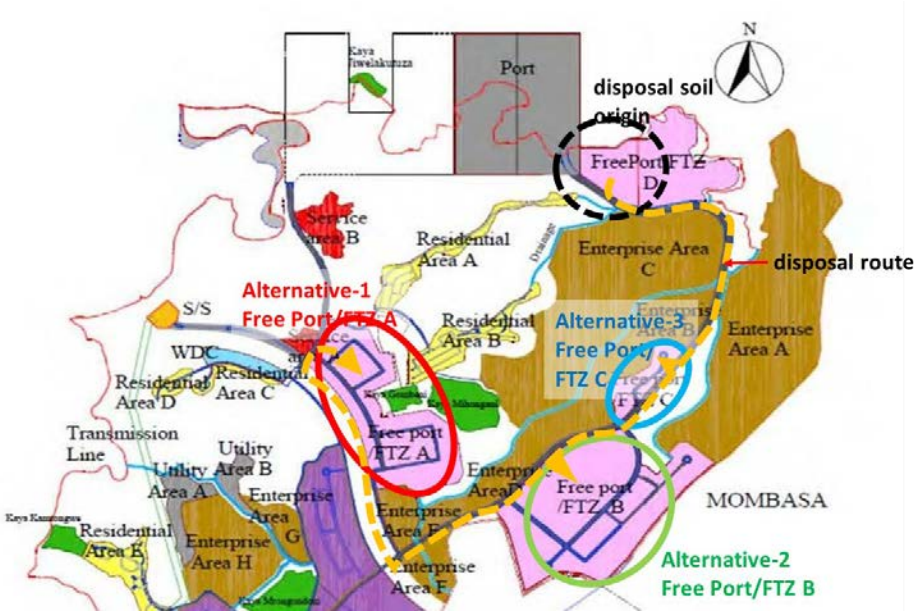
Source: JICA Study Team

Figure 1-4-13 Comparison of Alternative Pipeline Routes

(4) Soil disposal site

An alternative analysis was made for deciding the soil disposal site by comparing among three alternative plans in Figure 1-4-14. As the results, Alternative-2 of Free Port B was identified as the most preferable option due to the following reasons:

- Alternative-2 site has enough capacity to accommodate the soil and is located relatively close to the D1 site.
- Alternative-2 site is useful as a container yard and/or other facilities without preparing additional facilities such as an interchange.
- All options require cutting trees and relocation of a number of houses and will generate dust and noise.



Source: JICA Study Team

Figure 1-4-14 Comparison of Alternative Soil Disposal Sites

In addition to the above, Strategic Environmental Assessment (SEA) was conducted in surveys for the master plan in accordance with both JICA and Kenyan guidelines and the plan of the SEZ was approved by NEMA including the land development and the road plan. Considerations of alternatives in the preparatory survey on the port and road in 2019 lead to the final identification of the port facility location at the site without mangroves and the resettlement of residents. As for the creation of land for the proposed project, an off-shore option was considered, but there would be significant impacts on the natural environment. The current location was also considered to be most suitable one, to obtain the maximum integral function of the proposed project and the neighboring port facilities. The drainage route is planned with the maximum consideration of the natural topography, and this is appropriate also from the environmental aspect.

1-4-1-6 Scoping

Scoping was conducted the basis of the business plan and the existing information, and TOR for the Environmental and Social Consideration Survey was considered. TOR is presented in Table 1-4-23.

Table 1-4-23 Results of the Scoping and TOR for the EIA Study

No.	Item	Phase	Rating	Rationale	TOR of EIA study
1	Air pollution	PC	D	There would be no work to produce the air pollution.	—
		C	B-	Operations of cement/asphalt plant, excavation machines, vehicles, and heavy machines would emit exhaust gases and dusts to deteriorate the air quality.	• Review of relevant legislation • Field reconnaissance, air quality survey • Survey on air pollution sources • Confirmation of the execution scheme
		O	B-	Driving vehicles could cause the air pollution.	• Review of relevant legislation • Field reconnaissance, air quality survey • Survey on air pollution sources
2	Water pollution	PC	D	There would be no work to produce the water pollution.	—
		C	B-	Soil runoff from the land development site would lead to the marine pollution.	• Review of relevant legislation • Field reconnaissance, water quality survey • Collection of hydrological data for the area around the construction site • Confirmation of the execution scheme
		O	B-	There could be oil leaks by vehicles on roads or the completed land development area. Contamination could reach the marine area through the drainage channel.	• Review of relevant legislation • Field reconnaissance, water quality survey
3	Soil contami-nation	PC	D	There would be no work to produce the soil contamination.	—
		C	B-	There is a risk of soil contamination by oil leaks from construction vehicles/machines.	• Review of relevant legislation • Field reconnaissance, soil quality survey • Survey on soil contamination sources • Confirmation of the execution scheme
		O	B-	There is a risk of soil contamination by oil leaks from vehicles	—
4	Waste	PC	D-	There would be no work to generate waste.	• Review of relevant legislation • Survey on the local practice of waste disposal.

No.	Item	Phase	Rating	Rationale	TOR of EIA study
		C	B-	Construction could generate waste including cleared trees.	• Review of relevant legislation • Survey on the type and volume of waste • Survey on the local waste disposal facility
		O	B-	Maintenance activities would generate various waste.	• Identification of waste types. • Survey on the local waste disposal facility.
5	Noise and vibration	PC,	D	There would be no work to generate noise/vibration.	—
		C	B-	Operation of the construction vehicles and heavy machines would generate noise/vibration.	• Review of relevant legislation • Measurements of noise/vibration • Identification of the source of noise/vibration. • Confirmation of the execution scheme.
		O	B-	Driving vehicles would generate noise/vibration.	• Review of relevant legislation • Measurements of noise/vibration • Identification of the source of noise/vibration.
6	Ground subsidence	PC, C, O	C-	There is a risk that excessive water intakes could result in lower groundwater levels and subsequent ground subsidence.	• Review of relevant WARMA legislation. • Review of the existing information and references on the water source.
7	Offensive odor	PC C O	D B- D	There would be no work to generate offensive odor. Cement/asphalt plant would generate offensive odor. There would be no offensive odor generated.	— • Review of relevant legislation • Monitoring on offensive odor
8	Bottom sediment	C,	B-	Land development works could lead to contaminations of the bottom sediment.	• Review of relevant legislation • Control of contaminations of the bottom sediment
		PC, O	D	There would be no work to lead to contaminations of the bottom sediment.	—
9	Conservation area	PC, C, O	D	There would be no work to have impacts on the conservation area.	—

No.	Item	Phase	Rating	Rationale	TOR of EIA study
10	Ecosystem	PC, C O	D B- D	There would be no work to have impacts on the ecosystem. Clearing of trees could have impacts on the ecosystem. There would be no impact on the ecosystem.	— • Review of relevant legislation • Field surveys —
11	Hydrology	PC, C, O	D	There would be no crossing across rivers with constant water flows. There would be no impact on the existing hydrology.	—
12	Topography	C	B-	Land development works would change local topography. There is potential of soil erosion. Earth and sand generated by the earth cutting for land development would be used for embankment in SEZ to create a land for Free Port B.	• Review of relevant legislation • Considerations of measures to prevent soil from running into the sea.
		PC, O	D	There would be no work to change local topography.	—
13	Land acquisition/ involuntary resettlement	PC	B-	At the scoping stage, it is estimated that 154 people would be relocated.	• Review of relevant legislation • Review of the measures for compensation and assistance.
		C, O	D	There would be no relocation of people.	—
14	Socially vulnerable people	PC	B-	Socially vulnerable people are sensitive to changes associated with resettlement.	• Implementation of the socioeconomic survey • Identification of socially vulnerable people. • Review of the assistance measures
		C, O	D	There would be no activity to have impacts on socially vulnerable people.	—
15	Indigenous/minority people	PC, C, O	C-	It should be confirmed whether there are any indigenous/minority people	• Review of literatures • Implementation of the field reconnaissance and interviews
16	Local economy, such as the employment and livelihood measures	PC	B-	PAPs may lose their income sources unless appropriate compensations and assistances are provided.	• Implementation of the socioeconomic survey • Identification of factors to result in the loss/reduction of income. • Review of the assistance measures

No.	Item	Phase	Rating	Rationale	TOR of EIA study
		C	B-	Construction works may restrict some livelihood activities.	• Implementation of the socioeconomic survey • Identification of factors to result in the reduction of income. • Review of the assistance measures
		O	D	There are no activities that may affect livelihood activities.	—
17	Land use	PC	D	There would be no restriction on the land use.	—
		C	B-	There would be temporary restriction on the land use at the construction site. Surplus soil generated by the land development would be accumulated within SEZ, and this would restrict local land uses.	• Implementation of the socioeconomic survey • Identification of the current land uses. • Review of relevant legislation
		O	D	There would be no activity to change local land uses.	—
18	Utilization of local resources	PC, C O	D B-	There would be no activity to have adverse impacts on the utilization of local resources. *See “Water use”	—
19	Water use and water resources	PC	D	There would be no activity to have impacts on the local water use.	—
		C	D	Construction of a water supply facility would have no impacts on the river water use in the area.	—
		O	B-	A new water supply project could result in lower groundwater levels/depletion of water resources.	• Review of relevant legislation • Implementation of surveys to confirm the soundness of water resources, including those on groundwater levels.
20	Social infrastructures and services	PC, O	D	There would be no activity to have impacts on the social infrastructures and services.	—
		C	B-	The water supply route goes across several road, so its construction works could have impacts on the local road traffic.	• Confirmation of the construction methods

No.	Item	Phase	Rating	Rationale	TOR of EIA study
21	Social institutions such as those for social infrastructures and for local decision making	PC, C, O	D	There would be no activity to have impacts on local social institutions such as those for social infrastructures and for local decision making.	—
22	Misdistribution of the benefits and losses	PC, C, O	D	There would be no activity to cause misdistribution of the benefits and losses.	—
23	Local conflicts of interest	PC, C, O	B-	There could be local conflicts of interests between Kwale County and Mombasa County over the water use.	• Coordination through public consultation meetings for consensus.
24	Cultural heritage	PC	B-	There would be no direct impact on Kaya, but its maintenance could be affected by the resettlement of people.	• Confirmation of the maintenance of Kaya
		C, O	D	There would be no activity to have impacts on cultural heritage.	—
25	Landscape	PC, O	D	There would be no activity to have impacts on landscape.	—
		C	B-	The land development work etc. would change the surrounding landscapes.	• Review of project design for land development work
26	Gender	PC	B-	The Project area has patriarchal tradition with emphasis on men's rights, so its implementation would have negative impacts on women.	• Identification of the households headed by a woman through the socioeconomic surveys.
		C, O	D	There are no activities that may trigger gender issues.	—
27	Children's rights	C	B-	Construction contractors may exploit children for cheap labor.	• Review of relevant legislation. • Review of the child labour status in Kenya.
		PC, O	D	There would be no activity with infringement of children's rights.	—

No.	Item	Phase	Rating	Rationale	TOR of EIA study
28	Infectious diseases (HIV/AIDS etc.)	C	B-	There would be a risk of spreading of infectious diseases by incoming construction workers.	• Review of relevant legislation. • Assessment of the risk of infectious diseases.
		PC, O	D	A risk of the spreading of infectious diseases would be low.	—
29	Working Environment (including occupational safety)	PC	D	There would be no activity to cause adverse impact on working environment.	—
		C, O	B-	There would be a certain risk of occupational accidents.	• Review of relevant legislation. • Identification of high risk works for construction.
30	Accidents	C	B-	There would be accidents such as traffic accidents and falling into excavated trenches.	• Analyses of the factors to cause accidents. • Compliance with the Occupational Health and Safety Guidelines.
		PC, O	D	A risk of accidents would be low.	—
31	Transboundary impacts and the climate change	PC, C, O	D	There would be some impacts by changes of the current vegetation due to the land development and the accumulation of surplus soil.	• Review of relevant legislation • Conservation of trees as many as possible • Review the execution scheme

A+/-: Significant positive/negative impact is predicted, B+/-: Positive/negative impact is predicted to some extent. C+/-: Extent of positive/negative impact is unknown, D: No impact is predicted

PC: Pre-construction, C: Construction, O: Operation

Source: JICA Study Team

1-4-1-7 Results of the Environmental and Social Considerations Study

(1) Air pollution

The main source of air pollution during construction would be generations of dusts and exhaust gases by operations of a cement/ asphalt plant, installations of water pipes, land development works, and transportations of and surplus soil. Since the construction works are temporary and intermittent, it is not likely for the air quality around the construction site to constantly exceed the air quality standards due to the air pollution load by the construction. Therefore, no significant impact is expected, but sufficient measures need to be taken.

(2) Water pollution

During construction, muddy water mixed with earth and sand may flow out from the bare ground at the construction site during rainfalls, and this may contaminate surrounding water. The main sources of turbid water would be unpaved parts of the water pipe installation sites and the land

development sites. Another main source of contamination is concrete wash water. Concrete wash water is generally high in pH, and if discharged into the environment without treatment, it may locally contaminate the downstream water. Particularly, if a large amount of water is drained into a stagnant pond or groundwater, there would be a certain degree of impact since it takes some time for neutralization. Appropriate measures such as sedimentation pond and neutralizer would be required.

During operation, wastewater from water supply administration building at Mombasa Reservoir, administration building and restroom building at D1 area will be generated. However the blackwater will be treated by septic tank as well as outflow of septic tank and other greywater will be treated by penetration pit. The proper maintenance including periodical emptying of sludge will be essential to ensure the designed treatment performance.

(3) Soil contamination

The main sources of soil contamination are oil leaks and spills from the operation and maintenance of construction vehicles and heavy equipment. If a refueling tank is installed at the construction site, there could be oil leakages or spills during refueling or breakage. As for the impact during construction, unless there is an accident to lead to a spill of the large amount of oil, there would be no significant soil contamination, but in following cases, there would be local contamination.

- Old construction vehicles/heavy equipment, or those with poor maintenance.
- When the maintenance of construction vehicles/heavy equipment is performed at locations other than facilities dedicated for it (ex., construction sites).
- Refueling at the construction site.

(4) Waste

Waste would be generated during pre-construction works, construction works and operations. When waste is transported, processed or disposed, it is required to entrust it to a NEMA certified company in accordance with the Environmental Management and Coordination (Waste Management) Regulations 2006.

Clearing of 5,567 trees may be required. Only ordinary trees would be cleared, and rare species of trees are not subject to clearing. It is not necessary to dispose of felled trees since cleared trees would be generally reused as building material or fuel, they would not be disposed and no significant impact is expected.

During construction, waste such as excavated soil, packing material, scrap iron, and waste oil would be generated. There would be surplus soil of about 315,000 m^3, but this will be used at SEZ Free Port B for embankment to create a land for it, and there would be no soil waste generated. Harmless construction waste that cannot be reused or recycled would be disposed at

the final disposal site in each district. In Mombasa, there are 2 final disposal facilities operating at Mwakirunge and Shonda. Hazardous waste would include waste oil, but it could be entrusted to NEMA-certified waste oil recycling facilities for treatment. These suggest that there would be no significant impact by the construction waste. Since the final disposal facility is under the jurisdiction of each district, it is required to consult with the county government in advance, to establish a waste management plan.

During operation, maintenance works would generate general waste. As in the case of construction waste, general waste would be disposed at the final disposal facilities in Mombasa and recovered oil would be entrusted to NEMA-certified waste oil recycling facilities. These suggest that there would be no significant impact by the operation waste.

(5) Noise and vibration

The main sources of noise during construction are construction vehicles and heavy equipment. Among others, there will be frequent truck movement between D1 area and Free Port B for transporting surplus soil. Although their operation is intermittent and temporary, and limited to the construction period, appropriate safety and operation management including accident prevention is required.

(6) Ground subsidence

Water abstraction which will induce ground subsidence is not planned. However, the planned pumping rate must be adhered to so that excessive water withdrawal does not cause land subsidence.

(7) Offensive odor

Offensive odor would be generated from the operation of a cement/asphalt plant and possible delay of waste collection of waste for disposal.

(8) Sediment

There could be contamination of sediment as a result of soil runoff due to land development works.

(9) Protected area

The nearest protected area is Shimba Hills National Reserve in Kwale County, and it is about 8km away from the project area. There is no Kaya, or cultural heritage at the project site. Although Kaya is found at 4 locations around the project site, they are avoided and there would be no significant impact. There is no plan to clear forests such as community forests.

(10) Ecosystem

Flora and fauna surveys and hearings suggest that there occurs one species of precious birds. A land for the project would be developed further inland to the high tide line, and no clearing of mangrove forests is planned. However, land development and embankment works would lead to clearing of more than 5,000 trees, and there is a potential impact on the ecosystem.

(11) Topography, geology and landscape

Land development works and the embankment works for Free Port B will be conducted, which will change local topography and landscape. Appropriate measures would be required to prevent from soil erosion.

(12) Land acquisition and resettlement

According to the surveys for ARAP, 2.09 ha of land would be acquired in Kwale County and 55.76 ha of government land inside the SEZ in Mombasa country would be required for the Project, and surveys for ARAP suggest that 142 people of 61 households would be resettled.

(13) Socially vulnerable people

The surveys for ARAP suggest that 14 socially vulnerable people, including orphans, elderly above 80 years of age and disabled people would be affected by the project. In addition, female headed households were identified 6 and 11 in Kwale county and Mombasa County respectively.

(14) Ethnic minorities and indigenous peoples

People living around the project belong to Mijikenda tribe, which is the majority in Kwale and Mombasa counties. There is no ethnic minority or indigenous peoples in the project area.

(15) Regional economy such as employment and livelihood

There would be no large-scale land acquisition or resettlement. Negative impacts of the project on the affected people can be mitigated by assistance measures such as compensation and livelihood restoration programs. Furthermore, employment opportunities would be created by the construction works and the establishment of the special economic zone, to provide substantial benefits to local residents and economy.

(16) Land use

Land uses would be restricted at the construction site, but such restriction would be spatially limited and for a short term.

(17) Social infrastructures and services

The pipeline goes across several roads. During underground construction works, their use would be partially restricted, but only for several hours. Where the pipeline goes across Rikoni Ukunda road, an appropriate construction method shall be considered.

(18) Hydrology

The natural stream is observed along a part of alignment of temporary road in rainy seasons. Sections of the wayleave of the proposed road overlaps valley depressions. Therefore, it will be required to safely drain the storm water during construction.

(19) Water use and water resources

Some stakeholders concern that a new water supply project could lead to lower groundwater levels or depletion of water source, in case of excessive abstraction of water. In order to respond to such concerns on saline intrusion and groundwater level decline in Tiwi Aquifer, the preceding JICA Study, namely the Project of Design Mission (D/M) for Mombasa SEZ (2019) conducted a numerical simulation of groundwater flow system by 3D model. By the simulation, the D/M study team confirmed that the new water abstraction of 1,790 m^3/day (total planned pumping rate on three wells as of D/M study) in addition to the existing pumping will not cause the sea water intrusion and not cause the groundwater level decrease of existing wells compared with no-project cases. In Mombasa PID, the designed pumping rate is 2,300 m^3/day (2,000 m^3/day for Mombasa SEZ and 300 m3/day for local communities), which is larger than 1,790 m^3/day. On the ther hand, JICA Study Team referred to the other past study (Water Supply Mater Plan for Mombasa and Other Towns Within Coast Province, 2013), which indicated that more than 39,000 m^3/day abstraction will cause the saline water intrusion. According to these findings, total 2,300 m^3/day of abstraction is designed in the Project and it is not anticipated that the above mentioned impacts to groundwater resources will occur. The designed volume of groundwater pumping discharge should be maintained, and ground water level as well as water quality should be continually monitored to prevent over-exploitation of groundwater resources and saline intrusion.

(20) Misdistribution of the benefits and losses as well as local conflicts of interest

People in Kwale County tend to feel that sufficient water is not supplied to them even though they are living close to its source. The issue could be mitigated by the project implementation by providing additional water sources to those residents in Kawale County.

(21) Gender

Due to the local patriarchal tendency and lower educational levels, women would be vulnerable to impacts associated with the resettlement. In construction phase and operation phase of the project, priority for job opportunity will be given to female. In addition, careful monitoring to grievance from female headed households will be conducted, and prompt reaction will be taken by KPA in case any gender specific issues arise.

(22) Children's rights

A website of the US Department of Labor reports the child labor especially in the agriculture and in the construction industry for Kenya. Child labor could be used also in the project. Employment Act 2007 (Part VII) regulates child labor as follows.

- Definition of children: under 18 years old (Article 2).
- Employment of children under 13 years old is prohibited (Article 56).
- Children between 13 years old and 16 years old can be employed for light labor that does not pose a danger or impediment to their study at school (Article 56).

- Operation of heavy equipment at mines, factories and construction sites is prohibited for children between 13 years old to 16 years old (Article 58).
- Employment of children for open-pit and underground mining is prohibited (Article 58)
- Work from 6:30 pm to 6:30 am is prohibited for children (Article 59)

Minimum Age Convention (No. 138) of the International Labor Organization (ILO) ratified also by Kenya requires that the minimum age for employment is 15 years old. However, Article 2 allows developing countries to lower the minimum age of employment down to 14 years old if the work is not dangerous and children have graduated from the compulsory education. Article 7 allows employment of children of no younger than 13 years old for light labor under certain conditions. Engagement in dangerous labor may be permitted to children no younger than 18 years old, but those no younger than 16 years old can engage if their health and safety are sufficiently secured and they havex.one through training (Article 3).

Although there is no significant gap in provisions between Kenya and ILO, there is no minimum age provision for dangerous labor in Kenya except for the operation of heavy equipment and mining works. Therefore, for dangerous labor, the minimum age for employment shall be 18 years old, in accordance with the provisions of ILO.

It is a policy of the project to actively recruit local people for works such as the construction work. However, people around the project site may not have evidence, such as a birth certificate, to prove their age. When children are employed for the project, their age shall be confirmed thoroughly with county government offices.

(23) Infection diseases such as HIV / AIDS

According to Mombasa County AIDS Strategic Plan 2016 - 2020, HIV infection rate is decreasing in Mombasa County, but it is still 7.4% in 2014 and higher than the national average of 5.6%. Especially, infection rates for women is 10.5% and more than double of the infection rate of 4.5% for men. According to Kwale County HIV and AIDS Strategic Plan 2016-2019, HIV infection rate for Kwale County is 5.7% in 2014 and slightly lower than HIV infection rate in Mombasa County. As in Mombasa County, female-male ratio is high in Kwale County. Infection rates are generally high for homosexuals, sex workers and drug addicts.

Above suggests a considerable risk for workers of the project to be infected with HIV and spread it. Therefore, it is important to prevent infection with HIV and educate construction workers about HIV.

(24) Working environment

As for the working environment of construction workers, there would be a middle-class risk of occupational accidents, such as falling into an excavated trench.

(25) Accident

Driving of construction vehicles on the road would pose a considerable risk of traffic accidents. Roads to go to schools, intersections with a road with heavy traffic (ex., southern bypass road), and temporary roads to transport waste soil within SEZ would require special attentions. Many roads are not well lit, so it is dangerous to drive at night. In addition, there would be a risk of carelessness and drowsy driving due to overwork, so a work system to allow sufficient breaks would be required.

(26) Transboundary impact, climate change

In this project, 10 ha of D1 land will be developed, and a water supply center and roads will be constructed. In addition, the embankment work will be conducted at one location within SEZ to create a land for Free Port B. Although these are relatively sparsely vegetated lands with a mixture of young trees and shrubs and grasslands, it is required to reduce potential impacts on the climate change by sufficient considerations for the conservation of trees.

In this project, reforestation program will be developed which would include transplantation of long-lived trees as a mitigation measure against the loss of precious trees, and this would be regarded as a measure to minimize potential impacts on the climate change.

1-4-1-8 Impact assessment

Based on the results and predictions of the Environmental and Social Considerations Study, impact assessment was performed for items with potential negative impacts predicted in scoping. Note that this includes items that were not anticipated at the time of scoping, but were predicted to have a possible negative impact during the course of the study. Table 1-4-24 shows its results.

Table 1-4-24 Results of Impact Assessment

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Air pollution	D	B-	B-	D	B-	D	[During construction] The main sources of air pollution are exhaust gases and temporal dust emissions from cement/asphalt plant and heavy construction vehicles for excavation and surplus soil transportation. However, construction activities are temporary and intermittent, so no significant impact is expected. However, under the dry weather, certain impacts may occur on a small number of houses near the construction site. Greenhouse gases will be emitted by transportation of construction materials. [During operation] At scoping stage, it was predicted that air pollution would be increased by vehicle traffic. However the impact will be minor and negligible because another port access road to be constructed by the other JICA loan project will be used as a main traffic route to D1.
Water pollution	D	B-	B-	D	B-	B-	[During construction] Retaining walls are planned at the land development site, but measures must be taken to prevent soil runoff from the site. Concrete wash water from the cement/asphalt plant tends to have high pH, but its impact could be reduced by avoidance of the direct discharge to environment, installation of a settling pond, administration of neutralizer. [During operation] Toilet wastewater will be properly treated by a septic tank, and other gray wastewater and outflow of septic tank will be treated by penetration pit to meet effluent standards. However, if these wastewaters leak, they may contaminate groundwater. Regular maintenance of septic tanks and other facilities is important to maintain treatment performance.
Soil contamination	D	B-	B-	D	B-	B-	[During construction] Oil leakages from construction vehicles/machines and fuel tanks could lead to soil contaminations, but such leakages would be limited to relatively small areas. No significant impact is expected by taking measures such as installation of oil traps, metal oil pans and fuel tanks with solid barriers. Because the earth-fill work would cause the soil contamination if the cut earth is originally polluted, soil analysis will need to be conducted. [During operation] Risks of soil contamination by oil leakage from vehicles and other business activities in free port D1 area are expected.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Waste	D-	B-	B-	D	B-	B-	[During construction] More than 5,000 trees would be cleared for the project. Although it depends on the construction procedure specified in the construction plan, clearing may occur prior to the main construction. No significant impact is expected since the cleared trees could be reused for fuel, building material and furniture for the benefit of local communities, and since no precious tree would be cleared. Construction waste could be easily processed by a general waste treatment plant in the county, so significant impact is not expected. Cut earth and surplus soil generated by the land development would be used for embankment in SEZ, so measures to prevent a fall of earth or soil runoff would be required. [During operation] Since waste could be easily treated by a general waste treatment plant, and containers for test agents of water quality could be recycled by NEMA-certified recycling company, no significant impact is expected.
Noise / vibration	D	B-	B-	D	B-	B-	[During construction] Noise : The main sources of noise are excavation works for trenches to lay pipelines and the transportation of surplus soil. There would be no significant impact since they are temporal and for a short term. However, construction works shall be limited to certain time of a day, for example, by construction works only during daytime, or avoidance of works during night time. It is required to take a break on Sundays. Vibration : Sources of vibrations are excavations of rocks to lay pipelines and the operation of trucks to transport residual soil. Such works are temporal and for a short term, so avoidance of night works, or operations only during daytime could reduce the impact. [During operation] Noise/vibration would occur from vehicle traffic and operations of free port D1 development area.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Ground subsidence	C-	C-	C-	D	C-	B-	[Pre-construction] There will be no activities which could induce ground subsidence. [During construction] Water abstraction which will induce ground subsidence is not planned. However, construction activities may lead to subsidence where soft clayey soil is observed along a part of temporary road alignment. Soft clayey soil will be replaced with cut soil from D1 land to strengthen the foundation of temporary road. [During operation] Water abstraction which will induce ground subsidence is not planned. However, if there will be excess water intake from the water source, it may cause reducing water level resulting in ground subsidence.
Offensive odor	D	B-	D	D	B-	C-	[During construction] Cement and asphalt plants and delay of waste collection may cause offensive odor. [During operation] Sewerage from the installed outside toilet may lead to offensive odour if not properly maintained. The mitigation measures are included in EMP on wastewater management.
Sediment	D	B-	D	D	B-	C-	[During construction] There could be contamination of sediment as a result of soil runoff due to land development works. [During operation] During rainy season, stormwater around temporary road may cause erosion increasing sedimentation load.
Ecosystem	D	B-	D	D	B-	D	[During construction] Land development and embankment require clearing of more than 5,000 trees, and this would lead to the loss of/disturbance to natural habitats.
Hydrology	D	D	D	D	B-	D	[During construction] There would be some interference with natural stream by temporary road and soil erosion.
Topography/geology	D	B-	D	D	B-	D	[During construction] Land development works and land filling would alter topography. There is a possibility of soil erosion.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Land acquisition and involuntary resettlement	B-	D	D	B-	D	D	[Pre-construction] Surveys for ARAP suggest resettlement of 142 people and acquisition of about 57.9 ha of land.
Socially vulnerable people	B-	D	D	B-	D	D	[Pre-construction] Land take for development will result displacement of people increasing their economic vulnerability. Other vulnerability categories within the Project area are elderly, female headed households and Persons With Disabilities (PWDs). So appropriate compensations and assistances shall be provided to them. They will be prioritized for employment opportunities arising from the construction works.
Minority / Indigenous peoples	C-	C-	C-	D	D	D	No indigenous peoples/ethnic minority was identified in the project area.
Livelihood	B-	B-	D	B-	B-	D	[Pre-construction] Land acquisition and resettlement would have the following impacts on livelihood means. • Income would decrease due to impacts on agriculture within the project site, fruit trees on own premises, and commercial activities. • Income would decrease due to difficulties to harvest crops. • Income would decrease or be lost due to resettlement. [During construction] Although livelihood activities such as agriculture would be temporarily restricted at the construction site, construction works would be for a short term and for a limited space, and there would be no significant impact outside of SEZ area. On the other hand, in the SEZ area, the resettled people need to restore or stabilize their income sources after the relocation, which should be considered in the restoration program developed by ARAP.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Local economy such as the employment and livelihood	B-	B-	D	B-	B- /C+	B+	[Pre-construction] Affected people, including those to be resettled, may lose their income, for example, due to lost jobs. [During construction] The construction works would not allow to maintain livelihood means, for example, by the restricted access. On the other hand, the contractor will require specific skill sets to fill employment opportunities; nonetheless majority of residents have attained primary and secondary school levels. Therefore empowerment programs required to capacity build locals to take up most opportunities; otherwise the contractor ends up outsourcing staffing deficits. Training is planned in the compensation framework as well as ARAP. [During operation] The development of SEZ area including D1 area will create employment opportunities.
Land use	D	B-	D	B- /C+	B- /C+	C+	[Pre-construction] Some part of the project land is agricultural land, so there would be some impact on local land use. [During construction] Construction works could temporarily restrict local land uses. However, such impact would not be significant, since the restriction would be spatially limited and for a short term. Separately, construction surplus soil would be used as embankment work within SEZ, and this would also lead to the restriction on local land uses. On the other hand, use of local resources such as fuel and labour will serve as benefit local traders in the area. [During operation] With the change of land use at D1 area, it is expected that value of land will improve.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Water use and water resources	D	D	B-	D	B-	B-	[During construction] The project is expected to use to utilize water to settle dust and for construction. The specific amount of water for construction has not been specified for now. It needs to be managed so as not to overwhelm existing water supply needs. [During operation] Excessive intake of water from its source would lead to lower groundwater levels, invasions of saline water or the depletion of water at its source. The designed volume of groundwater pumping discharge should be maintained, and ground water level as well as water quality should be continually monitored to prevent such impacts.
Social infrastructure and services	D	B-	D	D	B-	C+	[During construction] The route crosses several roads. The use of these roads would be partially restricted during underground works, but such restriction would be only for a few hours. Where the pipeline crosses the Likoni Ukunda Road, an appropriate construction method shall be considered. [During operation] Upon completion, the temporary road will improve accessibility when utilized by local people.
Misdistribution of the benefits and losses	D	D	D	B-	B-	B-	[Pre-construction and during construction] Local people might feel there would be some misdistribution of the benefits and losses between the eligible PAPs and non-eligible persons when compensation and livelihood support such as employment opportunities are provided. The rightful PAHs will be verified by NLC and KPA when the compensation will be paid. Any compensation related grievance will be received and solved through the grievance redress mechanism. [During operation] Some complaints against priority to PAPs on employment opportunities and water distribution in SEZ might be continued, but should be addressed by grievance redress mechanism.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Local conflicts of interest	B-	B-	B-	B-	B-	B-	[Pre-construction] There might be some conflict between the eligible PAPs and non-eligible persons. The rightful PAHs will be verified by NLC and KPA when the compensation will be paid. Any compensation related grievance will be received and solved through the grievance redress mechanism. [During construction] The disturbance to local community due to construction work such as traffic, dust and inflow of people might happen if the community is not well informed. Such construction-related grievances might be received and will be solved through the grievance redress mechanism. [During operation] Residents in Kwale County tend to think not to gain a privilege of enough water supply despite of water source. Conflicts of interest between Kwale County and Mombasa County as water users. In addition, the disturbance to local community due to operation activities such as traffic, dust and inflow of people might happen if the community is not well informed. Any operation-related grievance might be received and solved through the grievance redress mechanism.
Cultural heritage	B-	D	D	B-	B-	D	[Pre-construction/during construction] Relocation of local residents would worsen the accessibility to Kayas. The project-related surveyors should not enter or disturb the sacred areas without permissions. The construction noise and the activities of workers should not disturb the sacred areas. Within the project area, there are no gazetted heritage sites or heritage sites requiring permanent conservation or re-realignment of infrastructure. Cultural artifacts encountered will be preserved under chance-find procedures.
Landscape	D	B-	D	D	B-	D	[During construction] The Project would change the surrounding landscapes through the land development and the creation of a land to accumulate surplus soil. However, the land development area is next to the shoreline and scarcely populated. Such change would not be of any significance.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Gender	B-	D	D	B-	C+/C-	C+	[Pre-construction] Women would be vulnerable to the resettlement due to the patriarchal tendency and the lower educational level of the local community. [During construction] There would be potential unfair treatments to women in the workforce. The jobs at construction sites should be open for both genders as a measure to empower the women. [During operation] Once the construction has been completed, the operation and maintenance activities should be open for any gender to do.
Children's rights	D	B-	D	D	B-	D	[During construction] Since child labor is relatively common in Kenya, minor children may be used for the construction work. Due to the low income levels of most households in the project area, children tend to look for jobs to help their families. The contractors should comply with legislation in Kenya and such impact shall be avoided.
Infection diseases such as HIV / AIDS	D	B-	D	D	B-	B-	[During construction] Construction would conducted by workers. Relatively high HIV infection rates in the area suggest its potential spreading. [During operation] The operational phase of free port will involve interaction between people from different regions and culture which might lead to sexual intercourse between them.
Working environment (including occupational safety)	D	B-	B-	D	B-	B-	[During construction] The risk of occupational accidents, such as falling down into an excavated trench, would be moderate. [During operation] Occupational accidents associated with maintenance and operation works would be expected.

Item	Scoping results			Impact assessment results			Evaluation basis
	PC	C	O	PC	C	O	
Accident	D	B-	D	D	B-	B-	[During construction] There would be a moderate risk of accidents by construction vehicles driving through ordinary roads. Trucks to transport the surplus soil would drive through the temporary roads within SEZ, but local people may use or go across the temporary road, so sufficient attentions shall be paid for their safety, for example, by the speed limits. [During operation] No major accidents are expected, but traffic accidents at temporary road may occur if it is used by local people.
Climate change	D -	D	D	D	B-	D	[During construction] Land development and embankment works require clearing of more than 5,000 trees, which will reduce the carbon sink. It should be mitigated by reforestation program.

A+/-: Significant positive/negative impact is predicted, B+/-: Positive/negative impact is predicted to some extent. C+/-: Extent of positive/negative impact is unknown, D: No impact is predicted
PC: Pre-construction, C: Construction, O: Operation
Source: JICA Study Team

Table 1-4-25 shows the type and quantity of impacts by the proposed project.

Table 1-4-25 Breakdowns of the Impacts within the Project Site

Category	Project Component	Impact Type	Unit	Quantity
Resettlement	Water Supply in Kwale	Resettled	person	3*
	Land Development	Resettled	person	34
	Land formation/Disposal site	Resettled	person	92
	Temporary Road	Resettled	person	13
Land Acquisition	Water Supply in Kwale	Loss of Assets (to be compensated)	ha	5.16
	Land Development		ha	24.7
	Land formation/Disposal site		ha	76.45
	Temporary Road		ha	28.5
	Drainage		ha	2.29
	Contractor site		ha	3.85
	Water Reservoir		ha	2.04
Affected Structures	Water Supply in Kwale	Relocated	case	1*
	Land Development	Relocated	case	11
	Land formation/Disposal site	Relocated	case	41
	Temporary Road	Relocated	case	8
Affected Trees	Water Supply	Cleared	tree	445
	Land Development	Cleared	tree	394
	Soil Dump	Cleared	tree	4,372
	Temporary Road	Cleared	tree	147
	Drainage	Cleared	tree	146
	Water Supply Center	Cleared	tree	15
	Temporal Construction Yard	Cleared	tree	48
Graveyard	Water Supply	Relocated	site	6

Note: * Water supply in Kwale is only affecting one household with a population of three individuals. This household will be avoided during detailed design. When the household is avoided, 139 individuals will be displaced by PID inside Mombasa Special Economic Zone.

Source: JICA Study Team

There are 6 graveyards at the proposed site for a water supply facility, and they need to be compensated. Informal consent has been obtained from the owners of graveyards for their relocation.

1-4-1-9 Mitigation Measures

The mitigation measures against possible negative impacts are summarized in the Environmental Management Plan (EMP) shown in Table 1-4-26. KPA takes a leading role in the planning and execution of the environmental management for each project component., in cooperation with other parties related to implementation of the Project such as construction contractors which will be responsible for environmental management at construction sites as well as CWWDA which will be responsible for operation of water supply facilities.

Table 1-4-26 Environmental Management Plan

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
Pre-construction					
Ecosystem	Vegetation loss	• Prepare a reforestation plan in consultation with KFS	KPA, DD (Detailed Design) Consultant	KPA	Included in the DD cost
Land acquisition and resettlement	Resettlement of residents due to land acquisition/ requirement, relocation of structures	• Implement appropriate and sufficient compensations in accordance with ARAP • Conduct internal and external monitoring to ensure the proper implementation of resettlement. • Establish and operate a Grievance Redress Mechanism(GRM). • Continuous stakeholder engagement to avoid any conflicts	KPA	NLC	Covered by the budget for ARAP
Socially vulnerable people	The socially vulnerable people are sensitive to the environmental changes associated with resettlement	• Appropriate compensations and assistances to socially vulnerable people shall be implemented as per ARAP.	KPA	NLC	Covered by the budget for ARAP
Livelihood	Income decreases due to impacts on agriculture	• Income restoration measures shall be developed by ARAP	KPA	NLC	Covered by the budget for ARAP
Local economy such as employment and livelihood	Loss of income due to land acquisition/requirement or relocation of structures and fruit trees	• Compensations and assistances based on ARAP. • Sufficient budget for the livelihood restoration	KPA	NLC	Covered by the budget for ARAP
Land use	Some restrictions on the local land use associated with the land acquisition/requirement	• Ensure the compensation/livelihood restoration against some restrictions on the local land.	KPA	NLC	Covered by the budget for ARAP
Misdistribution of benefits and damages	Misdistribution of benefits and damages	• The relocation of PAPs is to be guided by the ARAP for the grant project and KPA's Compensation Framework prepared for the MSEZ area.	KPA	KPA	Covered by the budget for ARAP

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		• The ARAP identified the rightful PAHs and provide compensation and assistance to mitigate the negative impacts on PAHs. • Give priority to PAPs on employment opportunities arising from the project during construction and operation in consultation with the existing PAP committee.			
Local conflicts of interest	Conflicts for water usage as well as land acquisition/requirement and resettlement	• Explanation to and seeking understanding from the communities on the project and impact on water resources • NLC and KPA will verify the eligible PAHs to receive compensation and assistance in relevant local government and local leaders. • Establish the KPA's Grievance Redress Mechanism (GRM) as per the ARAP to solve resettlement related grievance. • Establish environmental related GRM together with the Contractor during construction • KPA will monitor and solve grievances during operation. • Continue consultation with PAHs and local communities to share the progress of the Project with them and identify potential grievances at the early stage. • Conduct the internal and external social monitoring as per the ARAP and ESIA.	KPA for overall grievance; NLC for compensation related grievance	KPA	Covered by the budget for ARAP
Cultural heritage	Negative impact on the potential cultural heritage	• Prohibit access/entry to the cultural heritage areas	KPA	NMK	-
	Activities/acts to affect and degrade the sacred places/forests	• Avoidance of impacts on the sacred places/forests through the appropriate management of resettlement activities, which should be considered and guided by consultation with Kaya elders, local communities and NMK, depending on other SEZ area's development progress.	KPA	NMK	-
Gender	Negative impact on women by the project due to the local	• Guidance and supervision to ensure that women would not be treated unfairly for compensations, assistances to the vulnerable people, and livelihood restoration.	KPA	KPA	Covered by the budget for ARAP

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
	patriarchal tradition				
During construction					
Air pollution	Temporary emissions of dusts and exhaust gases from the construction vehicles and machinery	• Ensure compliance with the Environmental Management and Coordination (EMC) (Air Quality) regulations. • Establish regular inspection program for equipment. • If visual observations identify vehicles emitting pollutants (such as soot), they must not be operated until they have been repaired. • Carry out the regular maintenance of vehicles and machinery. • Vehicles without an appropriate inspection certificate must not be operated. • In order to prevent the generation of dusts, drive slowly on unpaved regional roads. • Trucks to transport the residual soil shall be provided with a cover for the entire loading platform to prevent dusts from scattering. • The cement/asphalt plant shall be of appropriate quality so as not to release pollutants, and it shall be properly maintained. • Sprinkle water regularly on the access roads and in the construction site to prevent dusts. • When trucks transport scattering loads such as sand, stone or mud, cover their loading platform with an appropriate cover • Provide PPEs including dust masks, eye goggles and coveralls • Do not drive or enforce speed limits as much as possible near the residential areas and schools.	Construction Contractor	KPA, Construction Supervision Consultant	Included in the basic construction cost
	Greenhouse gases.as emissions when transporting construction materials	• Avoid the long-distance transport wherever possible by the use of resources and material in nearby areas.	Construction contractor	KPA, Construction Supervision Consultant	Included in the basic construction cost
Water pollution	Turbid rainwater runoff from the construction site	• The soil at the land preparation site will be stabilized by appropriate measures. • Temporary soil erosion control measures (ex., covering with prevention sheets, sedimentation ponds) will be in place as required, during the land development work and earth work. • Install silt curtains to prevent contamination from spreading	Construction contractor	KPA, Construction Supervision Consultant	Included in the basic construction cost

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		where needed. • Such mitigation measures should be undertaken to minimize the possible adverse impact which could additionally deteriorate the water quality in natural stream, taking into consideration the current situation where it was found that the baseline water quality is contaminated by some total coliform and organic pollutants.			
	Discharge of untreated contaminated water from a concrete plant and other possible sources	• Before abstracting and discharging water, the contractor must acquire permits from WRA • Water containing any pollutants (e.g. oil and lubricants) shall be discharged into a conservancy tank for removal from construction site. • Prohibit the release of untreated concrete washing water to the environment. • Concrete washing water shall be treated at the designated facility. • If releases to the environment are required, obtain a permission from NEMA in accordance with the Environmental Management and Coordination Act. • Collect and reuse washing water as much as possible. • Potential pollutants of any kind and in any form shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered. • Wash areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas (including surface water bodies) are not polluted. • The contractor must act promptly on remedying any pollution incidents on site. • Storage areas or secondary containment should be constructed of water proof reinforced concrete or approved equivalent, which is not adversely affected by contact with chemicals captured within them. • Ensure compliance with the Water Act and the EMC (Water Quality) regulations.	Construction contractor	KPA, Construction Supervision Consultant	Included in the basic construction cost

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
Soil contamination	Accidental oil spills to ground from the heavy equipment	• Construction vehicles and machinery will be inspected regularly for prevention of oil and fuel leakage. Vehicles and machinery with problems will not be operated until their repairs are completed. • Maintenance shall be carried out at designated facilities equipped with pollution control devices. • Devices to respond to oil leaks (ex., adsorbents) shall be in place for the immediate use at the construction site. • Fuel tanks will be installed on an impervious foundation with spill-prevention walls.	Construction contractor	KPA, Construction Supervision Consultant	Included in the basic construction cost
	Soil contamination by the earth fill work if the cut earth originally polluted	• Soil contamination survey shall be carried out before the earth-fill and cut-earth works.	Construction contractor	KPA, Construction Supervision Consultant	Included in the EMoP cost
Waste	Generation of construction waste	• Minimize waste generation at source and through its reuse and recycling. • Waste will be stored in designated containers at designated locations. • Waste will be collected and disposed only by NEMA certified companies. • The contractor will develop a construction waste management plan in consultation with the county government and identify the various wastes to be generated and their storage and disposal procedures • Appropriate storage of construction remains and measures to prevent soil runoff. • Provision of sanitary facilities for use by workers. • Compliance with EMC (Waste Management) Regulations.	Construction contractor	KPA, NEMA, Construction Supervision Consultant	0.5 mil
Noise and vibration	Noise and vibration from construction vehicles/machines and pile driving	• Restrict works to the night-time, Saturday afternoon and Sundays. • In principle, transportation of the surplus soil and the excavation of rocks for the installations of pipelines are not allowed at night.	Construction contractor	KPA/NEMA Construction Supervision Consultant	Included in the basic construction cost

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		• Establish a speed limit for trucks to transport construction the surplus soil. • Consider noise emission characteristics during selection and mobilization of construction equipment with preference to low-noise technology. • Operate vehicles and machines equipped with exhaust mufflers where feasible and perform regular maintenance/inspection. • Avoid driving on roads passing through sensitive areas as much as possible. If unavoidable, drive slowly in such areas to prevent the unnecessary engine operation and idling. • Use pile drivers with the lowest noise as possible. Install the main body of a pile-driving machine at least 25m away from the nearest structure. Conduct pile driving works and other construction work as well as monitor noise levels so as not to exceed the construction site noise and vibration standards set forth in the Environmental Management and Coordination Act (Noise and Excessive Vibration) Regulations 2009. • Compliance with Environmental Management and Coordination Act (Noise and Excessive Vibration) Regulation 2009.			
Ground subsidence	Ground subsidence at construction site	• Not preferably use groundwater. • Replace soft clayey soil with cut soil from D1 land where soft clayey soil is confirmed.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Offensive odor	Offensive odor from waste and construction activities	• Waste collection bins provided with tight fitting lids for containment. • Routine waste disposal from construction site and contractor's camp done as frequent as possible to reduce pilling and offensive odour due to overstaying. • Delivery trucks should be well covered to suppress possible odours. • Prepare waste management plan. • The cement and asphalt plants/equipment shall be operated away from residential areas.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
Sediment	Soil runoff and sediment contamination due to land development works and road construction work along natural stream	• Soil at the land development site shall be stabilized appropriately. • Implement erosion control measures on prone areas e.g. steep scarps, stockpiled material and drainage lines.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Ecosystem	Effects on forests, plants and animals	• Implement a program for construction workers to prohibit activities such as hunting, poaching, collecting plants, dumping garbage and burning bonfires. • Minimize the number of trees to be cleared, and transplant them as many as practicable. • Implement a reforestation program with KPA. • Use low-noise type construction equipment as much as possible. • Stationary machines that generate excessive noise (ex., generators) will be surrounded by noise barriers. • Adopt invasive alien species measures at construction sties. e.g. Equipment and tools brought in for reuse from other project sites should be screened and cleaned of alien / invasive propagules to avoid introduction in the project area. • Maintain emergency response contact list including KWS Call Numbers and coordinate with KWS. • Proper waste collection that prohibits open dumping or burying waste that may attract scavangers	Construction contractor	KPA/KFS/KWS Construction Supervision Consultant	1.2 mil. for afforestation. Other measures included in the basic construction cost.
Hydrology	Interference with natural stream by temporary road and soil erosion	• Install drain pipes to prevent rainwater from entering the embankment. • Clearing of vegetation should be strictly controlled and only done if it’s absolutely necessary. • Disturbed valley beds and slopes should be re-vegetated to mitigate erosion on completed sections.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Topography/geology	Topography change and soil erosion by land development works	• Same as “Sediment”	Construction contractor	KPA Construction Supervision	Included in the basic construction

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
				Consultant	cost
Livelihood	Income decreases due to relocation	• Livelihood restoration programs shall be developed by ARAP	KPA	NLC	Covered by the budget for ARAP
Local economy such as the employment and livelihood	Temporary loss of income due to restrictions associated with the construction works	• Depending on the extent of impacts, compensations shall be provided to the affected people as per ARAP. • The affected people shall be fully informed about the construction plan in advance, and considerations shall be made to allow them to harvest their crops or continue other business activities. Consider arranging works taking into account the requirements of the local people. • Temporary workers shall be preferentially recruited from the local communities. • Stakeholder participation in decisions that affect them.	Construction contractor	KPA Construction Supervision Consultant	Covered by the budget for ARAP and basic construction cost
Land use	Temporary restrictions on land uses due to the construction	• Establish temporary construction yards/access roads at locations where land is not used or with limited use.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Water use and water resources	Poor management of water resources	• Liaise with the local WRA for permits to abstract water for construction in order to realise satisfactory management of water supply issues. • Ensure provision of adequate water storage facilities on the construction site to meet project needs during periods of low demand (e.g. late at night). • Minimize/monitor water consumption and enhance utilization in co-ordination with the contractor through strict supervision of construction works involving water use. • The contractor should sensitize construction workers on the importance of proper water management and conservation.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Social infrastructure	Temporary restrictions on road uses	• Develop a road use plan and traffic management plan, and obtain permission from road authorities (KeNHA, KeRRA). • Notify local communities in advance of the road use restrictions. • Limit speed in the construction area with appropriate signage,	KPA Construction contractor	KPA KeHNA, KeRRA Construction	Included in the basic construction cost

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		speed bumps and ensure compliance within the project area. • Sensitize workers and area residents on the importance of exercising care in the project area in as far as traffic movement and other safety issues are concerned.		Supervision Consultant	
Misdistribution of benefits and damages	Misdistribution of benefits and damages	• Give priority to PAPs on employment opportunities arising from the project during construction and operation in consultation with the existing PAP committee.	KPA	KPA	Included in the basic construction cost
Local conflicts of interest	Conflicts for water usage	• Explanation to and seeking understanding from the communities on the project and impact on water resources • Establish environmental related GRM together with the Contractor during construction • Continue consultation with PAHs and local communities to share the progress of the Project with them and identify potential grievances at the early stage. • Conduct the internal and external social monitoring as per the ARAP and ESIA.	KPA for overall grievance; NLC for compensation related grievance; Construction contractor for construction related grievance	KPA	Covered by the budget for ARAP fir compensation related grievance Included in the basic construction cost for construction related grievance
Cultural heritage	Indirect effects on Kayas	• Prior to the commencement of construction works, a meeting will be held with the Kaya elders to inform them of the construction schedule and activities, to discuss about required mitigation measures. • Prohibit the entry of construction workers to Kayas. • Establish a temporary yard far from Kayas as far as possible. • Use low-noise type construction equipment as much as possible. • Stationary machines that generate noise (ex., generators) will be surrounded by noise barriers.	KPA Construction contractor	KPA, NMK	Included in the basic construction cost
	Destruction of Cultural Artefacts	• Have in place a chance find procedures that intervenes through the National Museums of Kenya (NMK) in case of encounter	Construction Contractor	KPA, NMK	Cost for heritage

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		with cultural or archaeological collections falling within the project area.			impact assessment and mitigation measures should be estimated and secured in case of such encounter
Landscape	Loss of Landscape Character	• Restrict project activities (especially landscape scarring) in the project area; • Screen plant and re-vegetate native plants on disturbed sites to achieve harmony with surrounding; and • Throughout construction, adopt camouflage colours that blend with the surrounding especially on the imposing features.	Construction Contractor	KPA	Included in the basic construction cost
Gender	Gender Inequalities	• Promote gender inclusion within the workforce: • Establish and implement a structured and continuous staff sensitisation program on the expectations of the code of conduct recognizing various rights of different genders within the project workforce • Establish a well-resourced internal grievance management system for staff	Construction Contractor	KPA	Covered by the budget for ARAP
Child rights	Employment of minor children	• No children will be employed in accordance with the Employment Act of 2007.	Construction contractor	KPA	Included in the basic construction cost
Infectious diseases such as HIV/AIDS	Spread of infectious diseases due to the inflows of construction workers	• Contractors shall develop and implement programs for HIV/AIDS prevention/awareness raising and against communicable diseases in accordance with Kenyan laws and regulations. Such programs shall include the followings among others: ✓ Awareness raising program for construction workers ✓ Code of conduct for construction workers	Construction contractor	KPA County government/ public health officer	2.4 mil. against HIV/AIDS, and 0.3 mil. against communicable diseases.

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
		✓ Other measures (ex., counseling, medical examination)			
Working environment (including occupational safety)	Risk of occupational accidents (ex., falling from high places, falling into dig trenches, erroneous operations of the machinery)	• Use a safety harnesses when working at heights. • Install fences around an excavated pit. • Ensure provision of appropriate Personal Protective Equipment (PPE) for project personnel and enforce their use. • Contractors shall develop an occupational health and safety plan in accordance with Kenyan laws and regulations. Such plan shall include the followings among others: ✓ Risk assessment and safety measures ✓ Training programs for construction workers ✓ Organizational structure ✓ Emergency response plan • Ensure establishment of a Health and Safety Committee for the project team as per the Health and Safety Committee Rules 2004 of the OSHA Act. • Maintain an incident/accident register, in accordance with the Occupational Safety and Health Act 2007 and report incidences to the Nairobi Safety Officer and DOSHS.	Construction contractor	KPA DOSHS Construction Supervision Consultant	2.0 mil.
Accident	Risk of traffic accidents	• Prepare traffic management plan • Strict adherence to the speed limits. • Avoid the use of high-risk roads as much as possible. • All construction vehicles shall be equipped with a vehicle behaviour alarm to notify their left turn, right turn and backward movement. • Installation of warning signs and deployment of guides in high-risk areas. • Traffic Act should be adhered to enhance road safety.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
Climate change	Clearing trees	• Minimize number of trees cleared by the construction. • Implement a reforestation program with KPA.	Construction contractor	KPA Construction Supervision Consultant	Included in the basic construction cost
During operation					
Water pollution	Oil leaks from vehicles	• Thorough maintenance of vehicles and machines.	KPA	KPA	Included in

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
	and machines at D1 site	• Installation of an oil/water separation facility on site where necessary. • Establishment of barriers around fuel stations to prevent spills of fuel. • Always have sand to absorb fuel for its potential spills.			basic operating costs
	Wastewater from toilet and other building	• Installation and maintenance of appropriate wastewater treatment facilities at pollution sources. • Periodical dislodging from septic tank.	KPA, CWWDA	KPA	125 mil.
Soil contamination	Oil leakage from vehicles and equipment	• Proper maintenance of vehicles. • Prevent spills of the oil and other potential contaminants in facilities of D1 area.	KPA	KPA	Included in basic operating costs
Waste	Various wastes from operation and maintenance works.	• Reduction of waste and thorough recycling. • Thorough sorting and disposal. • Record of waste removals. • Collection and treatment by a registered company and at designated landfills.	KPA, CWWDA	KPA	Included in basic operating costs
Noise, vibration	Noise and vibration from driving vehicles	• Record of vehicle maintenances. • Establish speed limits and adhere to them. • Ensure grievance redress mechanism to receive any complaints about noise/vibration and take necessary action.	KPA	KPA	Included in basic operating costs
Erosion control*	Possible erosion along natural stream of temporary road	• Develop an erosion control plan where needed. • Ensure storm water runoff by drain pipes. • Use of appropriate methods for intercepting and slowing water runoff where needed.	KPA	KPA	Included in basic operating costs
Ground subsidence	Ground subsidence due to reducing water level	• Water resource management by monitoring of aquifer.	KPA, CWWDA	WRA	Included in basic operating costs
Water use and water resources	Depletion of water source due to the excessive water intake	• Continuous monitoring on Tiwi Aquifer. • When completed, use water from Mwache dam.	KPA, CWWDA	WRA	2.5 mil.
Local conflicts of interest/ misdistribution	Conflicts for water usage and other possible misdistribution	• Explanation to and seeking understanding from the communities on the project and impact on water resources • Ensure grievance redress mechanism	KPA for overall grievance; CWWDA for	KPA	Included in basic operating costs

Item	Influence	Mitigation measures	Responsibility for implementation	Responsibility for supervision	Estimated cost (KSh)
of damage and benefit	of damage and benefit	• Give priority to PAPs on employment opportunities arising from the project during operation in consultation with the existing PAP committee. • KPA will monitor and solve grievances during operation.	specific grievance related to their business activities		
Working environment (including occupational safety)**	Occupational accidents associated with maintenance and operation works	• The maintenance and operation contractor shall develop an occupational safety and health plan in accordance with Kenyan legislation.	KPA, CWWDA	KPA	Included in basic operating costs
Accidents	Traffic accidents in the access road to D1 site	• Road traffic signs shall be installed • Strict adherence to the speed limits.	KPA	KPA	Included in basic operating costs

* The mitigation measures for “erosion control” is added to EMP to specifically respond to possible concerns on soil erosion discussed in the environmental impact item on “sediment “and “hydrology”.

** Mitigation measures for "infectious diseases" are included in the mitigation measures for the “working environment” since they are related to the mitigation measures for the working environment in D1 area.

Source; JICA Study Team

1-4-1-10 Environmental Monitoring Plan

Table 1-4-27 summarizes the Environmental Monitoring Plan (EMoP). KPA takes a leading role in the planning and supervision of the environmental monitoring for each project component. Construction contractors and CWWDA will also take an important role for implementing the environmental monitoring at construction sites and for operation of water supply facilities respectively. Since there will be several ongoing development projects especially in MSEZ area, it is also crucial to plan and implement an effective environmental monitoring by coordinating with other infrastructure development projects in MSEZ to avoid overlaps of monitoring or to examine possible cumulative impacts.

KPA will establish its project implementation team including expert of the environmental and social considerations to respond to grievances. KPA has many experiences of the project implementation so far, and its staffs have relevant knowledges and experiences. KPA has a sufficient capability to implement the environmental management and monitoring.

Table 1-4-27 Environmental Monitoring Plan

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
Pre-construction					
Land acquisition and resettlement, and livelihood	Monitor the progress and effectiveness of resettlement	➢ Assess whether the compensation and other assistances are provided in line with ARAP ➢ Assess whether the measures to restore or enhance livelihood and the means of income are implemented ➢ Identify conflicts, problems, challenges, or difficulties associated with the resettlement process ➢ Review the record of grievances to confirm that appropriate remedial actions have been taken satisfactory	Internal monitoring and external monitoring will be done as per the ARAP.	KPA/NLC	Covered by the budget for ARAP.
Socially vulnerable people	Implementation status of the assistances	➢ Assess whether the compensation and other assistances are provided in line with ARAP ➢ Assess whether the measures to restore or enhance livelihood and the means of income are implemented ➢ Identify conflicts, problems, challenges, or difficulties associated with the resettlement process ➢ Review the record of grievances to confirm that appropriate remedial actions have been taken satisfactory	Internal monitoring and external monitoring will be done as per the ARAP.	KPA	Covered by the budget for ARAP.
Regional economy such as the employment and livelihood	Confirm the progress and effectiveness of the livelihood restoration plan	➢ Interview the affected people to confirm their new living conditions after the resettlement	Internal monitoring and external monitoring will be done as per the ARAP.	KPA	Covered by the budget for ARAP.
Local conflicts of interest	Confirm the status of conflicts	➢ Collect records of complaints submitted to KPA	Four times/year	KPA	Covered by the budget for ARAP.
Gender	Monitor potential unfair treatments to women	➢ Assess whether the compensation and other assistances are provided in line with ARAP	Internal monitoring and external monitoring will be done as per the ARAP.	KPA	Covered by the budget for ARAP.

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
During construction					
Air pollution	Monitor air quality associated with the construction works	On-site measurements of the air quality (PM2.5, PM10, CO, NO2, SO2, Pb, O3) at the pipeline installation sites, road construction sites, land development site and along the transportation route of soil for embankment (six sites in total). Assess the measured air qualities against the national air quality standards. Visual observations of dust emissions from the construction sites and the emissions of exhaust gases from construction vehicles and machineries	[Site inspection] Every day [Measurement] Twice/year(measurement)	Construction contractor	1.2 mil.
Water pollution	Identification of the marine pollution (turbidity) associated with the land development works	➢ [Turbidity monitoring] ➢ Method: On-site measurements of the surface and bottom turbidities (in NTU) at three locations around the earth work and land development area ➢ Evaluation criterion: Baseline + 15 NTU. Review the construction method if the turbidity exceeds the established criterion for two consecutive weeks ➢ [Other water quality monitoring] ➢ Water Temperature, pH, Color, DO, BOD, COD, Oil/Grease (Petroleum Ether Extracts), SS, Total Coliforms ➢ Monitoring sites: Surface water at three locations around the land development area ➢ Evaluation criterion: NEMA standards	[Turbidity monitoring] Every day during the earth work and land development work [Other water quality monitoring] Twice/year	Construction contractor	Included in the basic construction cost for daily monitoring 0.30 mil. for biannual monitoring

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
Soil contamination	Monitoring of accidental oil spills to the ground from construction v ehicles and heavy equipment	➢ Patrol, hearing and review of records ➢ Ensure appropriate storage and record the use of hazardous materials and chemicals; mainly lubricants and oils	[Site inspection] Every day during the construction [Meeting and report] Monthly	Construction contractor	0.5 mil.
	Confirm there is no soil contamination by earth-fill and cut-earth works	➢ Implement a soil contamination survey and evaluate the results (Cd, Cr, Cu, Pb, Hg, Ni, Ag, Zn, As) at three locations of cut-earth site	Before earth-fill and cut-earth works	Construction contractor	0.5 mil.
Waste	Confirm waste (solid waste and soil waste) is stored and treated in accordance with the contractor's waste management plan	➢ Method: On-site inspections and reviews of waste treatment/disposal records. ➢ Parameters to be evaluated: Waste storage method, littering at the site, waste treatment/disposal records.	Every day	Construction contractor	0.8 mil.
Noise / vibration	Confirm there is no excessive noise from the construction site	➢ Method: On-site measurements of the noise level (LAeq) and Vibration level (dB), Traffic volume (at sites which is impacted by road traffic noise) ➢ Location: 2 locations at the construction site boundary, and 3 locations in the residential area ➢ Evaluation Criteria for the construction site boundary: Noise standards established under the Environmental Management and Coordination Act (Noise and Excessive Vibration Pollution) Regulations 2009. Daytime: 60dB, Night-time: 35dB ➢ Evaluation criteria for residential areas: Noise standards established under the Environmental Management and Coordination Act (noise and excessive vibration and pollution) regulations 2009. Daytime: 50dB, Night-time: 35dB	Once/week	Construction contractor	Included in the basic construction cost If it is outsourced, Ksh. 0.7 mil. /time will be added.

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
Offensive odor	Monitor offensive odor by construction activities such as cement and asphalt plants and solid waste	➢ Site inspection ➢ Check a record of complaints from communities	[Site inspection] Every day [Meeting and report] Monthly	Construction contractor	Included in the basic construction cost
Sediment	Monitor soil runoff and sediment contamination	➢ Inspection, interview to communities (as needed) and self-recording	Every day	Construction contractor	Included in the basic construction cost
Ecosystem	Confirm soundness of the local ecosystem.	➢ Surveillance to confirm conditions of vegetation cover, bare ground, soil erosion and landscape etc. ➢ Record number of logged trees, transplantation and planting of trees	[Surveillance] Weekly [Others] 4 times / year	Construction contractor KPA	[Surveillance] Included in the basic construction cost [Others] 0.65 mil.
Topography/geology	Monitor topography change and soil erosion	➢ Inspection and interview to communities (as needed) and self-recording	Every day	Construction contractor	Included in the basic construction cost
Livelihood	Confirm the progress and effectiveness of the livelihood restoration plan	➢ Interview the affected people to confirm their new living conditions after the relocation	Internal monitoring and external monitoring will be done as per the ARAP	KPA	Covered by the budget for ARAP.
Local economy such as employment and livelihood	Confirm the progress and effectiveness of the livelihood restoration plan	➢ Interview the affected people to confirm their new living conditions after the relocation	Internal monitoring and external monitoring will be done as per the ARAP	KPA	Covered by the budget for ARAP.
Land use	Monitoring of the restriction on local land uses associated with the construction works	➢ Patrols and interviews with local residents (as needed) for their records	Once/month during the construction	KPA	Included in the basic construction cost
Social infrastructure	Monitoring of temporary restrictions on the road use and	➢ Confirm that a traffic management plan has been prepared, submitted and approved ➢ Keep track of grievance management records	Once/month during the construction	Construction contractor	Included in the basic construction cost

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
	traffic concerns				
Local conflicts of interest	Confirm the status of conflicts	➢ Keep track of grievance management records	Once/month during the construction	Construction contractor/KPA	-
Cultural heritage	Confirm no impact on nearby Kaya Encountering of any archaeological artefacts	➢ By patrols, confirm no entry of construction workers to Kaya and no wandering of them around Kaya ➢ Record of encountering any archaeological artefacts falling within the project area	[Site patrols] Every day [Meeting and report] Monthly	Construction contractor	Included in the basic construction cost
Children's rights	Confirm no child labor	➢ Review the contractor's employment registrations (confirm with the local government for their accuracy)	4 times/year	Construction contractor	Included in the basic construction cost
Infectious diseases such as HIV/AIDS	Confirm the progress and effectiveness of the prevention plan against HIV/AIDS and other infectious diseases	➢ Method: Review meetings and reports ➢ Parameters to be evaluated: awareness-raising programs, counselling, and records of the number of participants	4 times/year	Construction contractor	Included in the basic construction cost
Occupational health and safety	Confirm that safety procedures are implemented in accordance with the occupational safety and health plan	➢ Confirm the occupational safety procedures, and visually inspect the safety equipment.	Every day	Construction contractor	Included in basic cost of construction
Accident	Confirm the status of accidents	➢ Method: Review meetings and reports ➢ Parameters to be evaluated: Number and type of accidents, risk minimization measures	Twice/month	Construction contractor	0. 20 mil.
During operation					
Ecosystem	Confirm soundness of the local ecosystem.	➢ Confirm soundness of local animals and plants identified before the construction works.	4 times/year	KPA	Included in basic maintenance costs

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
Water pollution	Confirm no impact by the rainwater runoff	➢ Monitor oil slick at the rainwater discharge to confirm that there is no oil leak from vehicles	When it rains heavily	KPA	Included in basic maintenance costs
	Confirm no pollution by the eroded sediment	➢ Visually inspect soil erosion status and turbid water run off ➢ Measurements of turbidity at the rainwater discharge where needed	When it rains heavily	KPA	Included in basic maintenance costs
	Wastewater from toilet and buildings	➢ Check maintenance record of septic tank especially for periodical sludge disposal ➢ Monitoring water quality of effluent in D1 area: Water temperature, pH, Turbidity, TSS, BOD, Total Coliforms, Color, DO, COD, and Oil/grease	2 times/year	CWWDA for water supply administration building KPA for Free Port Zone at D1 area	0.3 mil.
Soil contamination	Monitoring of accidental oil spills from vehicles and equipment	➢ Check and record any spills of oil and other potential contaminants in facilities of D1 area	Every day	KPA	Included in basic maintenance costs
Waste	Confirm waste is stored and treated in accordance with the contractor's waste management plan	➢ Visually inspect the waste storage, especially wastewater from the water treatment ➢ Review records of the waste treatment/disposal	4 times/year	KPA/CWWDA	Included in basic maintenance costs
Noise and vibration	Confirm complaints on from community	➢ Record of received grievance and actions or measures taken against complaints	4 times/year	KPA	Included in basic maintenance costs
Ground subsidence	Monitor Tiwi Aquifer	➢ Water level monitoring of aquifer	Same as "water resource"	Same as "water resource"	Included in the cost for monitoring of "water resource"
Water use and water resource	Monitor Tiwi Aquifer	➢ Record of abstracted water volume ➢ Water level and quality (TDS, pH, Electrical Conductivity, Total Coliforms) at least three boreholes/wells in the surrounding area	At the commencement of operation, Thereafter, twice/year	KPA/CWWDA	0.036 mil.
Local conflicts of	Confirm the status of	➢ Collect records of complaints submitted to KPA	4 times/year	KPA	-

Item	Object	Method	Frequency	Responsibility for implementation	Estimated Cost (Ksh)
interest	conflicts				
Working environment (including occupational safety)	Confirm the status of occupational accidents associated with maintenance works	➢ Implementations of the safety education and guidance for personnel ➢ Review of records ➢ Confirm that measures to prevent recurrence are in place after an accident	[Site inspection] Every day [Other indicators] 2 times/year	KPA/CWWDA	Included in basic maintenance costs
Accidents	Confirm the status of traffic accidents	➢ Confirm and maintain the road traffic signs ➢ Review of the accident records	Every day	KPA	Included in basic maintenance costs

Source: JICA Study Team

1-4-2 Stakeholders consultation

(1) Stakeholders consultation

The proposed project area involves Mombasa County and Kwale County. In order to identify the appropriate and efficient approach to local communities, preliminary consultations were held with the political and administrative leaders of each county. Preliminary consultations with KPA and NEMA suggested that the impacts of the proposed project would be limited, and the interest of the local residents lies mostly in their potential access to clean and safe water and their compensation. In all meetings, EIA and ARAP were discussed. Public consultations were held at facilities such as the local elementary schools, in Swahili language which local people can understand. As shown in Table 1-4-28, a total of 58 meetings including the planning meetings, consultations with local leaders, and those with major informants were conducted during June 2019 to March 2020. A total of 2,139 people (1,405 men and 734 women) attended the meetings. In these meetings, the local residents put much value on the establishment of water kiosks, and each County expressed its active involvement in and support to the proposed project. So, it was deemed that the proposed project was accepted.

In addition, disclosure meetings for entire MSEZ were conducted between January-April 2022 to disseminate and obtain feedback on the Compensation Policy that was developed by KPA, which catered the long-standing issue of land in SEZ area, additional resettlement assistance to vulnerable PAPs and livelihood restoration measures. The meetings were staged, starting with high level government officials, then followed by elected political leaders, to local leaders including PAPs committee, Chiefs, and ass. Chiefs. and finally, to all PAPs from the six affected villages in SEZ area. The meetings were conducted in Swahili language using a Compensation Policy brochure. The Compensation Policy was largely accepted by the PAPs who showed concerns on provision of additional infrastructures in the arranged resettlement sites, job opportunities and the timeline for the implementation of the project. Details of each meeting is provided in Table 1-4-29.

Table 1-4-28 List of stakeholder consultations held from June 2019 to March 2020

SN	Phase of Survey	Type of Meeting	Date	Venue	Number of Participants		
					Men	Women	Total
1	Inception Meetings	Planning / Leaders Meetings	21/06/2019	Mombasa Golf Hotel	7	1	8
2			21/06/2019	CWSB at Tiwi Pumping Station	6	1	7
3			21/06/2019	Kwale WASSCO Meter Office- Tiwi	1	2	3
4			12/7/2019	ACK Guest House Likoni	93	33	126
5			15/07/2019	Kenya School of Government, Matuga	53	19	72
6		Public Hearing Meetings	25/07/2019	Well No.5 intake site-Chai	43	20	63
7			26/07/2019	Waa Primary	72	67	139
8			29/07/2019	Kombani Social Hall	31	12	43
9			29/07/2019	Chidzumu Primary School	22	17	39

SN	Phase of Survey	Type of Meeting	Date	Venue	Number of Participants		
					Men	Women	Total
10			30/07/2019	Kiteje Mwembe	51	32	83
11			31/07/2019	Well No 2-intake site-Dzangazangani	36	26	62
12			28/08/2019	Madibwani	19	11	30
13			5/9/2019	Well No 5. intake site-Chai	66	17	83
14		Key informant interviews	16/07/2019	Kenya Water Towers Agency	3	3	6
15			23/07/2019	NEMA office-Mombasa	5	4	9
16			24/07/2019	NEMA Kwale Office	1	2	3
17			24/07/2019	KFS Office- Kwale County	4	4	8
18			24/07/2019	KWS Office -Kwale County	5	4	9
19	Field Study Phase		25/07/2019	CEC Environment and Natural Resources-Kwale County	3	6	9
20			25/07/2019	Physical Planning Office-Kwale County	4	4	8
21			25/07/2019	Roads and Public Works-Kwale County	3	4	7
22			30/07/2019	Mbunguni WRUA Office	3	2	5
23			30/07/2019	TUKO NA HOPE CBO-Office	3	2	5
24			21/08/2019	South Coast Local Tour Operators	7	4	11
25			23/08/2019	Kwale Human Rights Network - Ukunda Office	7	4	11
26			23/08/2019	South Coast Resident Association- Diani Office	3	2	5
27			26/08/2019	Tiwi M.C.A Office	5	3	8
28			26/08/2019	Sauti ya Wanawake- Tiwi	2	7	9
29			27/08/2019	World Wide Fund for Nature - Ukunda office	2	3	5
30			27/08/2019	Kwale County Natural Resources Network	3	4	7
31			27/08/2019	National Museums of Kenya-Kwale County- CFCU	3	2	5
32			28/08/2019	Coast Development Authority	3	8	11
33		Consul-tation with lead agencies	24/07/2019	KWASCO office	9	6	15
34			29/07/2019	Consultation with Kwale County Secretary	3	3	6
35			30/07/2019	WRA CR Offices-Miritini	2	1	3
36			20/08/2019	KPA Board Room	9	5	14
37			22/08/2019	Kwale County Health Boardroom	10	4	14
38			19/09/2019	Kwale Water - Harmonization of Water Kiosk sites	2	1	3
39			6/11/2019	KWWASSCO Boardroom	4	1	5
40	Disclosure Meetings	Prepara-tory Meeting for State launch of SEZ	12/10/2019	Coast Regional Commissioner Office	6	0	6
41		State	18/10/2019	Mwangala Primary School-			<500

SN	Phase of Survey	Type of Meeting	Date	Venue	Number of Participants		
					Men	Women	Total
		launch of the SEZ		Dongo Kundu			
42		Meeting with corporate players	13/01/2020	Kwale County- Roads and Public Works Office	7	4	11
43			14/01/2020	KPA Corporate Boardroom	9	5	14
44			16/01/2020	CWWDA- Head office Mombasa	4	2	6
45			20/01/2020	Kwale County Health Board Room	18	3	21
46			24/02/2020	KPA Board Room	8	3	11
47			3/3/2020	Marketing Conference Room (KPA)	7	2	9
48			5/3/2020	CWWDA Board Room	12	5	17
49		Public Hearing Meetings	25/01/2020	Well No.2 Dzangadzangani	25	11	36
50			25/01/2020	Waa Primary School	36	26	62
51			27/01/2020	Kombani Social Hall	29	5	34
52			27/01/2020	Chidzumu Primary School	23	5	28
53			28/01/2020	Mwembe Korosho	28	13	41
54			29/01/2020	Denyenye	33	7	40
55		Records of inter-related Consul-tations initiated by KPA	24/01/2019	ACK Guest House	27	10	37
56			31/01/2019	DC's Office Likoni	294	114	408
57			14/03/2019	DC's Office Likoni	210	160	370
58			19/03/2019	ACK Guest House	21	8	29

Source: JICA Study Team

Table 1-4-29 List of stakeholder consultations held from January to April2020

SN	Phase of Survey	Type of Meeting	Date	Venue	Number of Participants		
					Men	Women	Total
59		Additional Consultation for the Compensation Policy	21/01/2022	RC's office (targeted for KPA, NLC, Regional Commissioner (RC), SEZA, National Treasury (NT) and Ministry of Industrialization, Trade and Enterprise Development, Governor's Office)	-	-	23
60			5/04/2022	ACK Guest House (targeted for Area MP, Members of County Assembly (MCAs), Regional and County Commissioner (RC/CC), Deputy County Commissioner (DCC), Assistant County Commissioners (ACCs), Chiefs, Security-)	-	-	73
61			7/04/2022	ACK Guest House (targeted for Chiefs, PAPs Committee/ Village leaders, Kaya elders, faith-based leaders and Local NGO)	-	-	58

SN	Phase of Survey	Type of Meeting	Date	Venue	Number of Participants		
					Men	Women	Total
62			12/04/2022	DCC ground (targeted for all PAP from the six villages in SEZ)	569	345	914
63			19/04/2022	Mkwajuni ground (targeted for PAPs in Mbuta village)	156	62	218
64			19/04/2022	Chairman's ground (Chairman Seleman Said) (targeted for Kaya Mtongwe and Siji villages)	114	67	181
65			19/04/2022	Football ground at Mrongondoni Village (targeted for PAPs in Mrongondoni village)	91	71	162
66			20/04/2022	Mwangala Primary School (targeted for PAPs in Mwangala village)	125	58	182
67			20/04/2022	DCC ground (targeted for PAPs in DK village)	119	68	187
68			21/04/2022	DCC Ground (Female Headed Households)	-	207	207
69			21/04/2022	DCC Ground (Elderly PAPs)	149	41	190
70			21/04/2022	DCC Ground (Youth PAPs)	111	22	133

Source: JICA Study Team

Through consultations with stakeholders and PAPs in Kwale County, it was agreed to establish a total of 10 water kiosks along the acquired RoW, to respond to the strong demand of local residents to obtain easy access to safe water. Locations of individual water kiosks were determined for convenience of the local people who would use them. Just like the existing water kiosks in the area, it was adapted that their maintenance would be conducted by the local communities themselves and financed through the water charge paid by the local residents. Table 1-4-30 and Table 1-4-31 summarize the consultations with the County Government leaders.

Table 1-4-30 Outcome of meetings with the Mombasa County leaders

	Stakeholder	Organization	Male	Female	Total	Meeting outcomes
1	National Government officials	Office of the MP, Interior and coordination, NGAO,	12	2	14	1. Consultation with the Kwale County Government is required prior to the water intake. 2. JICA conducted some pilot excavations in Kwale County to supply water to the Special Economic Zone. 3. Water was to be supplied to Mombasa Special Economic Zone from Mwache dam, whose completion has been delayed. 4. Projects to establish water kiosks for the benefit of local people have value.
2	County Government representatives	Office of the senator, MCA's office, MOWASSCO, NGAAF, PSC,	17	4	21	
3	Lead Agencies (ex., NEMA, KFS)	NEMA, KFS, KPA, NMK, CWWDA, Navy,	5	1	6	
4	Non-Governmental Organizations	Shika Adabu Disability group, Peace and cohesion, Hekima community organization,	9	3	12	
5	JICA and Repcon	JICA study team, Repcon Consultants	5	5	10	

	Stakeholder	Organization	Male	Female	Total	Meeting outcomes
	Consultants					5. For compensation, a public meeting with local people will be held to disclose the results of the RAP.
6	SEZ Committee members	SEZ committee	7	5	12	
7	Others (religious, associations and Civil Societies)	Likoni queens, Likoni stars, Likoni Staerlets, URAIA, PSC, Mombasa-Kilindini CFA, Sauti ya wanawake, Party leader ODM, Youth Leaders, Jipemoyo com, Smart mentorship centre, KIYO, Sheikh, Pastor, Bodaboda committee	38	13	51	
	Total		93	33	126	

Source: JICA Study Team

Table 1-4-31 Outcome of meetings with the Kwale County leaders

Date	Meeting outcomes
Date: 15/07/2019 Venue: Kenya School of Government, Matuga Attendance: 72 (Male 53, Female 19)	1. Kwale residents do not have access to clean drinking water. 2. It is important to provide water to Kwale residents before water is sent to Mombasa. 3. Unregulated well drilling would adversely affect Tiwi water resources. 4. More stakeholders shall be invited to cover variety of stakeholders. 5. Locations of the water kiosk shall be suggested by the local residents. 6. Studies to identify other appropriate aquifers need to be considered. 7. The Tiwi aquifer has been affected by the sand extraction and excessive water withdrawal. 8. Proceed to consultations with the Location level of the administrative district. 9. It is desirable to have reports and information disclosures at all stages. 10. CWWDA supplies more water to Mombasa County than Kwale County, so its allocation of water is not fair. 11. Most of the water supply networks managed by CWWDA are aging or broken, and the water supply to local people is limited. 12. Need to work properly with political leaders.

Source: JICA Study Team

(2) Outcome of interviews with the key informants

Summary of interviews with the key informants is shown in Table 1-4-32 below.

Table 1-4-32 Outcome of interviews with the key informants

Institution	Issue	Meeting outcomes
Kenya Water Towers- Coast Region Water officer II 16th July, 2019	Catchment Degradation within Tiwi Aquifer	1. It is necessary to raise awareness in all relevant departments. 2. Soil and water conservation is not adequate.
	Points of recharge (percolation) for Tiwi aquifer?	1. Tiwi Aquifer is replenished by 20% with rainwater. Aquifers will also be replenished from Simba Hills Nature Reserve. 2. Sources for its replenishment need to be maintained and sustainably managed. 3. The water withdrawal rate must not exceed the water replenishment rate. 4. Supervise the land use and water use in the catchment area. It is important to conserve native plants in the area, including bamboos and grasses. 5. Conservation is required for aquifers and buffer zones. 6. Work with WRUA in terms of the water demand, dynamics and management.
	Displacement of assets during implementation	1. Compensations to PAPs. 2. The proposed project will improve the socio-economic aspects of the local population. 3. The proposed project will create employment opportunities for the local people. 4. Involvement of the local people is required from the stage prior to commencement of the development. 5. Work closely with citizen leaders at all levels to avoid political oppositions. 6. Advocate the tree planting and cultivation at farms.
Mombasa NEMA Office County Director-NEMA Stephen Wambua Zachariah Mwambu 23rd July,2019	Waste management (Where will waste be discharged into?)	1. Promote investments for the development in Mombasa Special Economic Zone (MSEZ). MSEZ is not a low-risk project, but a medium-risk project. 2. It is necessary to identify the water demand of MSEZ. 3. It is recommended to consider an integrated wastewater treatment plan for MSEZ. 4. Identification of officers responsible for three intake wells. 5. Obtain relevant approvals from relevant agencies. 6. For the drainage of rainwater, mitigation measures shall be clearly indicated. 7. Officially, NEMA is responsible for EIA.
KFS-Kwale County Ecosystem Conservator 24/07/2019	1. Critical flora species to require special attentions; Mvule, Bambakofi, Mkelekele, Albizia (tree species), Mpingo, Mhungu, Mfundefunde 2. Invasion species are a major concern,	1. Tiwi's aquifer is replenished from Shimba Hills Reserve. 2. It is necessary to rehabilitate the Reserve with appropriate trees. 3. Consent is required from KFS before clearing. 4. It is required to consider the occurrence of mangroves, Kiteje Kaya, and the biological and cultural significance of forests. 5. The Kwale Water Department under the control of the County Government requires a report of the

Institution	Issue	Meeting outcomes
	especially for Lantana Camara, mistutu, Donder. Conservation Challenges 1. Land degradation as a result of deforestation 2. Charcoal burning 3. Few government and private owned tree nurseries. 4. Mangrove cutting to require rehabilitation.	hydrological survey.
Kenya Wildlife Service (KWS) A.Hamisi-CPL Tsulu Hamsi-HCA 24/07/2019	Presence of a wildlife corridor within the project area:	1. The project area does not affect the wildlife corridor. 2. Shimba Hills Nature Reserve is 288km2 wide. 3. The main animals are bevel monkeys, baboons and psych monkeys.
	Endangered Wildlife in the project area	1. There is no endangered animals in the project area. There occur many poisonous snakes along the coast. Black mamba, horsewhip, boom slang, python, and cobra. Snakes are decreasing in number.
County Government of Kwale Madam Saumu-CEC Environment and Natural Resources. Madam Nuru – Chief Officer Environment and Natural Resources 25/07/2019	The project scope to be clarified and the County Executive team to be informed in the inception meeting.	1. In the project area, surveys on the boundary between land ownerships are in progress. The land is divided. In Kiteje, disputes over the boundary were settled. In Tmpo Spring, they have not been settled yet. 2. After the map of the area is digitized, it is available at the Kwale County land office. 3. The planning department can assist the mapping of the lands for roads. 4. Follow-up is required for KWASCO and the County road staff. 5. It is important to publicize and disseminate the project information.
Physical Planning Office-Kwale County Shoka Ali Omar-Senior Physical Planner. 25/07/2019	Identification and management of the road reserve for county roads; and availability of spatial planning data for the project area	1. Land boundaries are yet to be digitized. The map is at the County office in Mombasa. 2. Lands for road are limited up to 30m in some areas. 3. For clear information about the lands for road, consult with the County's Road Department. 4. Land ownerships in the project area will be decided.
County Government of Kwale Principal Superintendent Engineer- Road and Public Works 25/07/2019	Terms and conditions for water utilities for their use of the roads designated by County	1. Comply with KeRRA conditions and standards for the planning and design. 2. Lands for roads are not uniform, and they vary depending on their locations. The road width is 12m. 3. Project pipes shall go along the existing coastal water pipeline (side by side).
	Terms and conditions for cutting earth across	1. It is recommended to use concrete with manholes at both ends.

Institution	Issue	Meeting outcomes
	the roads designated by County	2. Write an official letter to the County engineer, with c.c. to the Minister of Roads and Public Works.
	Future and/or proposed development plans for the proposed County roads	1. A larger map is needed to provide the road names. 2. Contact the County planner to align with the completed development. 3. The Ministry of Roads and Public Works is responsible for the development and maintenance of the social infrastructure such as roads and the water supply. County roads used to be managed by KERRA. 4. A new road classification has been added to KERRA.
Tsunza- Mbunguni Community Forest Association. Mbunguni Water Resource Users Association. Hamisi Swalehe Mwamui-Mbunguni WRUA Chairman 0727545549mwamuihamisi@gmail.com Mbunguniwrua2011@gmail.com 30/07/2019	Sub-catchment challenges within Mbunguni WRUA:	1. Mbuguni WRUA has a sub-catchment management plan developed in 2012 and reviewed in 2016. One of the intake wells is at WRUA. 2. The challenges are: 3. Illegal water intakes and deforestation. 4. Degradation of the watershed due to deforestation and the sand extractions. 5. Vulnerable livelihood portfolio of the local residents.
	Who is responsible for management of the water towers?	1. The water kiosks must be managed by CBO or self-help groups. 2. Public awareness, education and protection are required to avoid degradation of the. 3. Reduce the burden on a single aquifer watershed and intake well by requesting some CSRs for KPA to conserve Mbunguni.
TUKO NA HOPE CBO- Simkumbe Location Salim Mwajao Said - Chairman of Development Committee Tiwi Location. Member of TUKO NA HOPE CBO 30/07/2019	Inequitable shares and distributions of water resources in Tiwi location.	1. The community is supportive, but water is supplied to a richer society. 2. In response to the water shortage, there are some cases where residents drill wells by themselves. There are concerns about the lack of expertise and the excessive water intake. 3. There is a problem of the deforestation and watershed degradation.
	Socio-Economic concerns	1. There are issues such as the sand extraction, charcoal burning, mechanized quarrying, and a weak agricultural sector. 2. Request the location of a water kiosk. 3. It should be considered to manage a water kiosk by a registered CBO (Community Based Organization). 4. TUKO NA HOPE CBO supports the SEZ project. 5. There is no dispute over the use of natural resources. 6. Consult with the County Government to identify partners to plant trees as required. 7. Dispute resolution requires the third-party intervention or mediation.
South Coast	In MSEZ project where	1. The main challenges for SALTO are the local

Institution	Issue	Meeting outcomes
Association of Local Tour Operators -SALTO Sally Mathenge-SALTO Chairlady (0705479080) Willis Odheche-KNCCI/SALTO(0725494959) Gertion Kibindu-SALTO (0723661952) 12/08/2019	is the tourism placed?	tourism development and sand extraction. 2. The project will help improve the water supply for the tourism industry, specifically the hotel industry. 3. SALTO needs to be involved in the planning and development phase of SEZ. 4. SALTO wishes to establish an activity base in the SEZ area as a tourist information hub. 5. If the water supply in Kwale area is improved, the local tourism industry will flourish.
	Fears against the MSEZ Water Project	1. Local water is delivered to Mombasa, and Kwale residents have no water. 2. We want local labor to be used rather than the external labor. 3. How much is charged for water from a water kiosk? 4. Water costs to the community should be fully subsidized.
Kwale Human Rights Network (K-HURINET) 23/08/2019	Stakeholders engagement and the project benefits to the locals	1. The first consultation should be held with Tiwi residents. Consultations should start with locals, not senior managements. Consider sharing information and the cooperation with local residents.
South Coast Resident Association Onesmus Macharia-Committee Member 23/08/2019	Projected water demand for the industrial use most likely to stress Tiwi aquifer	1. Tiwi aquifer is a relatively small aquifer of around 187km2, with an estimated water intake of 4.8 million m3 per year. 2. There is no problem with Tiwi aquifer at the moment, but the expected water intake could be an overload on the water source. Therefore, an accurate survey is required to understand the capacity limit of the aquifer. 3. Kombani (a rapidly growing urban area) has a high demand for domestic water, and this may be a burden on Tiwi aquifer. 4. If a road authority needs to expand a road, the developer must be notified by such road authority. This is to understand potential impacts on its existing facilities such as water pipes in advance. 5. If the water intake increases, there would a concern of potential saline water invasions. 6. The SEZ development may have cumulative impacts in future to affect the aquifer. 7. We need a way to economically maintain and operate a water kiosk. 8. Kwale County Government is not functioning well enough to secure the water supply for local people. Consider Musambweni and Kinondo aquifers as alternative water sources (aquifers).
	Environmental concerns over the project;	1. There would be no major problem because water pipes would be laid within the land for road.

Institution	Issue	Meeting outcomes
	Social Concerns;	2. If resettlement is required, affected people should be compensated. 3. Relocated residents should be compensated and resettled to somewhere else. 4. Sub-County managers need to establish a committee to manage water kiosks under the supervision of the County Government. Such committee must not be too large to avoid potential confusions. 5. Water is not flowing through most water pipes. The reason for this is the high electricity bill by the County Government. 6. Please consult further with WRUA and Kwale Natural Resource Network.
	Political Concerns	1. Kwale County Government and Mombasa County Government need to agree on the proposed project. 2. Kwale County Government needs to be involved in wells in Tiwi aquifer to supply water to Tiwi and other areas of Kwale County.
Kwale County Government Mwinyi Burudai Mwawandembo-MCA Tiwi Ward. Mwanakombo Matano Chireya-Secretary MCA's Office Abdalla Tendegwa-MCA PA	More considerations are required for Tiwi area besides the water supply	1. MCA fully supports and assists the SEZ project. 2. Tiwi residents have challenges for their supply, and this is why they request a water supply to them before water is supplied to Mombasa County. 3. The local community feels a gap between the amount of water they will supply and the amount of water they will receive. 4. The local community has proposed the construction and renovation of a canteen, a meeting house and at least two schools. 5. They also wish to have a new junior high school in Muungano village. 6. The women group also wish to have a communication house. 7. In addition to the local employment opportunities, assistances shall be provided for the local youth to work on their alternative means for livelihoods, such as the poultry farming, horticulture and fishing. 8. Further inland villagers should also benefit from the proposed project. 9. Water kiosks need to be managed by local communities in the area. 10. MCA needs to be involved in securing employment opportunities during the implementation of the proposed project.
	Proposed water kiosks locations;	Pongwe: 1. There is a high demand for water, and there is also a public land. Tiwi Sports: 2. Although people far away from the land for road are not likely to benefit from water kiosks, there is a large population with challenges for

Institution	Issue	Meeting outcomes
		the water supply.
Sauti ya Wanawake-Tiwi Sikukuu Mwaraone-Chairlady (0712067731) Mwanarusi Buda-Vice Secretary (0728020937) Tatu Jeff- Treasurer-0716606870 Mebakari Ali Mwapishi- Vice Chairlady (O723716921 Riziki Mashobo-Assistant ward administrator (0725075658) 26/08/2019 26/08/2019	CWWDA takes water to Mombasa but it denies Kwale residents' access to their-own water resources.	1. CWWDA has made a substantial investment to supply water to Mombasa residents and Kwale people. 2. A community water kiosk may be installed, but its water supply may be cut off like any other water kiosk around Kwale County. 3. Tiwi people are struggling for a stable supply of water.
	Besides water kiosks, Tiwi residents/women need to have other incentives.	1. The proposed incentives include: Employment opportunities for Tiwi residents and provision of a facility for communication among women groups. 2. KPA/JICA should consider proposals by the local people. 3. The other incentive would be scholarships, but they should not be a breeding ground for corruption. 4. Benefits of the proposed project shall be enjoyed by a wide range of stakeholders. 5. Water kiosks need to be managed by the social groups such as the youth groups, women groups and men groups.
	Fears against the proposed project;	1. What will happen if the predicted demand of SEZ exceeds 2000m3? 300m3 for the local community will also be supplied to Dongo Kundu. 2. Local employment opportunities are influenced by factors such as the tribal bias and the recruitments from other regions. 3. There is no water for people in Tiwi. 4. Local people pay for water, but no water comes from the tap. 5. KPA should distribute water to Kwale residents before they supply water to SEZ. There shall be consent between Kwale resident and KPA. 6. Prioritize distributions of water to the affected people and the demand centers.
World Wide Fund for Nature (WWF) Neema Suya-Project Officer nsuya@wwfkenya.org 0790939932 27/08/2019	Cultural heritages and indigenous forests in the project area	1. Bombo has Kaya (Kaya Bombo), and this is recognized as an area of cultural heritage. Although Kaya Mkumbi is not officially notified by the Official Gazette, it would be located within the project route? 2. Kaya is a remnant of the coastal forest extending from Somalia to Tanzania. Kaya is considered to be a rich and diverse area, with some endemic species among its flora and fauna. It is a very important resource for WWF.

Institution	Issue	Meeting outcomes
	Safeguard Measures	3. KPA should consider option of infrastructure facility for the water supply which does not go through the forest areas. 4. Consult further with KWS, KFS, KEFRI and NMK. Exchange opinions with the private sector and the agricultural sector. 5. Kwale County has its forest law. WWF is responsible for regulations on the timber and fuel and the waste management. 6. Consult further with the Kwale County Environment Agency. WWF is working on protection of the forests and wildlife and the environmental issues. There is no report so far on the sand extraction. 7. There is no threatened wildlife in the project area.
Kwale County Natural Resource Network (KCNRN) Ali Mwatsulozi- Volunteer Communication Officer- 0726371917 Mwanakombo Juma- Communication Officer- 0716139602 Mwanakombo Hassan- 0729813113 28/08/2019	Natural resources in Kwale County and the position of governor	1. Kwale County has many natural resources including: Sands, stones, water, forests, and mangroves, and there also is oil in Matuga Sub-County. 2. There are many water sources, but they are not sufficiently utilized. Water in Marere Dam is mainly used in Mombasa County. The Governor supports Mombasa County, and this does not lead to an equitable allocation of water between Mombasa County and Kwale County.
	Tiwi has no access to a water infrastructure	1. Residents openly complain about water issues. There are many wells, but no water for use. 2. People rely on pools to be affected by the climate change. 3. Kwale people hope to have water supplied first to the local communities before it is sent to Mombasa SEZ.
	Extraction of water from Tiwi aquifer will affect the environment.	1. As an alternative to Tiwi aquifer, the Government should consider investing in the desalination in Mombasa County.
	Environmental and social considerations	1. He reminds people of the need to plant trees to benefit from rainwater. 2. He emphasizes the importance of securing rainwater as an alternative source of water to address the water shortage in local communities. 3. Sand extractions affect the local fisheries in general. 4. Poverty in the region is a major contributor to the environmental degradation. Kwale poverty level is 70%. 5. Fisheries, agriculture and sand extractions are the major economic activities in Kwale County.

Institution	Issue	Meeting outcomes
National Museums of Kenya- Coastal Forest Conservation Unit (CFCU) Matano Am-Collection Manager-0721692587 28/08/2019	1. Kwale is classified as a water scarce county in Kenya. 2. Why does the proposed project concentrate on the northern side of Kwale County and not on the rest of Kwale County e.x., Diani, Ukunda, 3. The locals have a lot of water problems. 4. There are concerns that eventually Tiwi aquifer would be depleted as there is a lot of pressures on the aquifer.	1. CFCU manages forests both for officially notified in the Official Gazette and those not officially notified in the Official Gazette. 2. Kayas are traditional forests. Although the official notification of Kayas started in 1902, in some Kayas, people still have their land title to some Kayas. 3. NMK does not have authority to allow the relocation of Kayas. It is impossible. 4. Protection of Kaya Mtongwe, Kaya Bombo, and Kaya Kiteje were formally notified in the Official Gazette. 5. Except for the rich biodiversity in Kayas, there is no major biodiversity along the entire pipeline. 6. Mpingo, Bamba kofi and Mvule are at the risk of deterioration, and there are valuable timbers. 7. If the resettlement of local residents is required, their compensation should be based on the market prices. 8. If the water pipeline runs near Kayas, its impact needs to be minimized to protect them. 9. There is also a need to plant trees. 10. An inventory needs to be prepared to identify the trees that existed before clearing.
Coast Development Authority (CDA) 28/08/2019 Mwanasiti Bendera-M/RPD Susan Mulewa-Manager Business Development Laurine kithi-Research Officer Beatrice Kavemba-ICT Officer Muzry Ahmed-County Coordinator Mombasa-0722679314 Fredrick Mwabili – OEA--0704502080	1. ESIA should also cover the electricity, drainage, sewerage and other components. 2. How is MSEZ positioned as a project to support the development of Mombasa? 3. How will the region benefit from the anticipated project? 4. Are there housing and residential components in the zoning of Dongo Kundu? 5. ESIA concentrates on potential impacts after the proposed project, not before its commencement. 6. Issues of the speculation need to be managed. 7. The proponent	1. CDA is a state-owned enterprise established under Act.404. 2. It operates in the six coastal counties. 3. Its functions include the planning, coordination and management of the major projects. 4. CDA develops its strategic plan, and in 2019, it prepared a blueprint for the region from 2013 to 2030 in its 20-year master plan. 5. Most projects are adversely affecting the coastal areas. If the proposed project is not evaluated for its economic status, it may not be able to benefit the entire region. 6. In the case of water, Marere spring would be another source for water. 7. This project should benefit the Kenyan EEZ zone and make the best use of it for the region and the country as a whole. 8. CDA is interested in how coastal areas will benefit from this project. 9. CDA needs to be involved in all phases of this project. 10. CDA has found that some trees would eventually contribute to rainfalls. 11. For the protection of Kayas, it should be officially notified in the Official Gazette. 12. Mwache Dam is currently in the ARAP process. Although it was expected to be completed by December 2019, it was delayed. Its construction commenced in March 2020 for the project period of two years. CDA lobbied for contractors.

Institution	Issue	Meeting outcomes
	(KPA) needs to educate the locals on the benefits of the proposed project. 8. In the project implementation, CDA can assist the capacity building. 9. The ecosystem, ex., marine and terrestrial ecosystems are endangered. 10. In the proposal, management mechanisms to protect the ecosystem should be considered. 11. Resources at Exclusive Economic Zones (EEZ) are not well identified and utilized. 12. The proposed project will affect the local community to create socio-economic issues.	13. CDA is one of the major stakeholders to Mwache Dam. 14. Mwache Dam would supply 118,000m3 per day. 15. Tiwi has a problem of the unregulated well digging. 16. The water kiosk needs to be a water supply center to address any future drainage.

Source: JICA Study Team

(3) Public consultation meetings

Table 1-4-33 shows a summary of the public consultations conducted to prepare the final draft report of EIA and ARAP.

Table 1-4-33 Summary of the public consultations

Venue & Date	Meeting Outcomes	KPA's Response in the Meeting
Dzangadzangani Village – Matuga Sub location 25/01/2020	1. The alignment to follow the road existing on the cadastral maps so as to avoid vandalism of the pipeline passing through private land.	1. The alignment to follow the road on the cadastral maps so as to avoid future challenges with the project. A follow up to be done on landowners whose land host the wells to ensure that they are compensated and it be in writing.
Waa Primary School – Kitivo Sub location 25/01/2020	1. How will people from Kwale County benefit after taking water to Mombasa?	1. People from Kwale county will get ten water kiosks (one kiosk will be constructed here in Waa Primary School); and get temporary employment. Kwale County also stands the highest chance to benefit

Venue & Date	Meeting Outcomes	KPA's Response in the Meeting
		with the development of SEZ. Kwale County will also take over the water infrastructure after the completion of Mwache dam.
Kombani Social Hall – Kombani Sub location 27/01/2020	1. The locals requested for a water kiosk at a public land near Kombani social hall. 2. KPA to carry out more CSRs in the area besides installation of the water kiosks such constructing nursery schools or sponsoring bright students in the community.	1. These inputs are very important and will be included in the final reports. 2. There are ongoing discussions about CSR between Kwale County government and KPA to help the communities. All suggestions given on CSR will be included in the final reports and will also be presented to KPA.
Chidzumu Primary School – Kombani Sub location 27/01/2020	1. The community suggested that realigning the designs to follow the existing road in the cadastral maps would be costly as many structure are constructed on the road reserves and therefore requested for the pipeline to use the designed alignment in well no.3. 2. KPA was urged to install street lights from the well to Tiwi booster station which would greatly help in manning the pipeline. 3. The locals requested the contractor to consider gender balance during employment of the locals.	1. The projects is weighing on the two options of following the existing road on the ground and acquire way leave or follow the actual road amended in the map. The team has discovered that the true designated roads in most cases have never been graded and there are trees and structures on them. 2. Noted, the proposals will be presented to KPA. 3. The law requires that on hiring there should at least be a third representation of both genders. We had requested the ward administrator to hire at least one female.
Kiteje- Mwembe Korosho 28/01/2020	1. The locals requested for an additional water kiosk at Mbondoni mosque in Mkumbi village.	1. The proposals will be added in the final reports and presented to KPA.
Denyenye-Mwembe Bursary 29/01/2020	1. There exist illiterate locals within the community who have great experience in skilled and unskilled labour but have no supporting documents. How will these people secure jobs during construction phase? 2. KPA was urged to carry out more CSRs in the area.	1. The contactor will be advised to consider demonstrated competency during recruitment after the committee have approved such locals. 2. Discussions are ongoing between Kwale County government and KPA to see which other CSRs can be done in the area.

Source: JICA Study Team

(4) Additional Consultation Meeting for the KPA Compensation Policy

Table 1-4-34 and Table 1-4-35 present the summary outcome of the consultation meetings for the Compensation Policy for both 3-high level meetings and meetings with PAPs.

Table 1-4-34 Summary outcomes for the 3-high level meetings

Venue & Date	Issue	Meeting outcomes
RC's office (1st high-level meeting) 21 Jan 2022	1. Disclosure of the compensation policy including the allocation of resettlement land within MSEZ for each affected land occupant 2. Plan for the disclosure process to all the PAPs	1. Concurrence on the Compensation Policy; 2. Need to accelerate the project by sorting out PAPs compensation; 3. Fishery compensation budget to be included in the entire PAPs compensation budget; 4. Need to develop action plan /matrix showing responsibility of each 5. organization with stake to MSEZ with timelines in regard to compensation funds, land allocation and any other arising issues at the project site; 5. SEZA, KPA, NLC, Mombasa County and all interested stakeholders' representatives to meet and discuss allocation of land with consideration to PAPs land allocation and considering the Master plan. In case there is land constraint, priority for land allocation would be given to SEZA; 6. The Ministry of Interior to construct the police station at the project area for security purpose; and ICT to have fiber installation at the project area; 7. NCL to officially inform KPA on the validation report; 8. Treasury to allocate funds for PAPs compensation; 9. SEZA to be allowed to start their activities immediately;
ACK Guest House (2nd high-level meeting) 5 April 2022	1. Disclosure of the compensation policy including the allocation of resettlement land within MSEZ for each affected land occupant. 2. Plan for the disclosure process to all the PAPs	1. Concurrence on the Compensation Policy; 2. Request for a faster implementation process so that the president (Hon. Uhuru Kenyatta) can launch the project before the end of his term and suggested that the chiefs and other stakeholders to be included in the compensation process for purposes of validation; 3. Leaders are thankful that the resettlement areas are still within Dongo Kundu area; 4. Copies (map) of the resettlement areas should be shared; 5. People should be compensated after being given plots so that they can be able to develop the land; 6. The leaders agreed to support the implementation process; 7. Suggestion to conducting a big baraza after disclosure to the PAPs Committee;
ACK Guest House (3rd high-level meeting) 7 April 2022	1. Disclosure of the compensation policy including the allocation of resettlement land within MSEZ for each affected land occupant 2. Plan for the disclosure process to all the PAPs 3. Discussion on the proposed public baraza	1. Concurrence on the Compensation Policy; 2. Beacons should be put in place for the Kayas and that the Kayas to be guarded by the people themselves; 4. Clarification on the exact measurement of land was communicated (An eighth of an acre is equivalent to a pull plot which is a 50 by 100); 5. Modern standard of housing is expected since the resettlement area will have a town/urban standard, though there is no pressure on the people especially because the compensation won't be the same to everyone; 6. The Public Baraza, to be held the following week (specific date to be communicated), hence PAPs Committee should tell others about the same.

Source: JICA Study Team

Table 1-4-35 Summary outcomes of village-wise meetings and FGDs

Venue & Date	Meeting Outcomes	KPA's Response in the Meeting
DCC Grounds (Public Baraza) 12 April 2022	1. Request for the timeframe for implementation of the RAP 2. PAPs requested to disclosure the PAP list as documented during ARAP study 3. Regular awareness forums undertaken to deepen the understanding of the PAPs on the Compensation policy. 4. PAPs requested on access to maps and information on the relocation sites	1. The pace of implementation of the Policy is dependent of speed of acceptance by PAPs. 2. The PAP list is available, and the PAPs welcomed to suggest where to station it. 3. There are upcoming village level consultation meetings and Focused Group Discussions (FGDs) after the public baraza. 4. Mwangala Village and Dongo Kundu (DCC area) village have been identified as the relocation sites. PAPs to follow up on maps and information on relocation sites during the upcoming consultation meetings.
Mkwajuni (Mbuta Village) 19 April 2022	1. Request to consider PAPs who have migrated or died after being inventoried during RAP 2. Why is the PAP compensation list not being publicly disclosed during the village meeting forum?	1. The cases would be forwarded to the PAP committee for advice on the next of kin. 2. Because of time limit PAPs compensation list cannot be disclosed during the meetings. PAPs should suggest the office to avail the list either in chief's office or DCC office
Kaya Mtongwe Village Elder's Compound (Kaya Mtongwe and Siji Villages) 19 April 2022	1. The fate of grave sites established after RAP validation by NLC. 2. Suggestion to have the PAPs List accessible at the area Chief's Office. 3. KPA and PAPs documents an agreement to recognize the existence of the PAPs.	1. PAPs will be facilitated to relocate them to the resettlement sites. 2. The suggestion was welcomed and to be considered. 3. All PAPs have been listed for compensation as adequate prove.
Mrongondoni Playground (Mrongondoni Village) 19 April 2022	1. Disclosure of PAP list 2. PAPs questioned about the missing names in the PAP list 3. PAPs questioned about KPA's ownership of the title for the MSEZ land despite their long existence 4. Request for a drug abuse centre for rehabilitation of addicts	1. PAP list to be stationed at the Chief's Office. 2. If a few names missing in the PAP list, then PAP Committee can handle. If the number of missing names is high, then further investigations will be done. 3. The land is legally owned by KPA. 4. The existing Mbuta Medical Centre will be improved to provide primary health care. Other Government agencies (Department of Health) will be called upon to augment services.
Mwangala Primary School (Mwangala Village) 20 April 2022	1. Partiality of the PAP Committee in ensuring equal chance for job opportunities. 2. Request on additional social amenities to augment the ones proposed in the Compensation Policy 3. Question about the levels of the	1. The PAP committee is to be trained on handling grievances and other matters. The Committee is also subject to vetting. The DCC Mr. Kazungu is the overall chair of the committee. 2. The social amenities provided in the compensation policy are determined

Venue & Date	Meeting Outcomes	KPA's Response in the Meeting
	grievance redress mechanism (GRM) 4. Call to alert PAPs not to sell allotted plots.	by Government based on need and population of residents. 3. PAPs are free to escalate their grievances from the PAP Committee level up to Court level. 4. DCC discouraged PAPs from selling plots upon allotment. This may push them into further poverty.
DCC Grounds (Dongo Kundu Village) 20 April 2022	1. Availing the PAP list taken during RAP study for scrutiny	1. PAP list will be availed for scrutiny in the DCC Office, Likoni
DCC Grounds (Female Headed Households PAPs) 21 April 2022	1. PAP requested to have a separate entitlement for vulnerable such as orphans and widows. 2. Provision of a special school for Person with Disabilities (PwD) within the resettlement areas. Modernize any other existing amenity for the PwD.	1. One time assistance of KSH 10,000 for vulnerable people including physically challenged and orphans is provided in the compensation policy. 2. Suggestions were noted for further advice.
DCC Grounds (Elderly PAPs) 21 April 2022	1. Establishing a direct line of communication between PAPs and KPA. 2. Compensating PAPs for development done on land parcels (to be ceded) post validation date. 3. PAPs requested to have another big meeting after the village wise meetings where all the collected views from the PAPs will be discussed and proposed solution declared to all prior to implementation of the Compensation Policy. According to PAPs, this is necessary to ensure that KPA had collected what they had aired and not otherwise. 4. Make public the detailed PAP list describing each item to be compensated and their value.	1. Comments and suggestions were noted for internal consultation within KPA. Feedbacks will be provided. 2. The comment was noted by KPA, but no specific answer was provided. 3. The comment was noted by KPA, but no specific answer was provided. 4. The comment was noted by KPA, but no specific answer was provided.
DCC Grounds (Youth PAPs) 21 April 2022	1. Provision of a playground within resettlement site as part of the relocation package. 2. Youth requested for longer training periods for them to acquire professional knowledge as opposed to 3- or 6-months training periods proposed in the Compensation Policy. 3. Providing advance notice on job opportunities to allow for adequate preparation or responsive job applications.	1. Views and suggestions collected during the meeting to be presented to the relevant KPA personnel for further advice. 2. The comment was noted by KPA, but no specific answer was provided. 3. The comment was noted by KPA, but no specific answer was provided. 4. The comment was noted by KPA, but no specific answer was provided. 5. The comment was noted by KPA, but no specific answer was provided. 6. The comment was noted by KPA, but

Venue & Date	Meeting Outcomes	KPA's Response in the Meeting
	4. Youth are worried that they are not presented well by the current PAPs committee especial in issues of job opportunities. Hence, they requested to form a separate functional committee for youth. 5. Adequate notice of invitation for public consultation meetings. 6. What's in place for children whose parents had not sub-divided land.	no specific answer was provided.

Source: JICA Study Team

1-4-3 Land acquisition and resettlement

1-4-3-1 Necessity of the land acquisition and resettlement (alternative analysis)

(1) Project components that may affect land uses and require the resettlements

Project components to require the resettlement are the installation of water supply system, construction of temporary access road, land development, and the development of a disposal site for soil. Areas to be affected are the project site in Mombasa County and Kwale County.

(2) Initial project alternatives to minimize social impacts

As presented in Section 1-4-1-5, the alternative analysis to minimize environmental and social impacts including comparison of "No project scenario", introduction of desalination system, and rainwater harvesting system were conducted. As the result, conducting the proposed project with readjusted alignment has been evaluated as the best option that contribute achieving "Kenya Vision 2030", the national development objectives, and minimize negative social impacts. Further consideration of minimizing impact by readjustments is described as following.

(3) Measures to minimize physical relocation during project implementation

After comparing diverse routes, two routes were considered in the alternative analysis of the transmission pipeline from Tiwi to MSEZ reservoir. Those were 1) the route utilizes road A7 section of Tiwi to Kibundani to MSEZ reservoir, and 2) the original route (from intake wells to Tiwi booster station to Mombasa Reservoir). The former is advantageous in terms of availability of land in the road reserve, security of the water infrastructure and easily integration with on-going pipeline developments. However, the route one will not be able to supply all 10 water kiosks in ten villages in Kwale County, which is considered to be the prerequisite for gaining social acceptance. As the result, current route was evaluated as the optimal route.

Summary of the proposed project components, its scale, number of structures and people to be affected are presented in Table 1-4-36. At the detailed design stage, physical relocations will be minimized as much as possible, for example, by optimizing the location of pipeline route for the water supply. Similar considerations will be conducted also for the other project components.

Table 1-4-36 Physical relocation required for each project component

Location of PID and Components		Length (km)	Impact on land (acres)	Structures to be affected by the Project (No. of households)	Number of Persons to be affected by the Project (persons)
Outside SEZ (Kwale)					
	Water Supply in Kwale	29.32	5.16	1	3*
Within SEZ-Mombasa					
	Water reservoir	1.58	2.04	0	0
	Construction of temporary roads	2.4	28.5	8	13
	Drainage Improvement	0.66	2.29	0	0
	Land development	-	24.7	11	34
	Land formation/Disposal Site	-	76.45	41	92
	Contractor site	-	3.85	0	0
Total		***33.96***	***142.99***	***61***	***142***

* Water supply in Kwale is only affecting one household with a population of three individuals. This household will be avoided during detailed design. When the household is avoided, 139 individuals will be displaced by PID inside Mombasa Special Economic Zone.
Source: Updated ARAP (May 2022)

1-4-3-2 Legal framework for the land acquisition and resettlement

(1) Outline of the Kenyan legislation for the land acquisition and resettlement

The main legislation on the ownership, use, transfer, and compensation for lands are the Constitution of Kenya, Section 40, Subsection 3; Section 7 of the Limitation of Actions Act Cap. 22 revised in 2012; and the Land Act 2012. The details of Kenyan legislation relevant to the land acquisition and resettlement is summarized in Table 1-4-37 .

The Constitution of Kenya provides that the state must not take private land for any purpose other than the achievement of public benefits; it must comply with the provisions of the Constitution and laws if it condemns a land; and it must immediately pay the full amount of legitimate compensation if it condemns a private land. Its Section 40, Subsection also provides that the residents without a land title (people living there for many years and practicing activities such as agricultural ones by tradition, and sincerely maintaining the life of their family) could be subject to compensation.

The Land Act 2012 provides that if a private land is compulsorily condemned under the Act, a full amount of the legitimate compensation shall be paid in advance after the rights and interests on this private land are identified. It also provides that the National Land Commission (NLC)

under the Ministry of Land develops rules to properly assess an amount for compensation. Definition of the wayleave, its purpose, application and compensation for it are provided in the relevant part the Land Act No. 6 – 2012, Section 143-148 (Public Right of Way). On the other hand, as for land ownership within MSEZ, NLC validation report concluded that the land in SEZ area is a public land, and the land title belongs to KPA. However, NLC requested KPA to consider supporting those with stake to land in the SEZ area by providing a resettlement site for them.

Table 1-4-37 Relevant Legislation in Kenya

No.	Legislation/Guidelines	Relevant Issue
1	The Constitution of Kenya 2010	The Constitution of Kenya protects the land and property owners as specified in Chapter 4, Section 40 (3). The State shall not deprive a person of property of any description, or of any interest in, or right over, property of any description, unless the deprivation - (b) is for a public purpose or in the public interest and is carried out in accordance with this Constitution and any Act of Parliament that - (i) requires the prompt payment in full, of just compensation to the person; and (ii) allows any person who has an interest in, or right over, that property a right of access to a court of law. Section 40(4) states that "Provision may be made for compensation to be paid to occupants in good faith of land acquired under clause (3) who may not hold title to the land". However, this provision is not applicable to public land as in the case of MSEZ.
2	The Land Act 2012 (No.6 of 2012)	The Land Act stipulates the details and procedures of land management system of public land, community land and private land. Sections in the act relevant to the project are as follows. Title to land may be acquired through - Section 7. (c) compulsory acquisition. Application for Land Acquisition - Section 107. (1) Whenever the national or county government is satisfied that it may be necessary to acquire some particular land under section 110, the respective Cabinet Secretary or the County Executive Committee Member shall submit a request for acquisition of public land to the National Land Commission to acquire the land on its behalf. Just and Timely Compensation - Section 111. (1) Says If land is acquired compulsorily under this Act, just compensation shall be paid promptly in full to all persons whose interests in the land have been determined. Creation of Wayleave Section 144. (1) Unless the Commission is proposing on its own motion to create a wayleave, an application, for the creation of a wayleave, shall be made by any State department, or the county government, or public authority or corporate body, to the Commission. Notice for Creation of Wayleave - Section 144 (4) The applicant shall serve a notice on - (a) all persons occupying land over which the proposed wayleave is to be created, including persons occupying land in accordance with customary pastoral rights; (b) The county government in whose area of jurisdiction land over which the proposed wayleave is to be created is located; (c) all persons in actual occupation of land in an urban and per-urban area over which the proposed wayleave is to be created; Settlement - Section 134. (1) The National Land Commission shall, on behalf of the national and county governments, implement settlement programmes to provide access to land for shelter and livelihood. Squatters - Section 160 (2) Without prejudice to the foregoing, the Commission shall have the powers to make regulations -(e) with respect to squatters - (ii) to facilitate negotiation between private owners and squatters in cases of squatter settlements found on private land.

No.	Legislation/Guidelines	Relevant Issue
3	The National Land Commission Act 2012 (No.5 of 2012. revised in 2016(2015))	The Act stipulates institutional arrangements and authority that exercise jurisdiction of Land Administration as follows. (a) for the management and administration of land in accordance with the principles of land policy set out in Article 60 of the Constitution and the national land policy; (d) for a linkage between the Commission, county governments and other Institutions dealing with land and land related resources. Section 5. Functions of the Commission ((a) to manage public land on behalf of the national and county governments; (e) to initiate investigations, on its own initiative or on a complaint, into present or historical land injustices, and recommend appropriate redress; (f) to encourage the application of traditional dispute resolution mechanisms in land conflicts; Section 16 authorizes the commission to establish committees for better execution of their functions among them compulsory acquisition process as outlined in the Land Act (2012).
4	The Valuers Act 2012	The Valuers Act provides for registration of valuers and for connected purposes as follows Section 21. Unregistered persons not to practice as valuers (1) After the expiration of six months from the commencement of this Act or such further period as the Minister may, by notice in the *Gazette*, allow either generally or in respect of any particular person or class of persons - (a) no individual shall carry on business as a practicing valuer unless he is a registered valuer; (b) no partnership shall carry on business as practicing valuers unless all the partners whose activities include the doing of acts by way of such practice are registered valuers; (c) no body corporate shall carry on business as valuers unless the directors thereof whose duties include the preparation of valuations in respect of any type of movable or immovable property are registered valuers. Section 24. Dishonest practices Any person who - (c) knowingly and willfully makes any statement, oral or written, which is false in a material particular or which is misleading with a view to gaining any advantage or privilege under this Act whether for himself or for any other person.

No.	Legislation/Guidelines	Relevant Issue
5	Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act, 2012	The act is applicable to the proposed project as it defines “Internally Displaced Persons” those who are forced to leave their place of resident by large scale development projects. Displacement and relocation due to development projects shall only be lawful if justified for compelling and overriding public. Relevant sections are as follows. Section 5. Prevention of displacement (1) Subject to the Constitution, the Government and any other organization, body or individual shall guard against factors and prevent and avoid conditions that are conducive to or have the potential to result in the displacement of persons. Section 6. Protection from displacement (3) Displacement and relocation due to development projects shall only be lawful if justified by compelling and overriding public interests and in accordance with the conditions and procedures in Article 5 of the Protocol, Principles 7-9 of the Guiding Principles and as specified in sections 21-22 of this Act. Section 22. Says Procedures for displacement induced by development projects (1) Subject to the Constitution and section 21(2) of this Act and prior to the decision to give effect to the displacement of persons due to development projects or projects to preserve the environment, the Government shall - (a) seek the free and informed consent of the affected persons; and (b) hold public hearings on the project planning. (2) The decision to give effect to the displacement of persons shall give the justification for the displacement and demonstrate that the displacement is unavoidable and no feasible alternatives exist. The decision shall contain detailed justification on the alternatives explored. (3) The Government shall ensure that the displacement is not carried out unless - (a) reasonable time is given to the affected persons to review the decision and challenge it before an independent body on the grounds that the conditions in section 21(2) are not adhered to; (b) an effective remedy in accordance with articles 46 and 47 of the Constitution is available for those affected (4) The Government shall ensure that the displacement is carried out in manner that is respectful of the human rights of those affected, taking in particular into account the protection of community land and the special needs of women, children and persons with special needs. This requires in particular - (a) full information of those affected and their effective participation, including by women, in the planning, management of the displacement, and in defining suitable durable solutions; (b) provision of safe, adequate and habitable sites and to the greatest practicable extent, of proper accommodation; and (c) creation of satisfactory conditions of safety, nutrition, health and hygiene and the protection of the family unity. (5) The Government shall ensure the presence of a Government official when the displacement and relocation is effected and the monitoring by an independent body.

No.	Legislation/Guidelines	Relevant Issue
6	Limitation of Actions Act Cap. 22 revised in 2012	According to Limitations of Actions Act: Section 7 An action may not be brought by any person to recover land after the end of twelve years from the date on which the right of action accrued to him or, if it first accrued to some person through whom he claims, to that person. Section 9. Accrual of right of action in case of present interest in land Where the person bringing an action to recover land, or some person through whom he claims, has been in possession of the land, and has while entitled to the land been dispossessed or discontinued his possession, the right of action accrues on the date of the dispossession or discontinuance. Section 13 Right of action not to accrue or continue unless adverse possession (1) A right of action to recover land does not accrue unless the land is in the possession of some person in whose favour the period of limitation can run (which possession is in this Act referred to as adverse possession), and, where under sections 9, 10, 11 and 12 of this Act a right of action to recover land accrues on a certain date and no person is in adverse possession on that date, a right of action does not accrue unless and until some person takes adverse possession of the land. Section 38. Registration of title to land or easement acquired under Act (1) Where a person claims to have become entitled by adverse possession to land registered under any of the Acts cited in section 37 of this Act, or land comprised in a lease registered under any of those Acts, he may apply to the High Court for an order that he be registered as the proprietor of the land or lease in place of the person then registered as proprietor of the land.
7	The Land Registration Act, 2012 (No. 3 Of 2012)	The Land Registration Act provides the following: Section 24. Interest conferred by registration Subject to this Act - (a) the registration of a person as the proprietor of land shall vest in that person the absolute ownership of that land together with all rights and privileges belonging or appurtenant thereto; Section 26. Certificate of title to be held as conclusive evidence of proprietorship (1) The certificate of title issued by the Registrar upon registration, or to a purchaser of land upon a transfer or transmission by the proprietor shall be taken by all courts as prima facie evidence that the person named as proprietor of the land is the absolute and indefeasible owner, subject to the encumbrances, easements, restrictions and conditions contained or endorsed in the certificate, and the title of that proprietor shall not be subject to challenge Section 93. Co-ownership and other relationships between spouses: (2) If land is held in the name of one spouse only but the other spouse or spouses contribute by their labour or other means to the productivity, upkeep and improvement of the land, that spouse or those spouses shall be deemed by virtue of that labour to have acquired an interest in that land in the nature of an ownership in common of that land with the spouse in whose name the certificate of ownership or customary certificate of ownership has been registered and the rights gained by contribution of the spouse or spouses shall be recognized in all cases as if they were registered.

No.	Legislation/Guidelines	Relevant Issue
8	NLC Guidelines on Compulsory Land Acquisition in Kenya, 2015	Under the Lands Act of 2012, the NLC has issued guidelines (19th November 2015) for the compulsory land acquisition as follows: (ii) Respective Government agency or cabinet must seek approval of NLC (iii) Inspection of land to be acquired NLC may physically ascertain or satisfy itself whether the intended land is suitable for the public purpose, which the applying authority intends to use as specified. If it certifies that indeed the land is required for public purpose, it shall express the satisfaction in writing and serve necessary notices to land owners and or approve the request made by acquiring authority intending to acquire land. (iv) Publication of notice of intention to acquire Upon approval, NLC shall publish a notice of intention to acquire the land in the Kenya Gazette and County Gazette. (vi) Holding of a public hearing NLC then convenes a public hearing not earlier than 30 days after publication of the Notice of Intention to Acquire.

Source: Updated ARAP (May 2022)

(2) Land ownership in Kenya

In Kenya, types of land ownership are classified into three, namely, public lands, common lands belonging to a community, and private lands. Public lands refer to lands that have not been transferred by the government to individuals or communities for the use or occupation by state agencies that include. Common lands refer to lands owned by the community on the basis of the common ties such as tribes, customs, cultures and traditions, and they are registered under the name of the representative, and owned, managed and used by the community. Private lands refer to lands held by individuals with freehold rights, lands to which leasehold is established, and lands identified as private lands by law.

The project area in Kwale County includes private lands and public lands managed by diverse authorities namely Kenya National Highway Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), Kwale County Government (KCG), Coast Water Works Development Agency (CWWDA) and Kenya Ports Authority (KPA). SEZ is a public land managed by KPA, and it was designated as the SEZ site by the Ministry of Industry in the Official Gazette of July 26, 2019. There are non-title holder residents at the SEZ site, whom as a result of NLC validation to non-land assets in 2019, it requested KPA to provide resettlement site for them. Therefore, KPA will proceed to providing the resettlement sites for affected non-title holders in SEZ area through the consultation and coordination with them, under the supervision of NLC.

(3) Land acquisition process

A land required for the proposed project will be handled by NLC in accordance with the Land Act 2012. Below describes the standard process on the basis of the hearing to NLC and relevant authorities and the reports on similar projects in Kenya.

1. KPA prepares materials to show the project site and its boundary/ownership.
2. KPA submits to NLC a document to indicate the land to be acquired.
3. NLC approves the application for land acquisition.
4. NLC notifies the land acquisition plan in the Official Gazette for 30 days.
5. After 30 days, NLC sets a period to receive inquiries on the property and compensation and notify it in the Official Gazette at least 15 days before the inquiry period.
6. NLC investigates the ownerships of the land, identify its owners and receive their written request for compensation.
7. NLC notifies all eligible owners that the compensation would be paid by the certificate.
8. NLC remits all the amount of compensation to the bank account of eligible owners.
9. NLC acquires the land and temporarily registers it as NLC land.
10. NLC conducts supplementary surveys on the land, as required, for the scrutiny and confirmation of their certificates of land ownership.

(4) JICA's policy on Land Acquisition and Involuntary Resettlements

JICA Guideline stipulates its policy on involuntary resettlements including the required information, procedure to be followed. Moreover, it is required to refer WB OP 4.12 as international standards. Summary of policy is presented in Table 1-4-38.

Table 1-4-38 JICA's policy related to Resettlement

Item	Principle
I.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
II.	When, after such an examination, avoidance is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected.
III.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
IV.	Compensation must be based on the full replacement cost as much as possible.
V.	Compensation and other kinds of assistance must be provided prior to displacement.
VI.	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
VII.	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
VIII.	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
IX.	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.
Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that "JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies". Additional key principle based on World Bank OP 4.12 is as follows.	
X.	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.
XI.	Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
XII.	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
XIII.	Provide support for the transition period (between displacement and livelihood restoration.
XIV.	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
XV.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.
In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.	

Source: JICA Guidelines (2010) and World Bank OP 4.12

(5) Gaps between the JICA Guidelines and Kenyan legislation

Comparisons between the JICA Guidelines and the legislation in Kenya are shown in Table 1-4-39.

Table 1-4-39 Comparisons between JICA Guidelines and Legislation in Kenya

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
Efforts is required to avoid the involuntary resettlement of residents and their loss of livelihood measures through considerations of all available options.	Article 110 (1) of the Land Act 2012 regulates the land acquisition. There is no provision in the Act for the avoidance, minimization or mitigation of the resettlement of residents.	There is no provision in the Land Act 2012 to require the avoidance, minimization or mitigation of the resettlement of residents as much as possible. Public works tend to require the involuntary resettlement, and there is a provision to require compensations to affected assets. Article 5 of the Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act 2012 requires avoidance of the resettlement of residents.	Consider avoidances of the resettlement of residents and their loss of livelihood means as much as possible, for example, through considerations of alternatives.
If the resettlement of residents is inevitable, effective measures shall be taken under consensus with those to be resettled, to minimize its impacts and compensate for their losses.	The Land Act 2012 does not clearly require to take measures to minimize the impacts. There is a provision to require compensation for the lands, structures, trees and crops. The Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act 2012: • Article 5 requires avoidance of the resettlement of residents • Article 22 (2) requires to consult with the residents and obtain the consent of PAPs on their resettlement.	The Land Act 2012 requires the prompt full compensation. However, there is no provision to require considerations for the avoidance, minimization, or mitigation of the resettlement of residents. The Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act 2012 has identical provisions on the resettlement of residents with the JICA Guidelines.	In order to minimize impacts of the project and compensate for losses, consider the following assistance measures. • Compensate for the assets such as lands, structures, trees and crops • Compensate for the losses of business income • Assist socially vulnerable people • Establish measures to assist the restoration of livelihood.

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
Sufficient compensations and assistances shall be provided to those subject to impacts of the involuntary resettlement or loss of livelihood measures, at an appropriate time by the host country. The host country shall take efforts for the resettled people to improve or at least restore their living standards, income opportunities and production levels. Included are the compensations for losses (of lands and assets) by lands or money, assistances to the relocation cost, and assistance for the re-establishment of community at the resettled location.	The Land Act 2012 Article 134 (1) NLC is required to implement a program to enable the affected people to settle on the land to provide a basis for their residence and maintenance of livelihood, on behalf of the national and county governments. (2) For the purpose of the Act, such program shall be also for settlement on the land for evacuation, movement, relocation due to non-land titled residency, natural disasters, development projects, national land conservation, internal conflicts or other causes. Kenyan Act requires the maintenance of livelihood and the resettlement, but there is no detailed provision for them.	Kenyan Law does not have a provision on actions to enhance the living standards of the residents to be relocated. On the other hand, it is the policy of JICA to require sufficient compensations and assistances, to cover also the transition period.	Sufficient compensations and assistances are planned for an appropriate time.
Compensations must be made in advance on the basis of the replacement cost wherever possible.	Article 111 (1) of the Land Act 2012 requires the prompt payment of compensations to those identified for compensations to their lands to be compulsory acquired.	There might be no gap. According to NLC, for government projects in Kenya, structure compensation is at replacement cost. Additionally, land compensation is at the market price and the 15% of the disturbance allowance is added to cover the gap between the market price and the replacement cost.	Full compensation will be paid in advance, on the basis of the replacement cost wherever possible.
Compensations and other assistances must be made before relocation.	Article 125 (1) of the Land Act 2012 requires NLC to pay full and justifiable compensations to residents identified as eligible recipients as soon as practicable.	There is no provision to clearly require the payment before relocation.	Compensations and assistances will be provided before relocation of residents.
In the case of large-scale involuntary resettlements for projects, the Resettlement Action	There is no clear provision to require the preparation and disclosure of the Resettlement Action Plan.	Kenyan legislation does not require the description of all issues associated with the resettlement of residents and	The Resettlement Action Plan will be disclosed to the communities to be affected.

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
Plan must be prepared and disclosed.		disclose it.	
For the preparation of Resettlement Action Plan, sufficient information shall be provided in advance and the residents to be affected and their communities shall be consulted.	Article 35 of the Constitution for the right to access information, Every citizen has a right to access; (A) Information held by the state, and (B) Information held by others and required for the exercise or protection of his right or fundamental freedom, when the government acquires a private land.	Although the right of citizen is secured to access information when the government acquires his/her land, there is no provision for the consultation.	Residents to be affected and their communities will be consulted after the information is shared with them.
For consultations, explanations shall be provided in the language and manner understandable by the people to be affected.	There is no specific provision.	There is a gap. Kenyan legislation does not clearly require to explain the project to the people to be affected in the language and manner understandable by them.	Swahili understandable by the residents to be affected will be used. For illiterate residents, oral explanations will be provided. Venues of suitable size for the number of participants will be selected as much as possible among the places they are familiar with. Microphones and speakers will be used so that everybody can hear.
Residents to be affected shall be properly involved in the planning of Resettlement Action Plan and also in its implementation at the monitoring stage.	The Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act 2012 requires participations of the people to be affected.	Although there is no fundamental gap, there is no detailed provisions in Kenyan legislation to promote participations of the people to be affected at all stages of the resettlement.	Residents to be affected will participate in the all stages of the Resettlement Action Plan.
An appropriate grievance redress mechanism shall be in place to allow its easy access by the residents to be affected and their communities.	Article 128 of the Land Act 2012 provides that a dispute over lands is eventually decided by the Land and Environment Court. The Act provides the following options for submission of a grievance;	There is no provision to require development of a grievance redress mechanism for individual projects.	The grievance redress procedure will be simple, convenient and reliable. A grievance submission form in Swahili will be prepared.

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
	• Utilization of an autonomous grievance redress mechanism widely accepted in the community • Utilization of an unofficial alternative local arbitration body • Re-negotiation with NLC with potential decision by Land and Environmental Court		
In order to distinguish the residents to be affected from those who flow in from the outside for their profits from the project, and to prevent such inflow from the outside, at an earlier project development stage as possible, it is desirable to conduct the initial baseline surveys (including establishment of the cut-off date to identify eligible people for compensations, population census, asset inventory, and socioeconomic surveys) to identify and record the residents to be affected. (WB OP 4.12 Para 6)	Section 147 of the Land Act 2012 requires the identification and documentation of the residents with wayleave.	Kenyan legislation does not have a provision on the cut-off date.	Public consultation meetings will be held at an earlier stage as possible to request cooperation for surveys to the residents and their communities. Cut-off dates will be explained to the residents and their communities at the commencement of surveys. There will be time for questions at the public consultation meetings.
Eligible persons for compensations are residents to be affected (1) with legal certificate of title (including legitimate traditional ownership of land), (2) with a right on their land or assets but without formal legal certificate of land title at the time of the census survey, or (3) without recognizable legal certificate of title to the land they occupy.	Sec 111. (1) of the Land Act 2012 requires the prompt payment of legitimate compensations to all residents with confirmed right to their lands when their lands are acquired compulsory. However, NLC has not developed rules to assess legitimate compensations. The Land Act 2012 provides that if a right to official or customary land with or without written certificate complies with	For the first half of Article 40 of the Constitution, there is no gap, if it is implemented (govt land is not subject to this clause). However, there is a gap for compensation for the informal occupants' structures and resettlement assistance. The provision of the Limitation of Actions Act does not have a gap since it relates to the recognized land rights.	Residents to be affected will be identified at an early stage to confirm their eligibility. This requires cooperation by KPA, local administrations, NLC, elders of the local communities.

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
(WB OP 4.12 Para 15)	the Constitution of Kenya, it will be recognized as a valid right to the land. The Act provides that the residents subject to compensations are those with the above-mentioned ownership to the land. Land Act 2012 also certifies pastoralists, those who use their land for a living, those with interests in their land, and those with request for their ownership of land. Section 40 (4) of the Constitution provides that there may be cases where compensations are paid in good faith to those occupying the land without legal certificate of land title. However, those who acquired their land illegally are not eligible. Section 7 of Limitation of Actions Act says an action may not be brought by any person to recover land after the end of twelve years from the date on which the right of action accrued to him or, if it first accrued to some person through whom he claims, to that person.		
For the relocation of residents who rely on their land for livelihood, it is desirable to prioritize relocation strategies based on the land. (WB OP 4.12 Para 11)	Sec 111. (1) of the Land Act 2012 requires the prompt payment of legitimate compensations to the all residents with confirmed right to their lands when their lands are acquired compulsory. The Act requires compensations in cash to the residents to be affected.	There is a gap. It is common to compensate in cash when Kenyan Government address the residents to be affected.	Potential impacts and the compensation policy will be explained in consultations with the residents, and their intentions are considered in the consultations with KPA on how to address them.

JICA Guidelines	Legislation in Kenya	Gaps between JICA Guidelines and Legislation in Kenya	Policy of the Proposed Project
Assistances shall be provided during the transition period (from relocation to the subsequent restoration of livelihood). (WB OP 4.12 Para 6)	Kenyan legislation requires the relocation and the restoration of livelihood, but it does not provide detailed measures to assist the restoration of livelihood.	Kenyan legislation does not provide details on how to assist the residents to be affected.	Residents to be affected will be provided with compensations and the assistances to restore their livelihood as required so that they do not have troubles against the maintenance or restoration of their livelihood.
Special attentions shall be taken to requests by the socially vulnerable people to be relocated (in particular, those below the poverty line or without land, elderly people, women, children, and minorities). (WB OP4.12 Para 8)	Section 107 of the Land Act 2012 does not require special attentions for the socially vulnerable people, except for its provision that spouses shall be also included as parties to the land or asset transaction, to protect their interests.	There is a gap. Kenyan legislation does not require consideration for the socially vulnerable people.	Socially vulnerable people to be affected will be identified for considerations of the appropriate compensations and assistance to them.
For a project to require an acquisition of land or involuntary resettlement of less than 200 people, the Abbreviated Resettlement Action Plan shall be prepared. (WB OP 4.12 Para 25)	Kenyan legislation does not have a provision for the Abbreviated Resettlement Action Plan.	Kenyan legislation does not have different guidance for the involuntary resettlement depending on the number of people to be relocated.	Less than 200 people need to be relocated, so the Abbreviated Resettlement Action Plan was prepared.

Source: ARAP(May 2022)

1-4-3-3 Scale and scope of the land acquisition and resettlement

(1) Potential impacts by the proposed projects

Cut-off dates were established as in Table 1-4-40 for the population census and the surveys on assets. For the prevention of illegal immigrations to the project site, the local youth will be employed for patrols at the project site to monitor illegal actions and report to the local administration as required. Illegal immigrants try to obtain or fence in lands or develop lands at the public lands or community lands, but there is no such public land or community land within the project area. Except for the lands for roads, only private lands will be acquired for the proposed project. Each landowner keeps close eyes on its own land, which is an invaluable asset for them. They will defend their land in cooperation with neighbors or community. If there occurs an illegal immigration, elders of the village will address it together with the local administration. There will be cooperation between the individuals, communities, youth watch groups, elders in the communities, and the local administration.

Table 1-4-40 Cut-off Dates

Cut-off Date	County	Sub-County
January 31, 2019	Mombasa	Dongo Kundu – DCC office
July 26, 2019	Kwale	Kombani Central Sub-Location
July 29, 2019	Kwale	Kombani Sub-Location
July 29, 2019	Kwale	Kombani Sub-Location
July 30, 2019	Kwale	Kiteje Sub-Location
July 31, 2019	Kwale	Matuga Sub-Location
August 28, 2019	Kwale	Ng'ombeni Sub-Location
September 5, 2019	Kwale	Shimkube Sub-Location

Source: ARAP (May 2022)

The entire project affects 261 lots, which is a total of 57.85ha of land. There will be impacts on the assets such as lands, structures, trees and crops, and the shops within the project site. Identified on the land to be acquired are 243 structures (not only houses but also hedges, walls and gates) and 5,567 trees. In total, there are 540 project-affected persons (PAPs), and 142 people in 61 households, who must be physically relocated. Their relocations together with their structures and harvesting of their crops will be required for this. In addition to these direct impacts, there would be indirect impacts on their livelihood. Table 1-4-41 summarizes the assets and households to be affected by each component of the proposed project.

Table 1-4-41 Lands, Assets and Households to be Affected by the Project

Project Component	County	# of land lot	Area to be acquired (ha)	# of structures	# of trees	# of households to be physically relocated	# of people to be physically relocated
Water Supply in Kwale	Kwale	118	2.09	87	445	1	3
Water reservoir	Mombasa	3	0.83	0	15	0	0
Construction of temporary road	Mombasa	49	11.5	15	147	8	13
Drainage Improvement	Mombasa	19	0.92	3	146	0	0
Land development	Mombasa	7	10	27	394	11	34
Land formation/Disposal Site	Mombasa	63	30.95	111	4372	41	92
Contractor site	Mombasa	2	1.56	0	48	0	0
Total		261	57.85	243	5567	61	142

Note: All affected assets in Kwale County are outside MSEZ area, while all affected assets in Mombasa County are inside MSEZ area.
Source: ARAP (May 2022)

Table 1-4-42 Breakdowns of the Number of the Households and People to be Affected

Project Component	County	To be physically relocated		To have their land acquired without relocation		To be economically relocated	
		# of households	# of people	# of households	# of people	# of households	# of people
Water Supply in Kwale	Kwale	1	3	118	158	10	10
Water reservoir	Mombasa	0	0	3	3	0	0
Construction of temporary road	Mombasa	8	13	44	44	0	0
Drainage Improvement	Mombasa	0	0	19	19	0	0
Land development	Mombasa	11	34	0	0	2	2
Land formation/Disposal Site	Mombasa	41	92	13	128	0	0
Contractor site	Mombasa	0	0	2	2	0	0
Total		61	142	199	354	12	12
# of households to be affected		271					
# of people to be affected		540					

Note: All affected PAHs/PAPs in Kwale County are outside MSEZ area, while all affected PAHs/PAPs in Mombasa County are inside MSEZ area.
Source: ARAP (May 2022)

(2) Protected forests

Surveys for the land acquisition suggest that there is no sacred tree subject to worship by the local community, or no protected area such as Kayas. Kaya Mkumbi at Kiteje is located along the boundary with a land for road for the installation of water pipes, but pipes will be installed at the opposite side of the road to this Kaya to avoid it.

(3) Public facilities

There will be no impact on public facilities such as schools and hospitals.

(4) Results of the socio-economic survey

For the socio-economic survey, households to own 61 lots out of the total of 257 property owners (therefore, 23.7% of entire PAH) to be affected by the proposed project were surveyed. Selected were 39 households from Kwale County in the outside of SEZ and 22 households from Mombasa County within SEZ. No indigenous people or ethnic minorities were recognized at the project site.

Followings describe the results of this socio-economic survey, and N stands for the total number of landowners selected for the survey.

1) Genders

As is common in the typical traditional patriarchy in the coastal area of Kenya, around 70% of the surveyed were men.

Table 1-4-43 Gender distributions of PAPs

	Men	Women
Gender (N=61)	68.9%	31.1%

Source: ARAP (May 2022)

2) Ages

Among the surveyed, 59.1% are more than 50 years old. Those more than 70 years old account for 16.4% of the surveyed, and they would be vulnerable to the impacts of relocation for the proposed project.

Table 1-4-44 Age distributions

	20-30	30-40	40-50	50-60	60-70	70-
Age category (N=61)	11.5%	13.1%	16.4%	27.9%	14.8%	16.4%

Source: ARAP (May 2022)

3) Marriage status

Among the surveyed, 83.6% are married, 16.4% are single or remained unmarred/single at the time of survey.

Table 1-4-45 Marriage status

	Married	Single/unmarried
Marriage status (N=61)	83.6%	16.4%

Source: ARAP (May 2022)

4) Religions

Among the surveyed, 3.3% are Christians and 96.7% are Muslims.

Table 1-4-46 Religions Status of PAPs

	Christian	Muslim
Religion (N=61)	3.3%	96.7%

Source: ARAP (May 2022)

5) Periods of the residence

The landowners surveyed have been living at the proposed project site for the following years. More than a half of them are at the site for more than 20 years.

Table 1-4-47 Period of the residence

	Less than 10 years	10-20 years	20-30 years	30-40 years	40-50 years	No less than 50 years
Periods of the residence (N=61)	16.4%	21.3%	16.4%	14.8%	6.6%	24.6%

Source: ARAP (May 2022)

6) Education levels

Majority (54.1%) of the surveyed completed only the primary education, and another 19.7% did not go through any formal education. It seems that PAPs do not have capacities to learn technical skills, and they would be completely relying on exploitation of both land and marine resources.

Table 1-4-48 Education levels

	No formal education	Primary education	Secondary education	Post-secondary education
Education level (N=61)	19.7%	54.1%	14.8%	11.5%

Source: ARAP (May 2022)

7) Occupations

Occupations of the surveyed are shown in Table 1-4-49 below. Among them, 83.6% are farmers and casual workers, and the rest is regular employees and businesspersons. Agricultural products and the main local merchandizes. Most of the casual workers and employees would be involved in farming, so the major livelihood at the proposed project site would be agriculture.

Table 1-4-49 Occupations of PAPs

	Farmers	Casual workers	Employees	Businesspersons
Occupation (N=61)	52.5%	31.1%	6.6%	9.8%

Source: ARAP (May 2022)

8) Monthly incomes and expenditures

Monthly incomes and expenditures of the surveyed are shown in Table 1-4-50. 77.4% of all respondents reported monthly household Incomes of Ksh 30,000 and below. At a household size of 5.7 in both Kwale and Mombasa counties, a monthly income of Ksh 20,000 translates to a daily per capita income of Ksh 116 implying that 26.4% of respondents subsist on the poverty line of 1.90 dollar per day and below. Considering those, 58% of respondents are categorized as poverty group.

For expenditure, 44.3% of respondents spend below Ksh 20,000 monthly out of which, 24.6% spend below 10,000 Ksh per month. Main expenditure items are school fees, food and Medicare in order of priority.

Table 1-4-50 Monthly incomes and expenditures

	Less than 10,000Ksh	10,000-20,000Ksh	20,000-30,000Ksh	30,000-40,000Ksh	40,000-50,000Ksh	More than 50,000Ksh
Monthly income (N=61)	32.1%	26.4 %	18.9%	3.8%	5.7 %	13.2%
Monthly expenditure (N=61)	24.6%	19.7%	14.8%	14.8%	6.6%	19.7%

Source: ARAP (May 2022)

9) Socially vulnerable people

People vulnerable to impacts of the proposed project, such as poor, elder or handicapped people, women and orphans, are the socially vulnerable people. Vulnerable PAPs were identified during the socio-economic survey. Vulnerability has been determined following three parameters:

1. physically challenged, on account of blindness, disability, dumbness and hearing impairment;
2. over aged (>80 years); and
3. orphanage children.

A total of 14 PAPs residing within MSEZ were identified as vulnerable. On the other hand, the PID project has no potential to significantly affect any of the vulnerable groups within the traverse and neither does it have potential to escalate vulnerability. Just and adequate compensation for all structures, trees and land displaced will greatly tone down potential impact on vulnerable groups.

Additionally, 6 female headed households were identified in Kwale County and 11 in Mombasa County. Though, the number in Kwale will be reduced due to review of RoW during D/D stage, planned assistance measures for female headed households include (1) preparing the livelihood restoration menu for each female headed household, (2) prioritizing

employment opportunity to a member of the households, and (3) monitoring their livelihood restoration periodically. If it is found that additional assistance is necessary through monitoring, any additional measure will be discussed and implemented.

1-4-3-4 Basic Policy for Land Acquisition and Resettlements for the Project

To mitigate impacts caused by project implementation, land, structures, cash crops and trees will be considered as subject of compensation and/or assistance programs. These will be conducted in compliance with diverse of legislation including the Constitution of Kenya, Section 40, Subsection 3; Section 7 of the Limitation of Actions Act Cap. 22 revised in 2012, and the Land Act 2012. Also in Kenya, valuation of property is examined by officially registered valuer, and compensation in money is common compared to provision of alternative land.

For this project, affected land and assets in Kwale County fall under private lands and public lands belong to different government institutions. Hence there will be land and assets compensation and land transfer for the public land in Kwale.

On the other hand, land ownership inside Mombasa SEZ is complicated due to the legal status and the traditionally recognized ownership. Legally, land has been leased to KPA for 99 years from 1979, and currently managed by KPA. However, there are residents living in the target area for many years long before 1979 and claiming ownership of the land. Although, Article 40(4) of the Constitution of Kenya says, “Provision may be made for compensation to be paid to occupants in good faith of land acquired under clause (3) who may not hold title to the land”, this clause is not applicable to public land as in the case of MSEZ. In September 2019, NLC conducted validation of land and structures ownership in SEZ area. The survey concluded that the land in SEZ area is a public land, and the title belongs to KPA. Hence, there will be no land compensation for affected lands in MSEZ except for non-land assets. However, NLC requested KPA to consider those with stake to land in the SEZ area by providing a resettlement site for them.

(1) Evaluation of lands

Lands will be evaluated for their reacquisition price, or 15% added to their market price for resettlement/relocation. At the wayleave in the outside of SEZ (Kwale County), it is allowed to turn cattle out to graze and to grow shallow-rooted crops.

(2) Evaluation of crops

A relocation notice will be provided 3 months before the land acquisition, and crops will not be compensated if they can be harvested before the land acquisition without impacts by the proposed project. However, if there is less than 3 months until relocation due to reasons of KPA or construction contractors, they will be compensated in cash in accordance with criteria of the Department of Agriculture. There will be cash compensations also to perennial crops.

(3) Evaluation of trees

Trees are evaluated in accordance with the procedures provided by Kenya Forest Services (KFS) based on the Forest Act 2005 and the Forest Regulations 2016. Specifically, their market prices (KSH / kg), growing periods (year), average life expectancies (year), seedling prices (KSH) are taken into account, and in the case of fruit trees, their annual average yields (kg/year) are taken into account. Compensation for trees will be calculated on the basis of their market prices and the guidance from the Forest Department of the County Government responsible for the area.

(4) Compensation for structures

Compensation for structure is based on their replacement cost. The replacement cost includes costs for the material, transportation and construction (including the payment to contractors, labor costs) to build a structure of the equivalent function and quality to the previous one after the relocation. The expenses for transactions and taxes should be included, whereas depreciation is excluded.

For assistances to relocations and the livelihood restorations, 15% of the structure cost will be added to their reacquisition cost.

(5) Compensation for businesses

For the business structures to be affected, a relocation notice will be provided 3 months before the land acquisition, and the monthly net earnings will be paid for the period of 3 months as a compensation for loss of business. The monthly net earnings will be calculated by NLC based on the taxes paid to Kenya Revenue Authority by the affected business.

(6) Compensation for graves

Graves and customary facilities within SEZ will be compensated for their relocations. Surveys identified 18 private graves at 6 lots within SEZ. In the outside of SEZ, the proposed project will be modified to avoid them, and no compensation will be provided.

(7) Compensation for socially vulnerable people

In accordance with KPA's Dongo Kundu Compensation Policy, which was reviewed and revised in 2021, one-time additional assistance of Ksh 10,000 will be provided to all identified socially vulnerable people falling into 3 groups mentioned in 1-4-3-3 9) above. Additionally, in kind supports will be provided to female headed households.

(8) Details of the compensations and assistances and the eligibilities for them

Contents of compensations, assistances and the eligibilities for them are summarized in Table 1-4-51 as Entitlement Matrixes of the proposed project.

Table 1-4-51 Entitlement Matrix for PAPs Inside and Outside the Project Area (as of 29 Nov. 2021)

No.	Type of Loss	Entitled Persons (Beneficiaries)	Entitlement (Compensation Package)	Responsible Agency
1	Loss of land a. Agricultural b. Residential c. Commercial d. Other types of land	Title holder both statutory and customary in Kwale county	a) Cash compensation at market price of the affected land b) 15% statutory disturbance allowance which includes land transaction costs c) Farming of crops and grazing of animals will continue along the wayleave land however landowners will not be allowed to grow crops or trees that are deep rooting	KPA & NLC
		Those without formal legal right in SEZ area	a) Legal ownership of 1/8 acre (0.125 acre) of a land plot in one of the resettlement sites (Residential Areas) within M-SEZ area, OR of legal ownership of 0.312 acre of a land plot in one of the resettlement sites (Enterprise Areas) within M-SEZ area. b) Provide resettlement sites with social amenities including 4 water kiosks (3 in Zone A and 1 Zone B); a marketplace which will be in Zone A; a dispensary located in Zone A, 1 acre of cemetery each in Zone A and B for both Christian and Muslim PAPs, and an access road to resettlement sites. c) Tax for transferring the land to the PAPs, registration fee, and other costs as the land transaction cost for obtaining the land tittle shall be incurred by the implementing agency. d) Transitional allowance at 15% of Ksh 450,000/acre as originally valued in RAP preparation in 2019 to cover the difference in value between the land lost and a land plot in the resettlement site	KPA & NLC
2	Structures and Buildings	Private residential/ business structures	a) Cash compensation at replacement cost without factoring depreciation. b) Right to salvage materials c) 15% statutory disturbance allowance for structure compensation d) 3-6 months' notice to vacate and reconstruct new structures	KPA & NLC
		Private movable assets such as Dish Racks	a) Since structures like racks, stands etc. can be relocated, there will be no compensation for them. b) 1 month' notice to remove	KPA
		Community Proprietary Resources e.g., Mosques, Churches	a) Cash compensation at replacement cost without factoring depreciation. b) Right to salvage materials c) 15% statutory disturbance allowance for structure compensation d) 3-6 months' notice to vacate and reconstruct new structures	KPA & NLC
3	Trees	Private owners	a) Cash compensation at market price for each tree based on compensation schedules prepared by the Kenya Forest Service (KFS) for various species depending on age and its future potential	KPA & NLC

No.	Type of Loss	Entitled Persons (Beneficiaries)	Entitlement (Compensation Package)	Responsible Agency
			b) Tree owners will be allowed to benefit/make use of the wood products from their trees after they have been cut down. c) 3 months' notice to vacate	
4	Loss of Annual Crops	Private owners	a) Annual crops will not be compensated since they can be harvested within the notice period of 3 months. b) Where KPA and the contractor are not able to wait for the 3 months, cash compensation at market price will be paid for affected annual crops based on compensation schedules prepared by the Agricultural Department. c) 3 months' notice to remove annual crops before construction commences	KPA & NLC
5	Loss of Perennial Crops	Private owners	a) Cash compensation at market price for affected perennial crops based on compensation schedules prepared by the Agricultural Department for various perennial crop types depending on age and its future potential b) 3 months' notice to remove perennial crops before construction commences	KPA & NLC
6	Graves/Graveyard and culturally sensitive areas (e.g., Kayas and Shrines)	Private owners in SEZ area	a) Community Kaya/Shrines will not be compensated or relocated but shall enjoy in-situ conservation to enable continuity of community cultural practices b) Cash compensation for relocation of graves including costs for performing cultural ceremonies, transportation and court charges in obtaining exhumation orders. c) 3 months' notice to relocate	KPA & NLC
		Private owners in Kwale county	a) KPA will endeavor not to disturb, relocate, or move any graves along the right of way by making appropriate adjustments. Therefore, there will be no compensation for graves since they will be avoided.	KPA & NLC
7	Special Assistance for Vulnerable	1. Physically challenged 2. Overage PAPs, >80yrs 3. Orphaned children	a) One-time cash assistance of Ksh 10,000.	KPA
8	Livelihood support and restoration	Business owners	a) Net monthly income from the lost business will be paid for a period of three months as a compensation for loss of business.	KPA & NLC
		a) Prioritized workable PAP b) All PAHs	a) Give priority to PAPs to work as construction worker during construction stage b) PAPs be given priority to work for the port as well as freeport under KPA's authority, and industrial park under SEZA's authority during project implementation and operation stage.	KPA in consultation with PAP's Committee

No.	Type of Loss	Entitled Persons (Beneficiaries)	Entitlement (Compensation Package)	Responsible Agency
		c) Applicable PAHs	c) Vocational training for 1 person/ household who needs to change jobs due to relocation and need a new skill. Courses and their duration include. 1. Preliminary level for 3 months: Plumbing, Mechanics, Drivers, Carpentry, Welders/Fabricators, Tailors, Masonry, Security, Painter. 2. Basic level course for 6 months: Computer Studies, Export Processing, Cargo Handling, Electrical Installation	KPA
		All PAHs	a) Money Management Training to avoid wasting compensation money including opening a bank account if not owned by the household head.	KPA

Source: ARAP (May 2022)

1-4-3-5 Resettlement Site

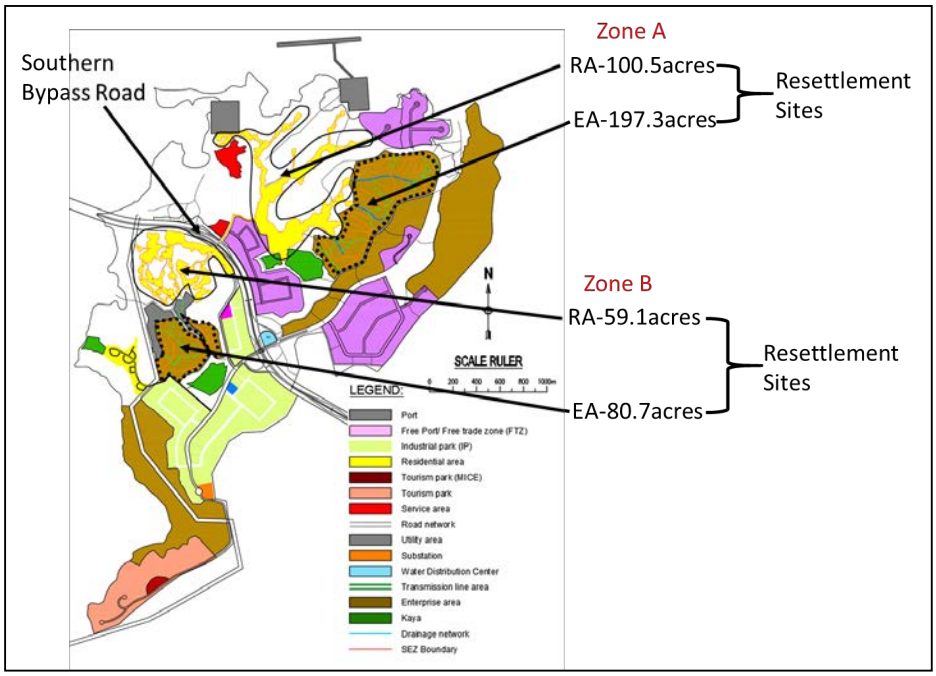
Although provision of resettlement site is not prescribed by relevant regulations, KPA decided to develop resettlement sites within SEZ for all the PAHs currently residing in SEZ area based on the request from NLC as mentioned in 1-4-3-4. The cost for the preparation of the resettlement sites will be incurred by KPA and not part of the grant project.

(1) Location of the resettlement sites

The Master Plan for MSEZ has provision for residential use within the SEZ. Two zones, Zone A and Zone B located in the Residential Areas (RA) were proposed for the resettlement of PAHs. As seen in Figure 1-4-15, Zone A is located at the north of the Mombasa Southern Bypass Road while Zone B is at the south of the Southern Bypass Road.

(2) Allocated plot size for each PAHs in SEZ area

It was proposed that all the affected land occupants be allocated 0.125 (1/8)-acre in the Residential Areas (RAs). However, due to limited availability of flat land in the RAs, resettlement sites were extended to Enterprise Areas (EAs). The topography of the EA is sloppier, and some earth formation works including cuts and fills, are proposed to make the area suitable for resettlement. Hence, though some PAPs prefer the hilly areas, based on common understanding, to balance advantages and disadvantages of the land plot options, 0.312 acre instead of 0.125 acre will be allocated to all individuals that their resettlement plots will fall into the EAs.

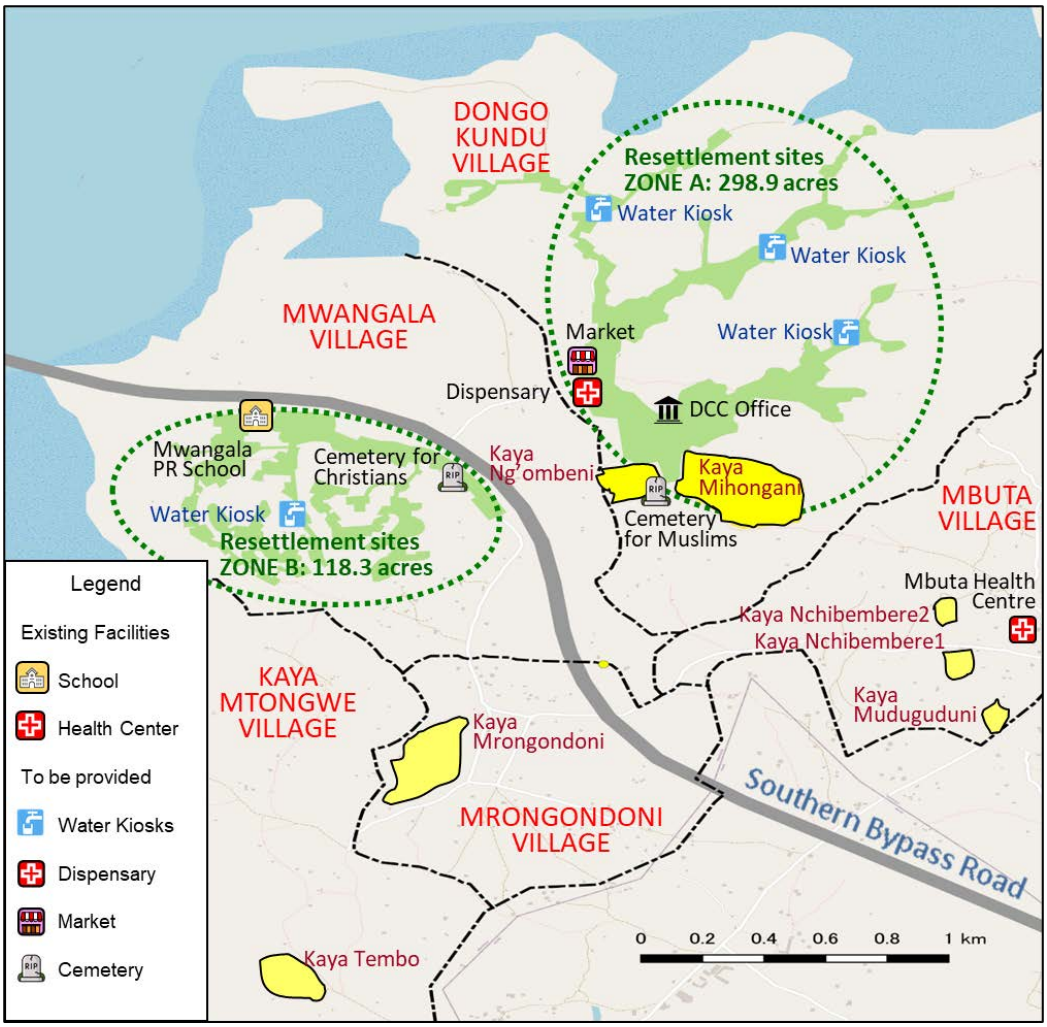


Source: JICA Study Team

Figure 1-4-15 Proposed Resettlement Sites

(3) Provision of social services in the resettlement sites

SEZ area being resided by PAPs, has some existing social services including community Kayas, a primary school located in Mwangala village, water facilities, electricity, and a health centre. The project plans to supplement the available services by providing an access road to the resettlement sites, four (4) water kiosks, a marketplace, a dispensary, and 2 acres for cemeteries for Muslim PAPs and Christian PAPs (1 acre each). Planning of the additional infrastructure complied with Kenyan standards in consultation with Department of Health and Department of Public Works of Mombasa County. The location of the existing and planned social services is as seen in the map below.



Source: JICA Study Team

Figure 1-4-16 Map of Resettlement sites and facilities to be provided

(4) Challenges and measures

KPA will need to survey and demarcate the resettlement sites before allocating plots to PAHs. Since the sites are currently occupied by some PAHs, the process of demarcating may induce

temporary relocation of the residents. To mitigate the impacts, the project plans to undertake the exercise in consultation with the existing residents and give a relocation priority to them so that they are relocated near to their original locations. On the other hand, the resettlement sites may need to undertake Environmental Impact Assessment (EIA) procedure as per the national legislation and obtain approval from NEMA before construction.

1-4-3-6 Livelihood restoration program

Livelihood restoration and support measures were designed by the project to ensure PAPs' livelihood is restored to pre-project levels or enhanced.

(1) Livelihood restoration measures

Under the livelihood restoration measures, PAHs will be eligible to compulsory money management training before compensation payment. A head of the household and his/her spouse from each affected household will be invited for this training. Additionally, the project will provide onetime cash compensation of Ksh 10,000 to all identified vulnerable people. Also, the project will provide an intensive vocational training program to physically relocated PAH from the MSEZ project area that need to change their current livelihood activities. These are mostly households located inside the MSEZ. Each affected household will identify one family member to participate in the program. KPA will contract the National Industrial Training Authority (NITA) to design and undertake trainings for the affected people. The table below presents the designed courses and course duration under the program.

Table 1-4-52 Criteria of the targeted trainee for vocation program

Proposed program	Targeted trainee	Education level required
Preliminary level	Affected household heads above 35 years with limited time (below 35 can also apply)	No specific education certificate required
Basic level	Affected youth (below 35 years)	Form IV, Form VI, or college level education certificate

Source: JICA Study Team

Table 1-4-53 Proposed courses and duration for the vocational training program

Proposed program	Course duration (in centre training)	Industrial attachment duration (compulsory)	Proposed courses	Trainers
Preliminary level	3 months	3 months	Plumbing, Mechanics, Drivers, Carpentry, Welders/Fabricators, Tailors, Masonry, Security, Painter	NITA
Basic level	6 months		Computer Studies, Export Processing, Cargo Handling, Electrical Installation	NITA

Source: JICA Study Team

(2) Livelihood support measures

For the livelihood support measures, PAPs especially those residing within MSEZ will be assisted to access both technical and non-technical jobs available at the project site during construction. To ensure this is implemented smoothly by the contractors, a clause may need to be incorporated in the contract document requiring the contractor to make these provisions available. Additionally, during operation phase, PAPs will be given priority to work for the port and free port under KPA authority and for industrial parks under Special Economic Zones Authority (SEZA). This program will be arranged by KPA in coordination with SEZA and PAPs committee.

(3) Livelihood support and restoration cost estimate

In total Ksh 4,855,200 will be required to implement livelihood restoration program. This cost will be under the responsibility of KPA.

Table 1-4-54 Cost estimate for livelihood restoration measures

Livelihood activities	Requirements	Cost (KSH)	No. of Beneficiaries	Budget estimate (KSH)
Preliminary level	Tuition fee/person/90days	20,200	Approx. 41	828,200
	Allowance/person/day	500		1,845,000
Basic level	Registration fee	700	Approx. 20	14,000
	Tuition fee/person/ 2 terms	37,000		740,000
	Caution money	1,000		20,000
	Meal and accommodation/person/2 terms	50,000		1,000,000
Money management Training (4days)	Tents & Chairs/day	5,000	-	20,000
	Print-out	20,000	-	20,000
	Stationary/person	200	540	108,000
	Water/person	100		54,000
	Transport allowance for Village Leaders/person/ day	500	6	12,000
	Transport allowance for PAPs Committee/person/ day	500	15	30,000
	Transport allowance for Chief and Assistant Chief/person/day	1,000	2	8,000
	Transport allowance for County administrators/ person/ day	2,000	2	16,000
Cash Assistance for Vulnerable PAPs	One time cash assistance	10,000	14	140,000
Total				4,855,200

Source: JICA Study Team

1-4-3-7 Grievance redress mechanism

For the smooth implementation of the proposed project, a fair and transparent accessible system for the grievance redress is required. Relevant agencies with the major responsibility of the executing agency will address all complaints prior to the commencement of construction to ensure the stability of affected residents and the local communities.

(1) Grievances

Affected residents may have various questions and complaints against the compensation for personal assets, uninterrupted public services and the relocation procedures, and they need to be addressed. In cooperation with the Project Affected People (PAP) Committee consisting of the representatives from each community, the traditional mediation by elders functioning in the area will be utilized to solve them.

(2) Grievance redress during the compensation stage

Grievances will be addressed as follows;

1) Project Affected Persons Liaison Committee: PLC

Each of the affected communities will be represented by its Project Affected Persons Liaison Committee of up to three residents and elders. This Committee will work with the affected residents and KPA for all aspects of the compensation and resettlement to address their grievances. It also plays a role to solve the basic conflicts among the community members.

2) Grievance redress through the public hearings by NLC

After NLC receives the Abbreviated Resettlement Action Plan from KPA, NLC will notify all of the lands to be acquired in the Official Gazette, and it will make inquiries to identify the official landowners. NLC will notify its open inquiries through local mass medias to hold public hearings to allow all stakeholders to express their opinions for adjustments. At these hearings, NLC will make its decision on grievances, and it will reject, continue its consideration, or accept them.

3) Grievance redress committee within KPA

In the capacity of Acquiring Agency, KPA will constitute an apex Grievance Redress Committee (the KPA-GRC) spearheaded by the Corporate Affairs Department and drawing membership from the Surveying and Environment Units respectively.

Within the KPA-GRC, a Senior Surveyor will be designated to liaise with the NLC on all matters relating to proposed acquisitions. The KPA GRC Team will keep an inventory of PAPs receiving payment and resolve those declining towards obtaining clear vacancy of target ROW.

The KPA-GRC will be a secretariat of the GRM, provide liaison with corporate entities namely KeNHA, KeRRA, KCG, CWWDA among others to solve the grievances, feedback the

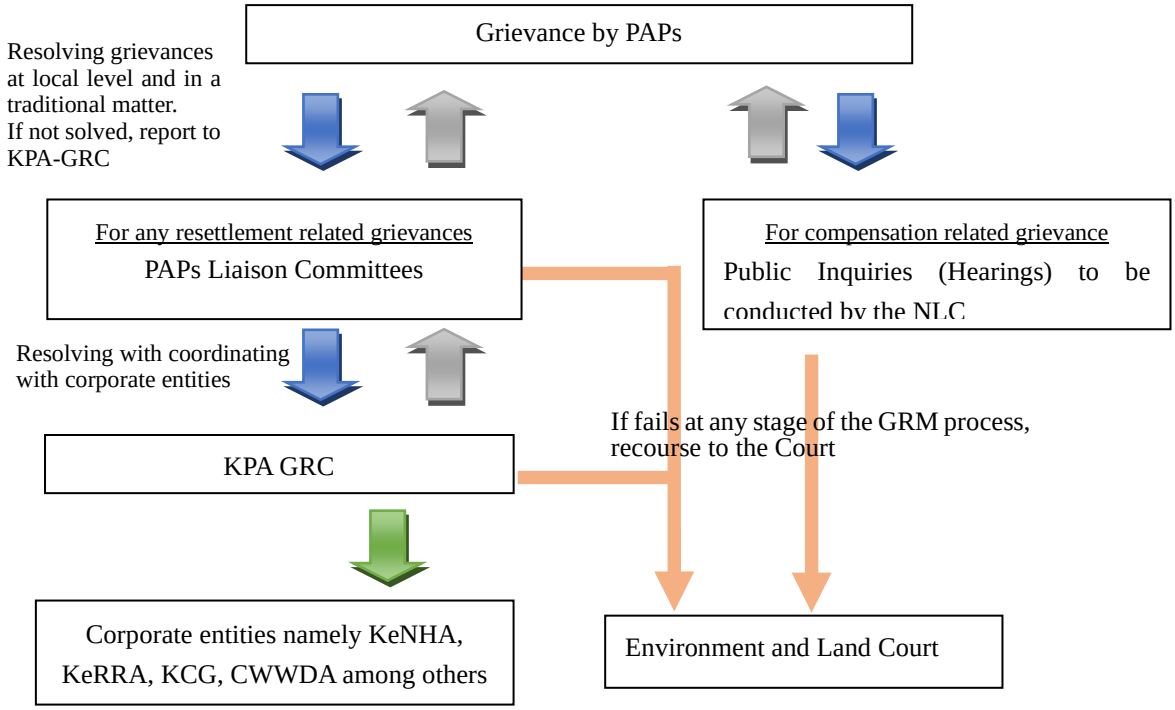
solution to the PAPs through PLC, keep records of any grievances related to involuntary resettlement, and monitor them until they are solved. Further, it will be the responsibility of KPA-GRC to provide liaison with corporate entities namely KeNHA, KeRRA, KCG, CWWDA among others, who control the bulk of ROW targeted by the PID.

4) Petition to the Environment and Land Court

If a grievance is not mediated at any stage of the grievance redress processes, then the Environment Court will make a final decision.

5) Grievance redress procedure

For grievances at the sub-location level, the relevant local government will attempt to solve them through dialogues and negotiations within 30 days after their submission as shown in Figure 1-4-17. If a grievance is not solved, its party may refer it to the competent court.



Source: ARAP(Apr.2020)

Figure 1-4-17 Grievance Redress Flow

(3) Grievance redress during the survey stage

Consultations were held with local residents to collect their concerns, requests and complaints. Their interests lied in the allocation of water and their stable access to safe water. They welcome the installation of water kiosks. The leading role of local communities in the identification of the locations of water kiosks and their maintenance nourished a sense of ownership by local residents, to contribute to their support to the proposed project.

The KPA's proposed GRM tends to use and supplement the existing mechanism which is familiar to the local residents. The proposed mechanism is assumed to be accessible by all the PAPs and to provide timely resolution of grievances as opposed to the court procedure. Furthermore, as mentioned, PAPs are not deprived from finding resolutions to the court whenever they desire to do so. Considering that using and supplementing local mechanisms are strongly advised by the international good practice as it provides choices for PAPs to seek resolution without additional struggles and costs, the proposed mechanism is evaluated as appropriate.

1-4-3-8 Implementation structure

(1) Outline of Implementing structure

Land acquisition will be implemented in accordance with the Land Act 2012, in concrete, KPA requests NLC for permission to acquire lands for its development project. KPA will be responsible for implementation of the ARAP for the PID, and the land acquisition and resettlement will be conducted by KPA together with the NLC which is fully responsible for the official land acquisition procedures. Additionally, corporate entities and County governments are also coordinated by KPA for the ARAP implementation as shown in Table 1-4-55.

(2) Land Acquisition procedure by KPA

In accordance with the Article 7 of the Land Act 2012, NLC published "NLC Guidelines on Compulsory Land Acquisition in Kenya", or its guidelines on the land acquisition in 2015. These guidelines will be applied to the land acquisition for the proposed project. The procedure required by NLC is as follows;

1) The acquiring body shall obtain a prior approval from the competent cabinet office.
2) A list of land parcels submitted by the acquiring body with details on their cadastral map, their parcel numbers, their total area and the area to be affected by a project in each parcel, shall be confirmed.
3) The reference number and the registered owner of individual parcels shall be confirmed.
4) Assistances shall be provided, as required, to the official surveys to be conducted by the acquiring body in the land parcels to be affected.
5) It shall be confirmed that the Environmental Impact Assessment (EIA) report has been approved.
6) It shall be confirmed that Resettlement Action Plan is in place.
7) In accordance with the provisions of the Constitution, funds for the prompt compensations shall be secured.
8) All applicants shall conduct the site reconnaissance at individual sites to be affected for their detailed assessment together with NLC.

9) The acquiring body conducts the final surveys to confirm the ownership of lands by the Central Government or County Government.

(3) Implementation structure

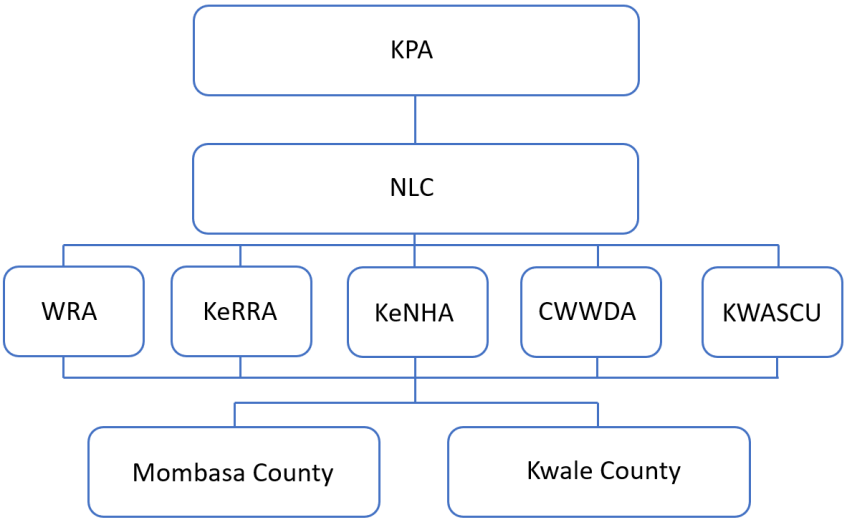
KPA and NLC will jointly conduct the land acquisition and resettlement. Official bodies and organizations to be involved in the land acquisition for the proposed project are listed in Table 1-4-55, and a conceptual diagram of the implementation structure for the land acquisition is provided in Figure 1-4-18. For the joint implementation of land acquisitions by KPA and NLC, a team of experts for the land acquisition will be established within KPA, and this team will implement the land acquisition practically.

Table 1-4-55 Relevant Organizations and Bodies with Their Roles

Organization/ Body	Role	Relevance to the Project	Relevant legislation
Kenya Ports Authority (KPA)	Development of ports in Kenya and their maintenance & operation	Manage lands for Mombasa SEZ as the project proponent	KPA Act (Cap 391)
Mombasa & Kwale County Governments (MCG / KCG)	Responsible for the development project planning and the land use planning	Involved in the infrastructure planning and layout, including the land acquisition. KCG manages the roads to install water pipelines and distribution pipes.	County Government Act of 2012/ Cap 286
County Commissioners	Coordination with the Central Government at County level	Land issues will be addressed in consultations with County Commissioners	Schedule Six (Sect. 17) of the National Constitution
Kenya National Highway Authority / Kenya Rural Roads Authority (KeNHA / KeRRA)	Road development and maintenance under the jurisdictions in Kenya.	KeNHA and KeRRA manage the land of A7 Highway for water pipelines and distribution pipes according to their responsibilities.	Kenya Roads Act 2007
National Land Commission (NLC)	NLC acquires lands in accordance with the legislation, and manages all unregistered lands.	NLC is a leading organization in the land acquisition for projects.	National Land Commission Act 2012/ Lands Act 2012
National Environment Management Authority (NEMA)	Responsible for the environmental administration.	NEMA functions to ensure the environmentally and socially sustainable development, and issues environmental licenses. The Project needs to comply with the environmental standards established by NEMA.	EMCA 1999 & EMC(A) A 2015
Water Resources Authority (WRA) Coast Water Works Development Agency (CWWDA) Kwale Water and	A legal manager of the water resources in Kenya	Water for SEZ will be obtained from the groundwater in Tiwi.	Water Act 2002
	Responsible for the large-scale water supply in the coastal	CWWDA will establish a booster pump station for the industrial use in its facility in Tiwi.	CWWDA will establish a booster pump station for

Organization/ Body	Role	Relevance to the Project	Relevant legislation
Sewerage Company	area.		the industrial use in its facility in Tiwi.
	Responsible for the water supply to the demand centre.	Its water pipes are within the Project site.	Its water pipes are within the Project site.
Coast Development Agency (CDA)	Coordination between all development plans in the coastal area	CDA implements the physical planning of its area.	CDA Act Cap 446
Kenya Forest Service (KFS)	Management of all vegetation, including Kayas and sacred trees not notified by the national official gazette.	KFS monitors the removal of vegetation and provides advices for its mitigation.	Forests Act 2005
Kenya Electricity Transmission Company (KETRACO)	Construction and operation transmission lines.	The Project goes through a part of the land for transmission lines.	Companies Act Cap 486

Source: ARAP (May 2022)



KPA: Kenya Port Authority, NLC: National Land Commission, WRA: Water Resources Authority, KeRRA: Kenya Rural Roads Authority, KeNHA: Kenya National Highway Authority, CWWDA: Coast Water Works Development Agency,
KWASCU: Kenya Water and Sewerage Company Limited
Source: ARAP (May 2022)

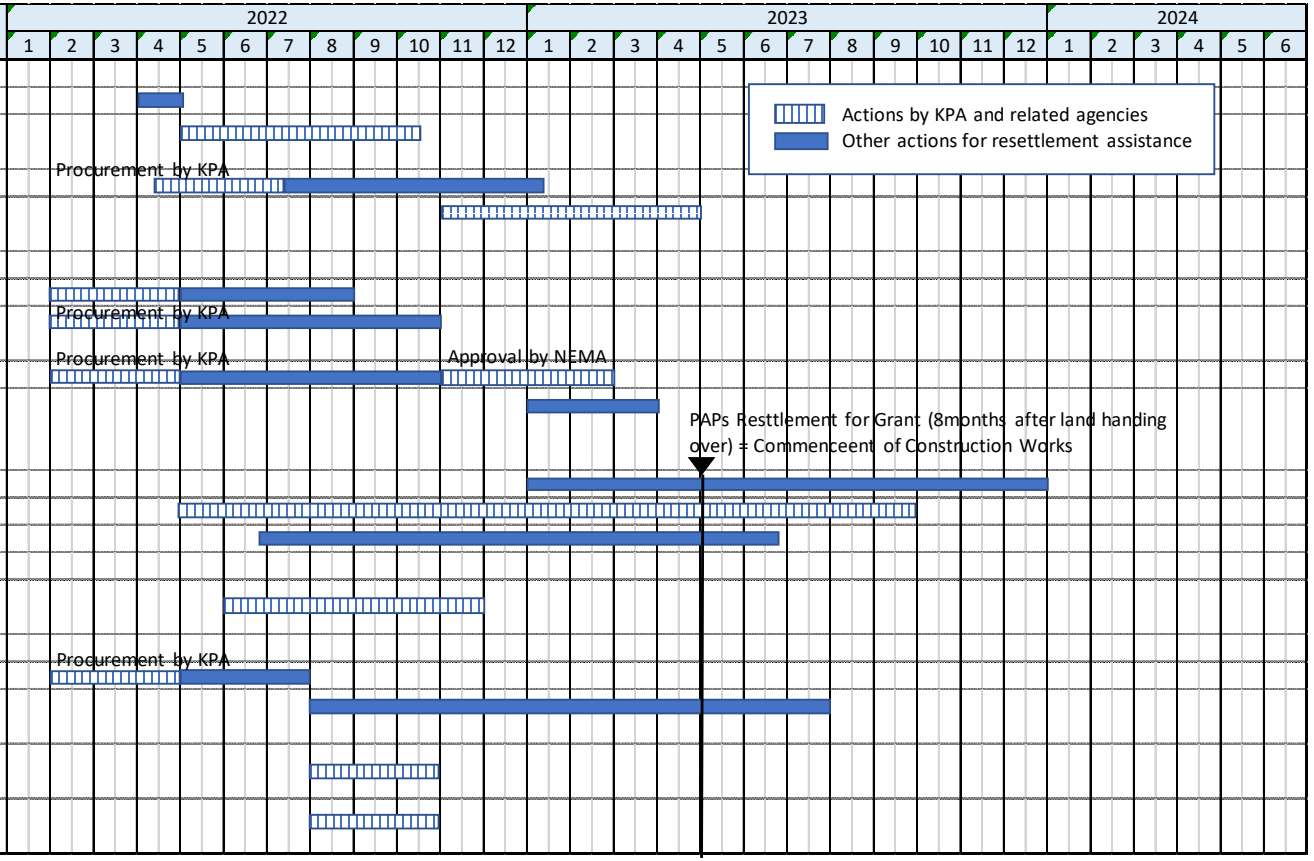
Figure 1-4-18 Implementation Structure

1-4-3-9 Implementation schedule

Implementation schedule is shown in Table 1-4-56 for the resettlement and some components of the project.

Table 1-4-56 Draft Implementation Schedule

Task		2022												2023												2024					
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
[General]																															
1-1	PAPs agreement on the Compensation Policy																														
1-2	Budgeting for the Compensation >after task 1-1																														
1-3	Detailed Resettlement Plan																														
1-4	PAPs agreement on DRP > after task 1-3																														
[Resettlement Supports]																															
2-1	Topographic Survey																														
2-2	Design works >finalization after task 2-1																														
2-3	EIA																														
2-4	Contractor Procurement ＞After task 2-2 and PAPs general agreement through task 1-4																														
2-5	Construction																														
2-6	Land Handing Over (resettle at all time)																														
2-7	Monitoring on the Resettlement Progress																														
[Financial Compensation]																															
3-1	NLC Disbursment of Compensation >after task 1-2																														
[Other Supports]																															
4-1	Preparation of the Livelihood Restoration Program																														
4-2	Implementation of Livelihood Restoration Program >after task 4-1																														
4-3	Disbursment of One-Time Cash Assistance >after task 1-4																														
4-4	Disbursment of Transitional Allowance >after task 1-4																														



Source: JICA Study Team

1-4-3-10 Costs and financial resources

(1) Breakdowns of the budget

A total of Ksh 730,724,396 will be required to compensate for all non-land developments in Kwale and Mombasa counties, and preparation of resettlement sites in SEZ area. Additionally, Ksh 10,857,830 will be required to compensate for acquisition of private lands and resettlement in Kwale County as presented in Table 1-4-57.

Table 1-4-57 Breakdowns of the Budget for Compensations

Compensated Items	Total Count (PID)	PID-Grant Project (540 PAPs both physically and non-physically displaced) in Ksh	Cost for acquisition of private land in Kwale County (118 parcels) in Ksh
Land acquisition in Kwale County	2.09 ha	-	10,340,790
Structures (@full replacement cost)	243	43,156,853.50	-
a. Permanent	34	27,081,395.09	-
b. Semi-permanent	37	3,373,045.00	-
c. Temporary	69	2,734,666.00	-
d. Others	103	9,967,747.42	-
Trees (@ market price, based on KFS rates)	5,567	28,085,000	-
Crops and pastures (@ market price, based on County Agriculture Department).		-	-
Loss of Business/Income from Fruit Trees	130	10,398,120	-
Relocation Assistance/Disturbance Allowance (15% of structure, trees and crops cost as in the law).		10,686,278	-
One time Cash Assistance of 10,000 for Vulnerable PAPs	14	152,500	-
Compensation for BMUs		-	-
Money Management Training (For all land and asset owners-540 for PID). 60 PAPs/meeting, 3 meetings/day for 3 days, 2hrs/meeting. *1	540	246,500	-
Vocational Training for 1 Person/Vulnerable Household (61 for PID-physically displaced households). 1a. Preliminary Level (short term training for 3 months) by National Industrial Training Authority (NITA) for 41 people *2, 1b. Allowance of 500/person/day. No accommodation required. *3, 2. Basic Level (long term training for 6	61	4,447,200	-

months for those who basic education background) by NITA for 20 people *4			
Transitional Assistance to Fill the Gap in Land Size	142.99 acres	9,651,825	-
Taxes (4% of land value)	142.99 acres	2,573,820	-
Site preparation for relocation assistance * For entire resettlement sites.		537,316,600	-
a. Land Grading		232,280,000	-
b. Road Gravel Pavement		223,277,400	-
c. Public Facilities		81,759,200	-
Topographic boundary survey, incl. concrete peg * For entire resettlement sites.	450 acre	18,213,300	-
Consultant for the site preparation * For entire resettlement sites.	lump sum	21,000,000	-
EIA for the resettlement site * For entire resettlement sites.	lump sum	10,000,000	-
Sub-total		695,927,997	10,340,790
Contingency (5%)		34,796,400	517,040
	Total	**730,724,396**	**10,857,830**
	Grand Total		**741,582,226**

Source: ARAP (May 2022)

1-4-3-11 Monitoring system by the executing agency, and the monitoring form

(1) Objectives of the monitoring

Monitoring will be conducted to detect the occurrence of unforeseeable events, to monitor the effectiveness of mitigation measures, and to take appropriate actions based on the actual conditions. Specifically, progresses of the land acquisition, payment of compensation and additional assistances, physical relocation and livelihood restoration, and the frequency and records of public consultations, the numbers of filed and solved grievances and their records, and whether the life of PAPs is maintained or improved after their resettlement will be assessed. It is also aimed to demonstrate to the third parties that the environmental and social considerations are sufficiently implemented.

(2) Monitoring at the implementation stage

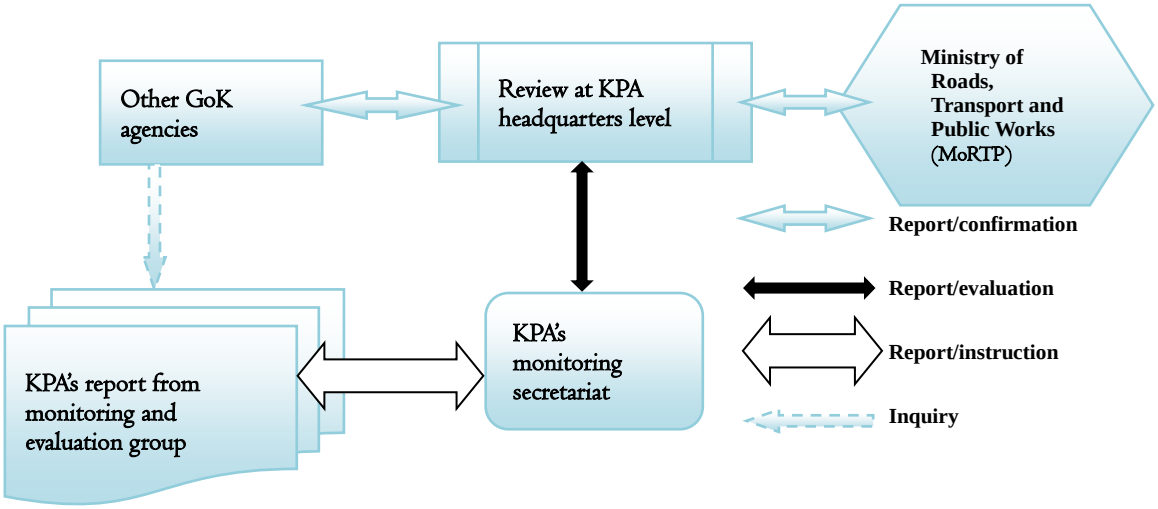
There are many stakeholders in the Mombasa SEZ project. It is necessary to prepare a database to allow their easy access for data in monitoring forms, the contents of grievances, and the materials for the land acquisition.

Through the monitoring, the project activities will be tracked for assessment of their achievements, and the project can be modified as required for its better performance. In the monitoring, data are collected and analyzed for the project activities, to properly implement and manage the project.

(3) Internal monitoring

Regular monitoring and reports of the land acquisition and reporting are the responsibility of KPA. KPA will establish its monitoring station (KPA Monitoring Office) in the Dongo Kundu area, and it will have an M & E staff (KPA Monitoring and Evaluation Group) to submit a status report regularly (quarterly). He will prepare such report for his submission and report to KPA Headquarters. Quarterly/annually or as required, KPA will assess whether all affected people are properly compensated and assisted in accordance with the requirements.

KPA will share information with the Central Government and other stakeholders during its internal verification, and it will provide its review and advice to them through the feedback mechanism. Figure 1-4-19 shows how monitoring results will be fed back to KPA. Internal monitoring will be conducted routinely, and its report will be submitted quarterly. For detailed records of the daily and monthly monitoring, specific forms shall be prepared for them.



Source: JICA Study Team

Figure 1-4-19 Proposed Structure for Internal Monitoring

(4) External monitoring and evaluation

External monitoring is for assessment of the internal monitoring, and it will be conducted regularly or for every milestone of the land acquisition and resettlement (ex., upon payments and the completion of the resettlement, and at one year and two years after the resettlement).

It is desirable for a qualified organization, such as research or consulting organization, university or NGO for the development, to conduct external monitoring. Followings shall be conducted;

1) Verification of results of the internal monitoring and the provision of advice as required.
2) Confirmation of the proper proceeding of the land acquisition and resettlement as planned.

3) Identification of any unpredicted impact, and confirmation of the measure against it.
4) Assessment of the efficiency, effectiveness, implication and sustainability of the above to learn a lesson for future projects.

1-4-3-12 Consultations with residents

Two series of consultation meetings were held with local residents. The first series of consultation meeting were to provide the outline of the proposed project, and to explain about the population census and the socio-economic survey together with their dates and to request cooperation to these. The second series of consultation meetings were to report the results of the socio-economic survey, and to explain the potential impacts of the proposed project, the policy for compensations and assistances and the measures to restore the livelihood.

The first series of consultation meetings were held from July to September 2019 at 7 location in total also for EIA with participations by a total 542 people. Minutes of meetings for the first and second series of consultation meetings with residents are provided in the Section 1-4-2. Local residents were interested in the clean and safe water. Locations of the water kiosks and their management and maintenance would be considered through consultations mainly with the local communities, and the explanation of this has led to wide support to the proposed project. Also explained were the small-scale land acquisition and resettlement for the proposed project, which could be minimized or avoided through the siting of the facilities and pipeline routes, and the compensations as required. These have contributed to the peaceful proceeding of every consultation meeting. The consultation meetings were conducted in Swahili for better understanding by the residents at the local facilities they were familiar with.

Additional consultation meetings with all the affected people within SEZ were conducted between 12-21 April 2022 for the disclosure of the Compensation Policy developed by KPA to cater the issue of land, additional assistances for vulnerable people and livelihood restoration. The policy was well accepted by the affected people, and requests for equitable distribution of job opportunities were made. KPA ensured PAPs that all matter of job opportunities will be handled in consultation with PAPs committee.

Land within SEZ was officially designated as a land for the development of SEZ by the Ministry of Industry in July 2019, and this was notified in the Official Gazette. From now on, KPA will proceed with its land acquisition through consultations with relevant bodies.

1-5 Considerations in Implementing a Grant Aid Project in Kenya

Considerations in implementing a Grant Aid Project in Kenya are provided below.

(1) Items to be undertaken by Kenyan Executing Agency

Prior to launching the construction of the Grant Aid Project, KPA is responsible for taking necessary actions to respond to conditions of Environmental Impact Assessment (EIA) license and for ensuring a budget for Abbreviated Resettlement Action Plan (ARAP). In executing compensation procedures in regard to the environment and social considerations, KPA is required to take timely actions according to the work procedures specified in Minutes of Discussion, so that construction works can be proceeded according to the schedule. ARAP contains land acquisition, resettlement of residents affected by the project, compensation for existing buildings, trees, etc. A special attention should be paid for the implementation progress of ARAP in relation to the construction of water supply facilities in Kwale County located outside of SEZ area.

(2) Construction Permits

For all the project components to be constructed under the Grant Aid Project, KPA is responsible for obtaining the construction permits from the concerned authorities, before public notification of the tender, so as to avoid delay in the project implementation process. The said permits include obtaining water right, construction permit on water supply pipelines in the public lands, construction permits on a booster pumping station in the premises of the TIWI office of Coast Water Works Development Agency (CWWDA), agreement on water supply with Kwale County, agreement on connection of a new connection pipe with the existing water distribution pipe of Mombasa County, application for power incoming for the intake pumps, booster pumps and water reservoir, but not limited to.

(3) Construction of Main Distribution Pipe

Development of Mombasa SEZ will be undertaken through both the Grant Aid Project and the Japanese Official Development Assistance (ODA) Loan Project. Main distribution pipe for water supply will be constructed along the Port Access Road in SEZ as a road component of the ODA Loan Project.

(4) Construction of Temporary Access Road for D1 Land Development

In order to secure the access to D1 land development site from the proposed soil disposal site (FTZ-B area), construction of a new temporary road is determined. By using this road, D1 land development work can be proceeded without intervention from/to the construction works of Port Access Road under the Loan Project.

(5) Procurement of Cargo Handling Equipment

It is determined to procure cargo handling equipment of reach stacker (4 nos.), forklift (10 ton: 3 nos. and 5 ton: 3nos.) and terminal tractor (14 nos.) & container chassis (14 nos.). The

procurement of equipment will be implemented after the successful completion of the bidding process of the civil/building components.

(6) Tax Exemption

Based on the Exchange Note (E/N) for the Grant Aid Project between the two countries, it is ensured Japanese nationals and Japanese companies which are involved in implementation of the project are exempted from taxes imposed in Kenya including value added tax, custom duties, other taxes and levies, for their activities for procurements of materials and equipment and for performing tasks under the work contracts authorized by Kenyan Government. A consistent understanding of concerned authorities of Kenyan Government on the tax exemption matters are required for the smooth implementation of the project.

Chapter 2 CONTENTS OF THE PROJECT

2-1 Basic Concept of the Project

2-1-1 Background

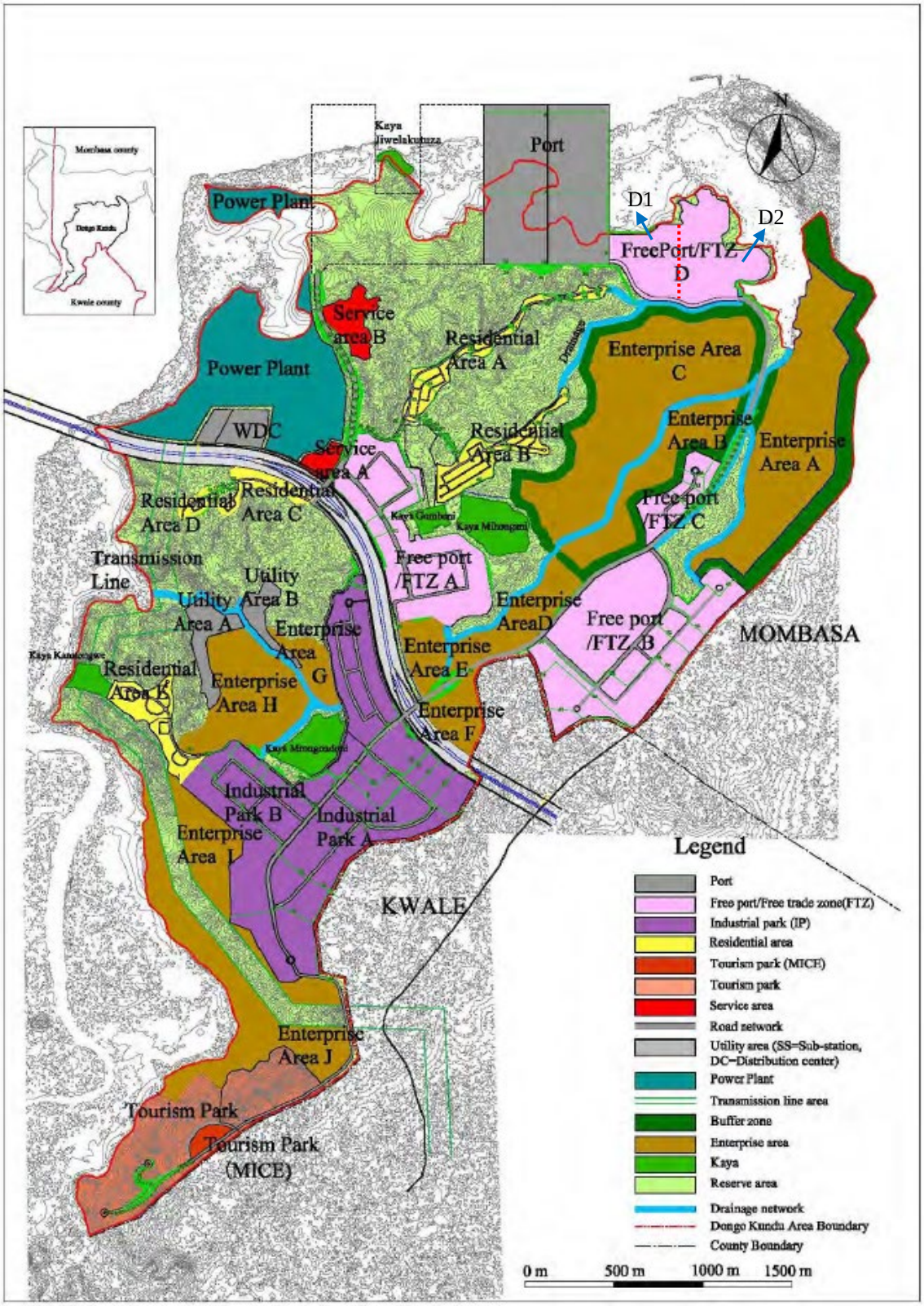
JICA conducted Mombasa SEZ M/P (2015/9) from January 2014 till September 2015 to realize Mombasa SEZ regarded as the high priority project in the national development program "Vision 2030." In addition, to accelerate the realization by utilizing Japanese ODA Loan Scheme, JICA conducted Mombasa SEZ D/M (2019/6) from December 2016 till June 2019.

Mombasa SEZ was located at Dongo Kundu district and had approximately 12 km^2 area. The development concept for SEZ mentioned that to create the main base for commodity distribution, trade and manufacturing industry, the below function and facility would be developed; FP, Free Trade Zone (FTZ), industrial area, electrical substation, residential area and tourism function (including MICE). In addition, to invite foreign direct investment (FDI) to Mombasa SEZ, basic infrastructure (electricity, water supply system, wastewater treatment system and telecommunication) which matched with the international standard would be developed.

2-1-2 Mombasa SEZ M/P (2015/9)

In Mombasa SEZ M/P (2015/9), land use and infrastructure development were planned. With respect to the land use plan, Mombasa SEZ area was divided into 17 districts as shown in Figure 2-1-1 based on the function and the estimated information about development area, labor and residential population and development schedule was proposed. It is developed by 3 phases as year of 2018, 2025 and 2030 as shown in Table 2-1-1.

Regarding the infrastructure development plan, Mombasa SEZ area was divided into the priority development area (Category A area) and the other area (Category B area) which are defined below:



Source: Mombasa SEZ M/P (2015/9)

Figure 2-1-1 Land Use Map in Mombasa SEZ

Table 2-1-1 Land Use Plan

Land Use Zone	Development (ha)			
	Phase 1 (Y2018)	Phase 2 (Y 2025)	Phase 3 (Y2030)	Total
Port	0.0	34.2	32.3	66.5
FP/FTZ A/B/C	67.3	9.0	45.3	121.6
FP/FTZ D	0.0	10.2	23.0	33.2
Industrial park	34.4	65.6	21.6	121.6
MICE area	0.0	2.2	0.0	2.2
Tourism parks	0.0	15.2	34.2	49.4
Service area	2.8	6.9	0.0	9.7
Power plant	64.0	0.0	0.0	64.0
Transmission line	56.0	0.0	0.0	56.0
Enterprise area (A/B/C)	85.4	113.1	0.0	198.5
Enterprise area (D~J)	0.0	69.0	60.3	129.3
Residential area E	0.0	4.3	7.0	11.3
Residential area A/B/C/D	29.2	0.0	0.0	29.2
Mombasa southern bypass road	34.0	0.0	0.0	34.0
Internal arterial road/1	13.0	6.0	3.0	22.0
Utility (SS, DC, utility area)	18.0	0.0	0.0	18.0
Main drainage network area	18.6	1.7	5.6	25.9
Total	422.7	337.4	232.3	992.4

Source: Mombasa SEZ M/P (2015/9)

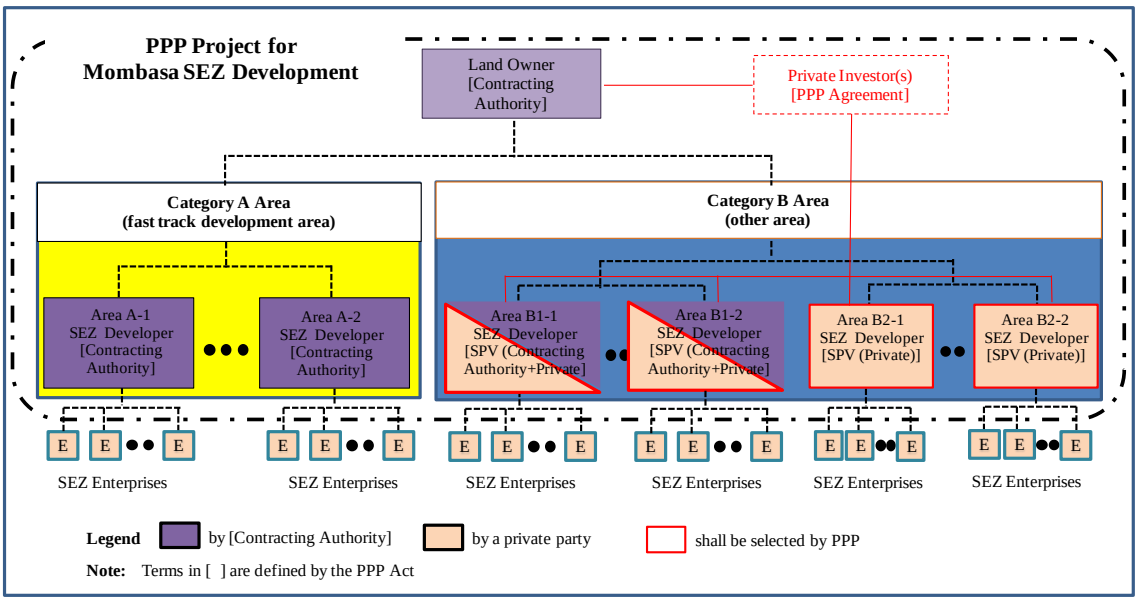
Category A areas; Priority development area by the Government of Kenya to initiate the SEZ project. The area will include a selection of Industrial Parks and FTZ, as well as public infrastructure such as roads, power and water supplies, sewage facilities that will contribute to entire SEZ. The draft SEZ Act requires that the SEZ developer be a company established in Kenya. Therefore, the supervising ministry with land ownership should set up a Contracting Corporation. It is envisioned that the Contracting Corporation would obtain land ownership and develop Category A areas independently as an SEZ Developer.

Category B areas: The objective is to attract labor-intensive and other industries. Two types of public-private partnership development methods are possible. One is for the Contracting Corporation, established in accordance with the same process as Category A areas, but to establish an SPV with a private company and to take on the role of SEZ developer through the SPV together with the private sector. In this case, the Contracting Corporation would provide the land, and the private company would be expected to make a project contribution. The second method is for the private company to lease land from the Contracting Corporation and develop leased land as an SEZ developer.

In terms of infrastructure development in the SEZ, land development, road network, transportation, port, electric supply, water supply, sewerage, rainwater drainage, greywater drainage, waste management and telecommunication were studied. To start the business in the SEZ in the target year 2018, it was especially pointed that the enforcement of the SEZ law is the critical factor to achieve the target.

The executing agency for the Mombasa SEZ was not clearly described following the Kenyan instruction and the selection was continued by the Government of Kenya based on the proposed organization structure. At the moment, the Special Economic Zone Authority (SEZA) and the KPA were the major candidates.

In Mombasa SEZ M/P (2015/9), Figure 2-1-2 had been proposed as the organization structure, but there was no agreement about it when the Preparatory Survey started. Finally, the KPA became the executing agency as explained in Chapter 1.



Note
Category A Area is the priority area that accelerates the project to meet the development time frame set by the Government. The Contracting Authority suggest to develop the Category A Area as a fast track area to facilitate participation of private parties into the SEZ under PPP agreements. The Category A Area consists of following components:

1. Public infrastructure development that requires injection of public funds including major roads, drainage system, substation, water terminal and resettlement areas, and
2. Model area development that leads private investment to the SEZ.

Source: Mombasa SEZ M/P (2015/9)

Figure 2-1-2 Implementation Organization Structure planned in M/P

2-1-3 Mombasa SEZ D/M (2019/6)

Following Mombasa SEZ M/P (2015/9), Mombasa SEZ D/M (2019/6) was conducted to earlier embody Mombasa SEZ. In Mombasa SEZ D/M (2019/6) focusing on the necessary infrastructure for Phase 1 mentioned in Section 2-1-2, the development plans were revised and the survey about the SEZ law was conducted. Concretely, to achieve the goal, the natural condition survey was conducted about the below: flow regime, water level, turbidity, sediment, sea route, soil condition and topography.

It should be pointed out that the development area by Phase 1 was slightly amended according to the following:

- Adjustment of the location of Mombasa Southern Bypass Road
- Cancelation of LNG power plant project
- Basic design for port and SEZ main road
- Basic design for transmission line
- Basic design for substation and relocation of water distribution center
- Basic design for main transmission pipeline

In addition, in the study, eight wells were developed to intake water for SEZ and three of the eight wells were ensured to be successful for the quality of industrial water and quantity of water demand of stage 2 in phase1 of SEZ. These wells would be used as the water source for SEZ until the Mwache dam was constructed.

2-1-4 Preparatory Survey for the Project for Infrastructure Development in Mombasa SEZ

2-1-4-1 Initial Scope of Works

Preparatory Survey for the Project for Infrastructure Development in Mombasa SEZ (hereinafter, the Survey) was implemented for the purpose of preparing for the Grant Aid Project. At the beginning, the below scope of works was planned.

- To construct the four well facilities
- To lay the distribution and transmission pips (Transmission Pipe, approximately 20km and Distribution, approximately 10 km), construct two elevated tanks
- To construct drainage (approximately 6 km)
- To develop D1 Area (approximately 10.3 ha)

Because the Survey started before Mombasa SEZ D/M (2019/6) was finished, these survey items were temporary, and the executing agency were planned to be both Ministry of Industry, Trade and Cooperatives and Ministry of Water and Sanitation. However, it is desirable that one organization shall carry out the implementation and operation of the Project, and the KPA became the executing agency in terms for the condition of the Project. During the work under the Survey, the scope of works was amended and a part of them was reflected in the result of Mombasa SEZ D/M (2019/6). The explanation of the amendment of the scope of works is described in Section 2-2.

2-1-4-2 Work Items of the Project

Work Item of the Project was shown in Table 2-1-2. In order to clarify the contents of works, it is summarized as the category of infrastructure. The infrastructure is composed of four components

categorized into civil/building works as water supply, drainage, land development and road, and those facilities and location are shown in Table 2-1-2 and Location Map as described at the beginning of this report. In addition, procurement of cargo handling equipment is considered.

Table 2-1-2 Work Items in the Project

Component	Items	
Water Supply	1. Intake Facilities (3 wells)	
	1) Submersible Pump	Submersible Pump:
		- Well No.2; q=0.417m^3/min, H=74m
		- Well No.3; q=0.625m^3/min, H=77m
		- Well No.5; q=0.556m^3/min, H=61m
		instrument: 3sets
	2) Pump pipe	Steel Pipe, Water Meter, Pressure Meter, Valves; 3sets
	3) Accessories	well protection, gantry crane, fence, gate: 3sets
	4) Management House	Concrete (incl. PE tank and water kiosk): 3sets
	2. Transmission Pipe (well - BPS)	
	1) Pipe Installation	HDPE Pipe (OD160mm): L=9.3km
	2) Accessories	Thrust block, road crossing, river crossing, valve chamber, line marker and etc.: 1set
	3. Booster Pumping Station	
	1) Pump Admi. Building	RC (8m x 5m x 3m）: 1set
	2) Underground Reservoir	RC (8.5m x 5.5m x 3.6m): 1nos.
	3) Transmission Pump	q=0.868m^3/min, h=86m：3nos. (incl. standby)
	4) Distribution Pump	q=0.146m^3/min, h=147m：2nos. (incl. standby)
	5) Pipe Installation	steel pipe, water meter, valves: 1set
	6) Instrument	water gauge, control panel and etc.: 1set
	7) Generator	100kVA (incl. fuel tank): 1set
	8) Generator	50kVA (incl. fuel tank): 1set
	9) Chlorine Injector	1set
	10) Accessories	Replacement of fence and gate: 1set
	4. Main Transmission Pipe (BPS - WSR)	
	1) Pipe Installation	HDPE Pipe (OD280mm): L=16.1km
	2) Accessories	Thrust block, road crossing, valve chamber, line marker and etc.: 1set
	5. Distribution Pipe (Kwale WSP)	
	1) Pipe installation	HDPE Pipe (OD90mm): L=14.4km
	2) Accessories	Thrust block, road crossing, valve chamber, line marker and etc.: 1set
	3) Water Kiosk	RC: 7nos.
	6. Mombasa SEZ Reservoir	
	1) Earthwork	11,250m^2
	2) Water supply Admi. Building	RC (incl. water quality labo.) (120m^2): 1nos.
	3) Reservoir	RC (1,000m^3) 1nos.
	4) Elevated Tank	Steel Panel Tank (50m^3, h=15m): 1nos.
	5) Control Chamber	1nos.
	6) Pump	q=0.083m^3/min, h=20m: 1nos.
	7) Pipe Installation	thrust block, water meter, valves and etc.: 1set
	8) Generator	5.5kVA：1nos.
	9) Instrument	water gauge, control panel and etc.: 1set

Component	Items	
	10) Chlorine injector	1set
	11) Accessories	fence, gate: 1set
	7. Connection Pipe (to Mombasa WSP)	
	1) Pipe Installation	HDPE Pipe (OD225 mm): L=5.7km
	2) Accessories	Thrust block, road crossing, valve chamber, line marker etc.: 1 set
Drainage Improvement	1. Bank Protection	
	1) natural channel (3 nos.)	Gabion mat (River width =5m, Max. side slope=1:1.0, h=2m~3m): L=2,250 (H=0.5m and B=1.2m)
Land Development	1. Earthwork	
	1) Felling & Grubbing	120,200m^2
	2) Cutting	820,200m^3
	3) Filling	108,900m^3
	4) Removal of Surplus Work	674,300m^3
	5) Slope Protection	Concrete Shotcreting: t=100mm, 3,450m^2
		Concrete Frame (incl. planting works): 6,084m^2
		Retaining Wall: 110m
	6) Drainage	Slope drain: 474m
		Slope vertical drain: 861m
		Connection basin: 39nos.
		Discharging pipe (HDPE 300mm, wave type): 16m
		Step drain: 23m
		Drain pipe (HDPE 300mm, wave type): 260m
		Unlined canal: 1,000 m
	7) Land surface protection	Crushed stone placing: t=200mm, 82,600m^2
	2. Building Support Work	
	1) Car park	Asphalt pavement: 10,000 m^2
	2) Other facilities	Restroom building, bus roundabout, vehicle road and foot path around administration building, street lighting apparatus, guardrail and fence and other utilities (water supply pipe, sewerage, drain diches, sleeve pipes for electric and communication cables
	3. Administration Building	2 stories (866.32m^2): 1 set
Road Construction	1. Temporary Access Road	L=2.4km, access to D1 land development site from soil disposal area (FTZ-B)
	1) Cutting	11,500m^3
	2) Filling	14,400m^3
	3) Road Cross Drain	Placing PC pipes (dia. 1.2m) as required
	4) Pavement	crushed stone placing: 16,800 m^2 (t=200mm)
Procurement plan of cargo handling equipment	1. Reach stacker	4 nos.
	2. Forklift (10 ton)	3 no.
	3. Forklift (5 ton)	4 no.
	4. Terminal tractor	14 nos.
	5 Trailer chassis	14 nos.

NOTE: Selection of the equipment and the quantity will be determined after conclusion of contractor for construction works.
WSP: Water Service Provider
Source: JICA Study Team

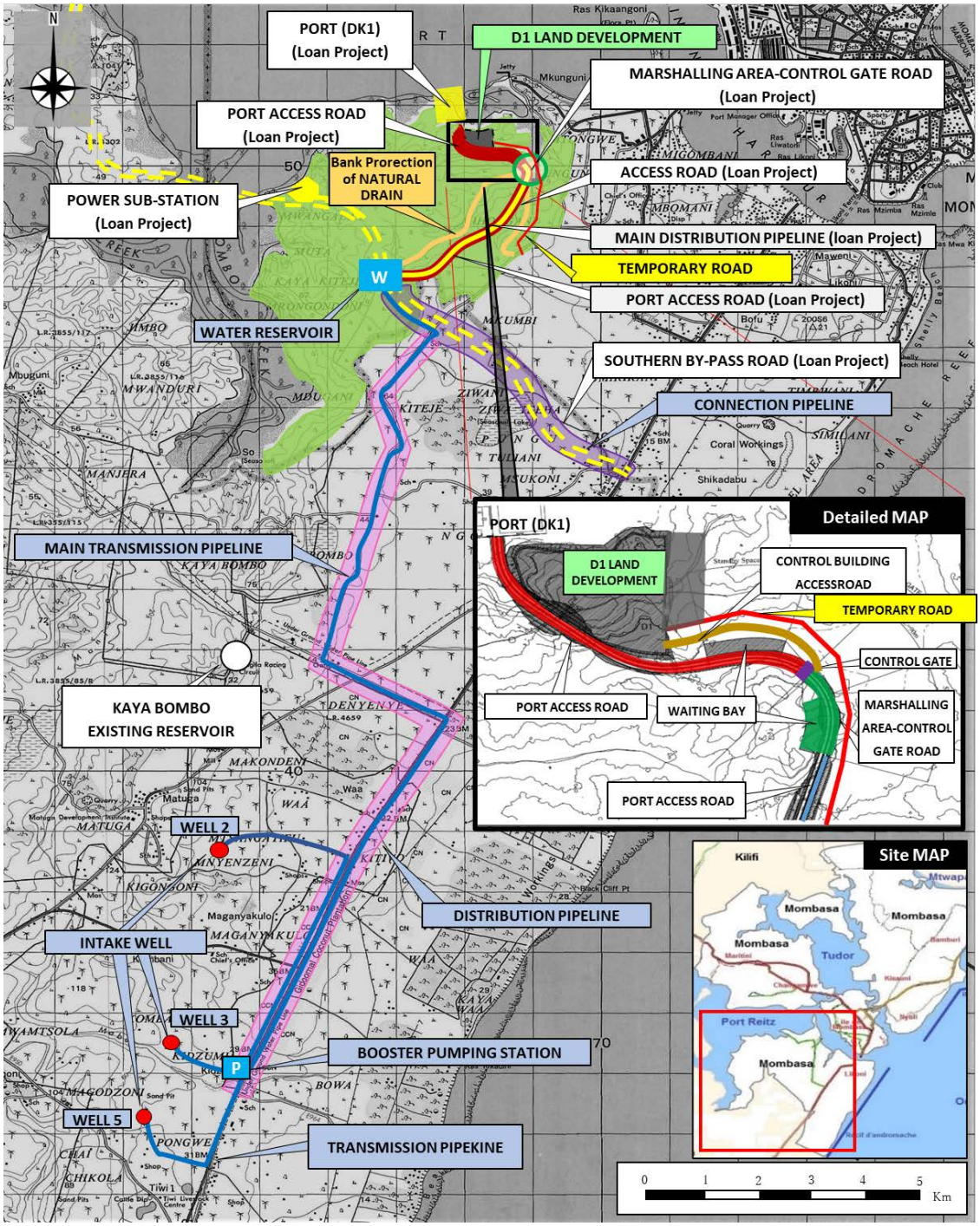
2-1-4-3 Demarcation with the Loan Project

The necessary infrastructure at the beginning of Phase 1 mentioned in Mombasa SEZ M/P (2015/9) will be provided by both the Grant Aid Project and the Loan Project in parallel. Table 2-1-3 and Figure 2-1-3 show the work demarcation of those Projects.

Table 2-1-3 Scope Comparison between Grant Aid and Loan Project

Component	Grant Aid Project	Loan Project
Water Supply	1.Intake Facilities (3 wells) 2.Transmission Pipeline (Transmission Pipe (Well - BPS) 3.Booster Pumping Station 4.Main Transmission Pipeline (BPS-Reservoir) 5.Distribition Pipeline (Kwale WSP) 6. Mombasa SEZ Reservoir 7.Connection pipeline (to Mombasa WSP)	1.Distribution Pipeline (SEZ-Substation) 2.Main Distribution Pipeline (SEZ)
Drainage	1.Bank Protection	1.Diversion Channel-1 2.Diversion Channel-2
Land Development	1.Earthwork 2.Admi. Building 3.Admi. building external development (incl. car park, restroom building, bus roundabout, vehicle road and foot path, street lighting apparatus, guardrail and fence and other utilities)	1.Control Gate for Admi. worker, control gate between bus roundabout/car park area and admi. building premises, 2.Security Fence
Road Construction	1.Temporary Road for D1 land development work between D1 land development site and soil disposal site (FTZ-B)	1.The entire Port Access Road (4.3 km incl. accessories of marking sign, lighting guardrail and etc.) 2.Connection part between Port Access Road and Access Road to Admi. Building (incl. accessories of marking sign, lighting guardrail and etc.) 3.Waiting Bays (incl. accessories of marking sign, lighting guardrail and etc.) 4.Control Gate in Port Access Road (incl. accessories of marking sign, lighting guardrail and etc.) 5.D1 Access Road to Admi. Building from the junction with Port Access Road till D1 Land boundary
Port	-	1.Port
Cargo Handling Equipment	1. Procurement of reach stacker (for empty), forklift, terminal tractor, container chassis	1. Procurement of mobile harbor crane and reach stacker (for quay & yard)
Substation	-	2.Substation

Source: JICA Study Team



Source: JICA Study Team

Figure 2-1-3 Work Demarcation between Grant Aid Project and Loan Project

The noteworthy description is below.

(1) Water Supply Component

The Grant Aid Project will construct a series of water supply facilities from intake wells till Mombasa SEZ Reservoir where reservoir, elevated tank and other related facilities will be installed. The Loan Project will construct a main distribution pipeline along the port access road

that will be constructed between the Mombasa SEZ Reservoir and DK1 port facility under the same Loan Project. Furthermore, the Loan Project will construct a distribution pipeline and the related facilities required for water supply to an electrical substation of which construction is planned at the north-west of the Mombasa SEZ Reservoir.

Water Supply Administration Building and the control room for operating the water distribution, which will be constructed by the Grant Aid Project, will receive the power from the existing commercial power or the installed generator before the electrical substation is constructed. After constructing the electrical substation, transmission line will be constructed by the Loan Project.

(2) Drainage Component

Two Diversion Channels are constructed by the Loan Project together with the construction of the entire Port Access Road. The diversion channels are connected to the box culverts which cross under the Port Access Road and are considered as part of the road structure. It is, therefore, efficient to construct as road structure under the Loan Project.

(3) Land Development Component

In parallel with the D1 Land Development, construction of Administration Building and the external development will be conducted under the Grant Aid Project. It includes provision of restroom building, bus roundabout, vehicle road and foot path around the administration building, car parking, lighting apparats, guardrail, fence and utilities for the buildings and facilities.

The Loan Project will conduct the construction about the below;

- Construction of security fence to segregate the Port Area and gate setting work considering transportation of general-purpose vehicles and workers' vehicles as the transportation facility around the Administration Building
- Constructing transmission line from the electrical substation till the D1 Land boundary in order to supply power to the Administration Building

(4) Road Component

The entire Port Access Road from the junction of Mombasa Southern Bypass till DK1 Port including the Waiting Bays and the Control Gate will be designed and constructed by the Loan Project based on the standard design which was made in Mombasa SEZ M/P (2015/9) and reviewed by Mombasa SEZ D/M (2019/6).

Considering the above-mentioned work demarcation between the Loan Project and the Grant Aid Project, a temporary road for D1 land development is newly proposed to construct under the Grant Aid Project so that the temporary road that is to be undertaken under the Grant Aid Project can be secured without intervention from/to the construction works under the Loan Project.

(5) Procurement of Cargo Handling Equipment

Procurement of self-propellent vehicles without installation work is planned in the Grant Aid Project. In selection of the equipment, consideration will be given to convenience in use based on KPA's experiences, easy procurement of spare parts and consumables as well as price. Therefore, the country of origin is not limited to Japan and the third countries are also accepted. In addition, final adjustment and trial run of equipment, provision of initial operation guidance and equipment management know-how to KPA is required to the contractor/manufacturers, up on completion of equipment delivery.

2-1-4-4 Project Design Matrix

Table 2-1-4 shows the Project Design Matrix.

Table 2-1-4 Project Design Matrix

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal Government of Kenya achieves the Middle-Income Nations in accordance with the target of Vison 2030.	a) Economic Growth Rate b) GDP	a) Statistics Data of World Bank b) Statistics Data of KNBS	Structure of Kenyan Government on economic development and investment climate are not changed.
Project Purpose Necessity infrastructure provides in Mombasa SEZ.	a) Occupation ratio of developer in SEZ b) Utilization (sale) ratio of water supply	a) KPA Annual Report b) Water Supply Operator Report	No changes in the SEZ function by KPA and/or Kenyan Government.
Outputs a) Development of water supply, drainage, land development and road in the target area. b) Sustainable Operation & Maintenance for the above facilities.	a) Construction of water supply, drainage, land development and road based on the design b) Establishment of organization for O&M for above facilities	a) As-built drawings of the facilities and field investigation b) KPA and relevant authority's report	No business transformation by KPA and/or Kenyan Government.
Activities JAPANESE SIDE Water Supply Intake facility, Transmission pipe, Booster pumping station, Main	Input JAPANESE SIDE Experts for Construction	KENYAN SIDE Staff of KPA for Construction	KPA staff who in charge of O&M is not shifted to other organization within a short time.

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Transmission pipe, Distribution pipe, Reservoir and Connection pipe Drainage Bank Protection Land Development Earthwork, Building Support Work, Admi. Building and the external development, including outside toilet and utilities Road Temporary Road for access to D1Land development Procurement of equipment Cargo handling equipment Kenyan side O&M for the above facilities	Supervision Facilities ・New constriction for intake facility for well, booster pumping station, pipeline and water supply facilities ・Bank protection ・Land development and new Admi. Building ・Construction of temporary road for D1 Land Development site Equipment ・Reach stacker, Forklift, Terminal tractor and Trailer chassis	Supervision Construction of facilities and Sensitization a) Land Acquisition b) Getting of O&M measure c) Storage of spare parts for the facilities O&M a) Proper implementation of O&M b) Storage of spare parts	Precondition a) Economic condition should not significantly change. b) Groundwater source does not decrease, does not dry up and become not salty.

Source: JICA study team

2-2 Outline Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Water Supply Component

(1) Demarcation about Main Distribution Pipe Laying Work with Loan Project

Main Distribution Pipe from Mombasa SEZ Reservoir (as located in the area of interchange between the southern bypass road and the port access road) to the Port aiming at water supply to Mombasa SEZ will be laid under Port Access Road constructed by the Loan Project. Although construction of the Main Distribution Pipe is a part of Water Supply Component of the Grant Aid Project, it therefore was determined to be constructed by the Loan Project in conjunction with the Port Access Road.

(2) Schedule and Water Demand in Mombasa SEZ

Development area and location in Phase 1 is amended to fulfil the current situation and it is divided further into three stags although the SEZ is developed by Phase 1-3 as noted in SEZ M/P (2015/9). Table 2-2-1 shows the revised schedule of development plan SEZ.

Table 2-2-1 Review of Schedule and Area of Development

Land Use Zone	Development Area (ha)						
	SEZ M/P			Phase1 Review			
	Phase1	Phase2	Phase3	Stage1	Stage2	Stage3	Total
1.Port	0.0	34.2	32.3	34.2	0.0	0.0	34.2
2.FP/FTZ A/B/C	67.3	9.0	45.3	30.0	20.0	17.3	67.3
3.FP/FTZ D	0.0	10.2	23.0	10.2	0.0	0.0	10.2

Land Use Zone	Development Area (ha)						
	SEZ M/P			Phase1 Review			
	Phase1	Phase2	Phase3	Stage1	Stage2	Stage3	Total
4.Industrial park	34.4	65.6	21.6	0.0	0.0	34.4	34.4
5.MICE area	0.0	2.2	0.0	0.0	0.0	0.0	0.0
6.Tourism parks	0.0	15.2	34.2	0.0	0.0	0.0	0.0
7.Service area	2.8	6.9	0.0	2.8	0.0	0.0	2.8
8.Power plant	64.0	0.0	0.0	0.0	0.0	64.0	64.0
9.Transmission line	56.0	0.0	0.0	0.0	0.0	56.0	56.0
10.Enterprise area (A/B/C)	85.4	113.1	0.0	0.0	35.4	50.0	85.4
11.Enterprise area (D~J)	0.0	69.0	60.3	0.0	0.0	0.0	0.0
12.Residential area E	0.0	4.3	7.0	0.0	0.0	0.0	0.0
13.Residential area A/B/C/D	29.2	0.0	0.0	29.2	0.0	0.0	29.2
14.Mombasa southern bypass road	34.0	0.0	0.0	34.0	0.0	0.0	34.0
15.Internal arterial road/1	13.0	6.0	3.0	13.0	0.0	0.0	13.0
16.Utility (SS, DC, utility area)	18.0	0.0	0.0	18.0	0.0	0.0	18.0
17.Main drainage network area	18.6	1.7	5.6	18.6	0.0	0.0	18.6
Total	422.7	337.4	232.3				467.1

Time: Stage 1; 2023 year, Stage 2; 2026 year, Stage 3; 2030 year
Source: JICA Study Team

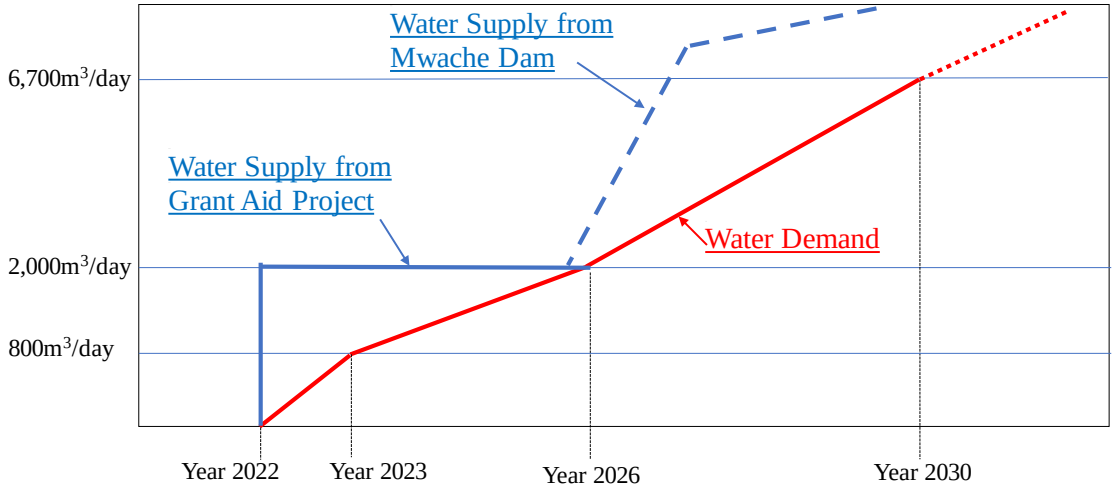
Accordingly, the water demand of SEZ is amended as shown in Table 2-2-2.

Table 2-2-2 Review of Water Demand in Phase 1

Land Use Zone	Water Demand (m^3/day)			
	Stage 1	Stage 2	Stage 3	Total
1.Port	160	-	-	160
2.FP/FTZ A/B/C	597	398	344	1,340
3.FP/FTZ D	15	-	-	15
4.Industrial park	-	-	3,400	3,400
5.MICE area	-	-	-	-
6.Tourism parks	-	-	-	-
7.Service area	-	-	-	-
8.Power plant	-	-	38	38
9.Transmission line	-	-	-	-
10.Enterprise area (A/B/C)	-	705	995	1,700
11.Enterprise area (D~J)	-	-	-	-
12.Residential area E	-	-	-	-
13.Residential area A/B/C/D	4	-	-	-
14.Mombasa southern bypass road	-	-	-	-
15.Internal arterial road/1	-	-	-	-
16.Utility (SS, DC, utility area)	11	-	-	11
17.Main drainage network area	-	-	-	-
Total	787	1,103	4,778	6,668
Rounded Total	800	1,200	4,700	6,700
Cumulated Total	800	2,000	6,700	-

Time: Stage 1; 2023 year, Stage 2; 2026 year, Stage 3; 2030 year
Source: JICA Study Team

Accordingly, the water demand in SEZ will reach 800m^3/day in 2023 and 2,000m^3/day in 2026. The water supply to fulfil the water demand in 2026 is developed by the Grant Aid Project. The water demand exceeding 2,000m^3/day will be supplied by the Mwache Dam which is under implementation in the World Bank Project (see Figure 2-2-1).



Source: JICA Study Team

Figure 2-2-1 Diagram of Water Demand and Water Supply

It should be noted that water was supplied from an elevated water tank to Utility Area, Residential Area A, B, C and D and FP A shown in Figure 2-1-1. About the elevated water tank and the main distribution pipe to connect the tank, they will be constructed by the Loan Project in the future.

(3) Water Supply to Local Residents

Necessity of water supply to local resident in Kwale County where the water source and pipeline are located is requested by the Kenya Government in order to contribute to improvement of current water supply situation and support for the water supply system which will be constructed in the Grant Aid Project. Therefore, the surplus water of 300m^3/day which is balance of the water demand is examined. Table 2-2-3 shows the comparison of water supply method in terms of whether distribution pipe and/or water kiosk are installed by Grant Aid Project.

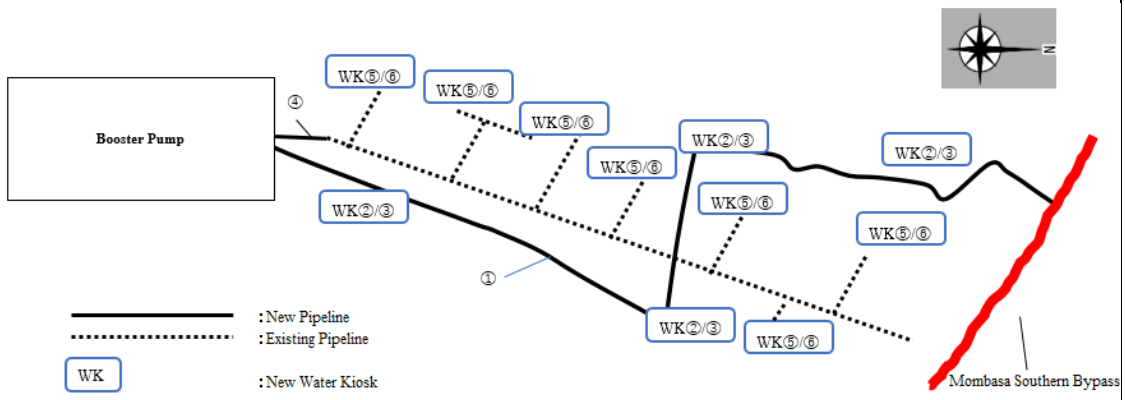
Table 2-2-3 Comparison of Water Supply Method to Local Residents

Project about Water Kiosk by the Grant Aid Project	**Laying pipes by the Grant Aid Project / Connecting to the existing pipe by the Grant Aid Project**	
	Distribution Pipe from Booster Pump Station to Southern Bypass Road	**Connection to the existing pipe in Kwale County**
None	Option 1: KPA or Kwale Water will install WK. [Challenges] -The period of WK installation is undecided.	Option 4: Kwale Water will connect the existing distribution pipeline to the booster pump station [Challenges]

Project about Water Kiosk by the Grant Aid Project	**Laying pipes by the Grant Aid Project / Connecting to the existing pipe by the Grant Aid Project**	
	Distribution Pipe from Booster Pump Station to Southern Bypass Road	**Connection to the existing pipe in Kwale County**
	-It is unclear whether KPA can maintain and manage the water distribution pipeline until the WK installation. -Water business shall not be promoted as KPA and Japanese-supported CSR. -Distribution pipeline shall be installed in the site boundary.	-The connection timing is unknown -Water business shall not be promoted as KPA and Japanese-supported CSR
Equipment Grant	Option 2: In contrast to Option 1, provision of prefabricated WK materials and equipment will increase WK installation reliability. [Challenges] -Need to confirm the O&M system of WK -Selection of installation sites and specific work (consultation with local people) may be difficult. -It is difficult to determine the number of grant equipment. -The use of surplus of 300m^3/d (corresponding to 6,000 people) for WK is unknown. -Distribution pipeline shall be installed in the site boundary.	Option 5: In contrast to Option 4, provision of prefabricated WK materials and equipment will increase WK installation reliability. [Challenges] -It is necessary to confirm O&M system of WK, -Selection of installation sites and specific work (consultation with local people) may be difficult. -It is difficult to determine the number of grant equipment. -The water supply along the pipeline is uncertain.
Construction	Option 3: Develop WK [Challenges] -Survey is required to determine the appropriate capacity, location of WK. -Selection of installation sites and specific work (consultation with local people) may be difficult to complete during the survey period. -It is necessary to establish a water association for O&M. -The use of surplus of 300m^3/d (corresponding to 6,000 people) for WK is unknown. -The cost of additional surveys will increase and delays ongoing design work.	Option 6: Develop WK [Challenges] -Survey is required to determine the appropriate capacity, location of WK. -Selection of installation sites and specific work (consultation with local people) may be difficult to complete during the survey period. -It is necessary to establish a water association for O&M. -The cost of additional surveys will increase and delays ongoing design work. -The water supply along the pipeline is uncertain.

Project about Water Kiosk by the Grant Aid Project	Laying pipes by the Grant Aid Project / Connecting to the existing pipe by the Grant Aid Project	
	Distribution Pipe from Booster Pump Station to Southern Bypass Road	Connection to the existing pipe in Kwale County

WK: Water Kiosk



Source: JICA Study Team

Finally, it was determined that to properly manage water supply facility and to improve the residents' accessibility to clean water, the Grant Aid Project would install a set of distribution pump in the booster pump station, lay Distribution Pipe and construct water kiosk. It was noted that these facilities installed by the Grant Aid Project would be passed from the counterpart, KPA to Kwale County. In addition, the number of water kiosk was to be determined within the budget of the Grant Aid Project and the installation location and the relevant discussion with the local residents were to be managed by KPA and Kwale Country. In terms of O&M of water supply facilities, Kwale Country would handle them.

KPA discussed water kiosk with Water Service Provider (WSP) in Kwale County. Then, the below points were determined: seven water kiosks would be installed in public places and three water kiosks would be installed in each well (Table 2-2-4 and Figure 2-2-2).

Table 2-2-4 Planned Installation Location of Water Kiosk

	Coordinate*		Location
	X	Y	
①	566,979.151	9,539,147.975	Waa Primary School
②	566,263.770	9,541,419.272	Madibwani Mosque
③	566,707.234	9,543,687.810	Ningawa Primary School
④	566,703.222	9,544,843.860	Kiteje Dispensary/Mosque
⑤	567,091.218	9,545,077.916	Masjid Mosque
⑥	567,514.936	9,546,743.352	Mukumbi Mosque
⑦	567,620.709	9,540,786.269	Magandia Mosque
⑧	-	-	Well No.2
⑨	-	-	Well No.3
⑩	-	-	Well No.5

*System: WGS 84 UTM Zone 37S

Source: JICA Study Team

Source: JICA Study Team

Figure 2-2-2 Planned Installation Location of Water Kiosk

(4) Design Criteria and References

The design policy of the water supply component is decided based on the Practice Manual for Water Supply Services (Ministry of Water and Irrigation)", which is the design policy of Kenya, and the Design Criteria for Waterworks Facilities (Japan Water Works Association). Details are shown below Table 2-2-5.

Table 2-2-5 Design Criteria of Water Supply Component

Category	Item	Design Policy
	Material	HDPE (Transmission pipe, Main transmission pipe, Distribution pipe, Main distribution pipe, Connection pipe) GI (Water supply facilities except pipe line)
	Min. Design Flow Velocity	0.5m/s
	Max. Design Flow Velocity	3.0m/s

Category	Item	Design Policy
Pipeline	Min. Hydraulic Gradient	Transmission pipe: LWL (well) ~ HWL (underground reservoir at booster pumping station) Main transmission pipe: LWL (underground reservoir at booster pumping station) ~ HWL (elevated tank at Mombasa SEZ Reservoir)
	Min. Dynamic Water Pressure	Not less than 0.04MPa
	Max. Hydrostatic Pressure	Not more than 0.74MPa
	Air Valve	Install at the protrusion point. In case there is no protrusion point, install the air valve at every 1km to 3km.
	Blow Off Valve	Install at the depression point.
	Earth Covering	Not less than 1.5m: road controlled by Kenya National Highway Authority (KeNHA) Not less than 0.6m: all other roads
	Bend	Installation of thrust block
	Hydraulic Calc.	Hazen-Williams Formula
	Valve Chamber	RC chamber with steel cover
	River Crossing	Concrete encasement
	Road Crossing	Apply non-open cut method, or concrete encasement for open cut section
Pump	Intake Pump	Submersible pump (600m^3/day, 800m^3/day, 900m^3/day)
	Booster Pump	Horizontal volute pump (670m^3/day x 3nos.＋210m^3/day x 1no.)
	Distribution Pump	Pump capacity (200m^3/day)
Reservoir	Booster Pumping Station	RC underground reservoir (V-100m^3 : W-5m x L-8m x D-2.5m), clearance from HWL to soffit level of top slab≧500mm
	Mombasa SEZ Reservoir	RC ground reservoir (V-1,000m^3 : D-20m x H-3.18m), Clearance from HWL to soffit level of top slab ≧500mm Elevated tank, RC foundation, H=15m, Steel tank (V-54.5m^3: W-3.66m×L-6.10m×D-2.44m)
Building	Control Room・Guard House・Water Kiosk	RC foundation, Concrete block wall, GCI sheet roofing (Control Room), RC roofing (Guard House and Water Kiosk), Steel window, Steel door
Others	Generator	Electricity supply for the pump and control house
	Cable	From the commercial power to pump and control house From the generator to pump and control house
	Crain	Fixed gantry crane for well pump, Manual hoist for booster pump

Source: JICA Study Team

(5) Selection of Pipe Material

The Terms of Reference (TOR) of this Preparatory Survey specifies that the pipe material must be either high density polyethylene pipe (HDPE pipe) or ductile cast iron pipe (DCIP). The characteristics of HDPE pipe and DCIP are shown in Table 2-2-6.

Table 2-2-6 Pipe Material Comparison

	HDPE Pipe	DCIP
Advantage	・ Pipeline installed applying fusion joint is regarded as an integral structure with flexibility and it can be adapted to ground deformation. ・ Corrosion resistance ・ Light weight and good workability	・ Pipe with high strength and shock resistance ・ High durability ・ Pipeline flexibility against ground deformation can be kept applying flexible joint and the chain structure

	・ Track record in Kenya	joint.
Disadvantage	・ Weak against heat and ultraviolet ・ Special equipment is necessary for fusion joint ・ Difficult to install in the rain and an area in which ground water level is high	・ Heavy weight ・ Once corrosion proof is damaged, it is relatively easy to corrode.
Evaluation	◎Selected	-

Source: JICA Study Team

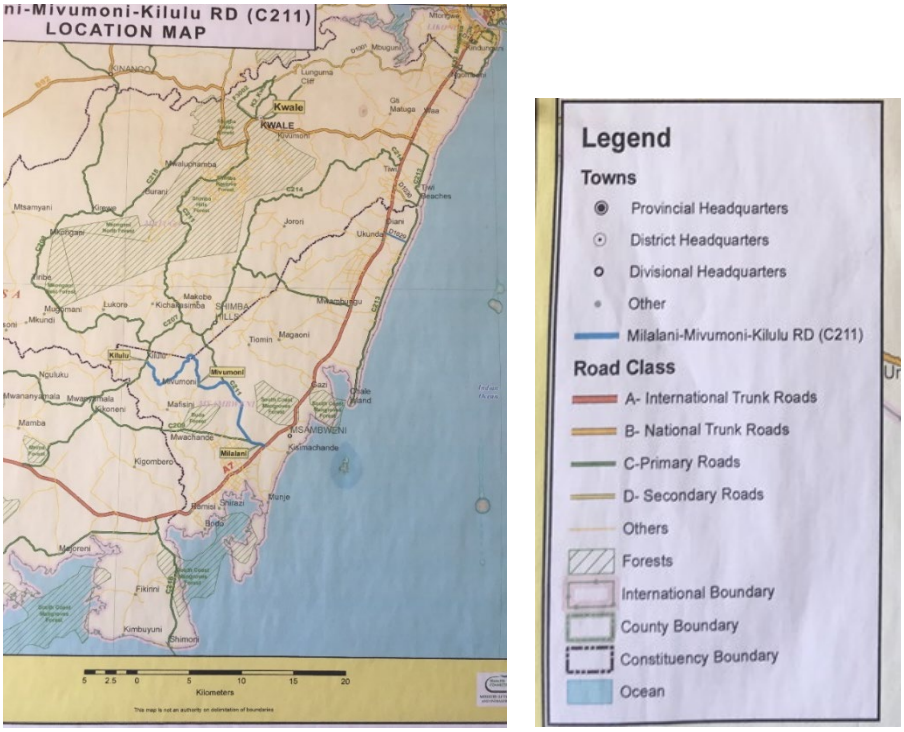
DCIP has high strength and shock resistance, however the weight is heavy and once its corrosion proof on the internal and external surfaces is damaged, it is relatively easy to corrode.

A single HDPE pipe has high flexibility, and as it is further possible to make a pipeline as integral structure by applying fusion joint, the pipeline can be adapted to ground deformation. As the pipe material is light and a pipe rolled around a drum is also available for the pipe diameter not more than 110mm, the workability is good.

Taking into account of the material features, track record and availability in Kenya, in this Grant Aid Project HDPE pipe was adopted for the construction of pipelines so that a pipeline can be adapted to ground deformation in the project area. Moreover, in order to compensate for the disadvantages of HDPE pipe, a galvanized iron pipe (GI pipe) was used for piping work around other water supply facilities than pipelines, such as in the pumping station and the reservoir. HDPE pipe is not adequate to use for above ground facilities due to less ultraviolet resistance and the processability of GI pipe for building a plant system by connecting pumps, valves, short pipes, tanks, etc. is excellent.

(6) Installation Conditions of Pipeline

Out of the pipelines planned in this project, transmission pipe, main transmission pipe, distribution pipe, and connection pipe are planned to be installed inside the right of way of public roads. However, a part of the existing roads between intake wells and the booster pumping station through which transmission pipes will be installed is located inside private lands, thus land acquisition is required for installation of a part of the transmission pipe. As shown in Figure 2-2-3, roads in Kenya are classified into Road Class A, B, C, D and others according to the purpose of use. Since the control authority is deferent by road class, the different installation condition of pipeline has to be applied.



Source：KeRRA

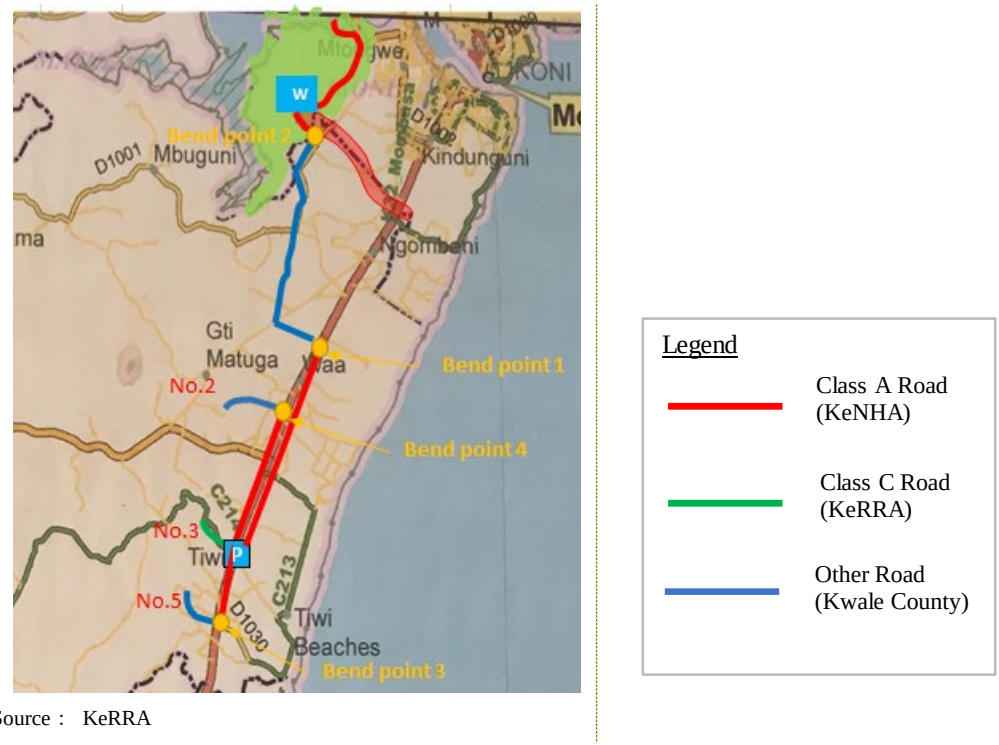
Figure 2-2-3 Road Class Map by Control Authority

The pipe installation conditions adopted in this preparatory survey were determined through discussion with Kenya National Highway Authority (KeNHA), Kenya Rural Road Authority (KeRRA) and Kwale County that are road control authorities. Based on the map (see Figure 2-2-3) provided by KeRRA, roads for installation of the pipelines are identified as shown in Figure 2-2-4. The pipe installation conditions by control authority are indicated in Table 2-2-7.

Table 2-2-7 Design Conditions of Pipe Installation

Beginning Point	End Point	Class	Control Authority	Earth Covering Depth	Distance from Road Boundary
Well No. 2	Bend Point 4	Others	Kwale County	0.6m	2.0m
Bend Point 4	Booster Pump Station	A	KeNHA	1.5m	-
Well No. 3	Booster Pump Station	C	KeRRA	0.6m	2.0m
Well No. 5	Bend Point 3	Others	Kwale County	0.6m	2.0m
Bend Point 3	Booster Pump Station	A	KeNHA	1.5m	-
Booster Pump Station	Bend Point 1	A	KeNHA	1.5m	-
Bend Point 1	Bend Point 2	Others	Kwale County	0.6m	2.0m
Bend Point 2	Mombasa SEZ Reservoir	Others/D	Kwale County	0.6m	2.0m
Mombasa SEZ Reservoir	D1 Area Land Development	A	KeNHA	1.5m	-
Connection Pipe		A	KeNHA	1.5m	-

Source: JICA Study Team



Source： KeRRA

Figure 2-2-4 Road Class Map by Control Authority

The pipelines are installed near a road boundary and the requirements for the earth covering depth by KeNHA and other authorities are 1.5m or more and 0.6m or more, respectively. In case of crossing a Class A road controlled by KeNHA, pipe installation by non-open cut method is required.

2-2-1-2 Drainage Component

(1) Design Criteria and References

In the design of drainage facilities, the following criteria and existing study reports were considered.

① Road Design Guidelines for Urban Roads in Kenya, Aug. 2001 (Guideline of Kenya)
② Mombasa Port Area Road Development Project, Engineering Report Final (Jun. 2014)
③ Project on Master Plan for Development of Mombasa SEZ, Final Report (Sep. 2015)
④ Design Mission for Mombasa SEZ Development Project, Final Report (Jun. 2019)
⑤ Guideline for Sewerage Plan and Design (Japan Sewerage Works Association, 2010)
⑥ River Control Structure Ordinance (Japan River Association, 2010）

(2) Designed Facilities

1) Bank Improvement of Natural Drain Channel

After development of Mombasa SEZ in the future, the rainwater on the SEZ will be drained into the existing natural drain channels through the drainage system to be constructed in the SEZ, and further drained into the sea through the natural channels. At present there observed bank erosions at some locations of the natural channel. In order to control the further erosion and to maintain a sufficient flow capacity of the existing natural drain channels in the major basins, bank protection of the channels is carried out using a gabion mat for sections where major bank erosion is remarkably observed. These sections are mainly found at the confluences of the branch channel with the main drain channel.

(3) Design Conditions

The design conditions for the drainage facilities are given in the Table 2-2-8.

Table 2-2-8 Design Conditions of Drainage Component

Facility	Item	Design Condition
Bank Improvement	Protection Method	Gabion
	Max. Side Slope	1:1.0
	Provision of Loss of Soil	Placing geotextile sheet underneath gabion

Source：JICA Study Team

2-2-1-3 Land Development Component

The target of land development in this project is the FTZ D1 area.

D1 Area is located adjacent to the port facilities and between the port access road and the SEZ development boundary established in SEZ M/P. The elevation of this area is about 3m to 40m and most of the geology is shale. Considering the maximum elevation of the port access road (EL. 18m) and the linkage between D1 Area and the port access road, the maximum excavation depth of D1 Area from the original ground surface is assumed at about 20m, and a lot of surplus soil

will be generated. Therefore, methods such as rock excavation and disposal of surplus soil are issues. Table 2-2-9 shows the design policy of land development design.

Table 2-2-9 Outline Design Policy of Land Development

Work Item	Description	Design Policy
Land Development	Concept	Designing of cutting and filling work, leveling, and related facilities. Permanent facilities, such as internal road, drainage, etc., are excluded.
	Development plan elevation	Development plan elevation is set according to the planned elevation of the front access road. A slope that can be drained to the seaside is provided on the development surface.
	Development flat area	Minimum area required for development.
Slope	Gradient	The gradient of slope is set to ensure stability.
	Step	Providing the step at appropriate positions to maintain stability on the slope.
	Slope protection	Cutting Slope: Shot concrete, Filling Slope: In-situ concrete frame and vegetation mat
	Slope drainage	Drainage is installed on slope and steps.
	Small dike	A small dike is installed on slope shoulder.
North Filled Area	Soft ground countermeasure	Considering countermeasures for a soft layer on the existing ground under the embankment.
	Wave breaker	Since the embankment faces the seaside, a wave breaker is considered at a toe of the slope.
	Underground drain	Underground drains are installed around the natural ground to discharge groundwater smoothly.
Drainage	Temporary drainage	In the D1 area, only embankment construction and leveling is performed. Therefore, a temporary drainage facility is provided on the development surface.
	Stepped drainage	Stepped drainage (permanent facility) is installed on the northern slope to connect with the temporary drainage facility, and rainwater is discharged to the seaside.
Building support facility	Outside development	Car park, restroom building, bus roundabout, vehicle road and foot path, street lighting apparatus, guardrail and fence and other utilities
Soil disposal		Excavated soils should be earth fill material as much as possible. All remaining soil is to be disposed to FTZ-B area inside the SEZ.

References: ・Road Earthworks Guidelines（Japan Road Association）
・Explanation of Residential Land Developments Manual (residential land disaster prevention)
・Outline of Road Earth Work (Japan Road Association)
・Design Manual for Roads and Bridges 2nd Draft (2009) - Ministry of Road, Kenya

Source: JICA Study Team

2-2-1-4 Road Component

(1) Construction of Temporary Road

In the Grant Aid Project a new temporary road is proposed to secure the work access to the D1 Land Development site so that the D1 Land Development work can be proceeded without intervention to/from the construction work of the Port access Road constructed under the Loan project.

(2) Design Criteria

In the road design, the following criteria and the existing study reports were considered:

① Road Design Guidelines for Urban Roads, Aug. 2001 (Guideline of Kenya)
② Design Manual for Road and Bridges 2nd Draft 2009 (Guideline of Kenya)
③ Mombasa Port Area Road Development Project, Engineering Report Final (Jun. 2014)
④ Design Mission for Mombasa SEZ Development Project (Jun. 2019)
⑤ Road Structure Ordinance (Japan Road Association, 2015)
⑥ Guideline of Road Structure (Aichi Prefecture, Construction Dept. 2011)

(3) Designed Facility

1) Temporary Access Road

The objective road is located between FTZ-B area inside the SEZ, which is proposed as soil disposal area, and the D1 Land Development site. The total distance is 2.4 km and the alignment is almost parallel with the Port Access Road and the Access Road to the D1 Administration Building.

(4) Design Conditions

In order to avoid intervention between both Grant Aid and project and the Loan Project works during the construction, the alignment is designed keeping sufficient distance between both works. Furthermore, the alignment is determined so as to minimize negative impacts to the existing houses, structures and cultivated lands.

The design conditions for the road design are as follows (Table 2-2-10):

Table 2-2-10 Design Conditions of Temporary Road

Facility	Item	Design Policy
	Road Classification	Temporary Access Road
	Number of Lanes	2 lanes
	Width	3.5m
	Cross Slope	2.5%
	Horizontal Alignment	Keeping sufficient distance from the road construction area under the Loan Project and minimizing any negative impacts to the existing houses structures and cultivated lands
	Gradient	Not more than 8.0%
	Pavement	Crushed stone placing
Slope	Cut Slope	Slope 1:1.5
	Fill Slope	Slope 1:2.0-
	Cut Slope Protection	No protection
	Fill Slope Protection	No protection
Cross Structure	Design Flow	Pipe Culvert：2-year probable flow (road crossing)
	Roughness Coefficient	Concrete：0.015
	Design Flow Depth	80% of culvert height

Source：JICA Study Team

2-2-1-5 Building Facilities

(1) Background

Based on the KPA's request and discussion, it was decided that Administration Building would be constructed in D1 Area. The Building is two storied one having 866.32m^2 gross floor area. At the ground floor, One-Stop-Service office which is necessary for FP will be located and at the first floor, management office for FP will be located. It should be noted that the Grant Aid Project will prepare for the building itself and the minimum interior without furniture like desks and chairs. In addition, Restroom building (84m^2 single floor) for general visitors will be constructed at a location facing the roundabout.

(2) Policy on scale setting of facilities

For the size setting, confirm the size of each room corresponding to the planned capacity and furniture layout, and design the facility. In this Project, the Administration Building, which has an area of 866.32 m^2 and the Restroom building, which has an area of 84m^2 are located in the D1 area of Land Development Component, will be the target of the cooperation, but consideration will be given to the possibility of expanding the Administration Building next to it for this Project.

(3) Policy on socio-economic conditions - Traditional architectural style

Mombasa is an old historical city with a mix of buildings of various architectural designs and styles, mixed with influences from Spain, Portugal, the United Kingdom, and so on. The exterior walls of a traditional Mombasa building are decorated with bricks made from local coral stones. It will be reflected in the facility design utilizing this traditional architectural style.

(4) Policy of natural environment

The policy of the design in viewpoint of the influence of sunshine and sea breeze in the natural environment are shown in Table 2-2-11.

Table 2-2-11 Viewpoint and Design policy to Natural Environment

	Viewpoint	Design Policy
1) Sunshine	Considering the solar radiation conditions of Mombasa near the equator.	The buildings are located on the east-west axis in order to prevent direct sunlight from the east and west directions. In order to lessen the brightness from the sun, a vertical louver will be installed outside the opening to serve as shade from direct sunlight
2) Sea breeze	The site of the Administration Building is located near the coast and the building is easily affected by sea breeze	It is best to select opening fittings (e.g., aluminum windows and steel doors) and air conditioning equipment that have rust prevention properties.

Source：JICA Study Team

(5) Policy on local design standards

Architectural design standards conform to the local “Building Planning and Regulations (2008)”and “Code of Practice for the Design & Construction of Building and Other Structures in relation to Earthquakes (1973)”. However, design standards are not defined, so items reflected in the design, design contents will be proposed to follow the Japanese Building Standard Law.

The policies for loading stresses on earthquake and wind to buildings are shown in Table 2-2-12.

Table 2-2-12 Viewpoint and Design Policy to Earthquake and Wind

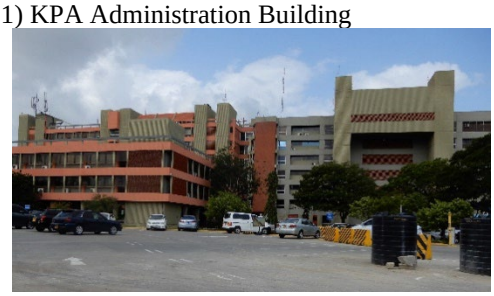
	Viewpoint	Design policy
1) Earthquake	Site of building are located in an earthquake zone by Kenya's seismic standard and are evaluated quit low compared with the Japanese Building Standards Law (Article 20-Building Structural Strength). Kenya's seismic standard where the standard shear force coefficient for Mombasa earthquake is less than 1/10 of the Japanese Building Standards Law	The standard shear force coefficient at the time of an earthquake set to 1/4 to ensure earthquake resistance on the safe side.
2) Wind	The wind resistance standard for wind stipulates the unit of 100-year reproduction period in determining the standard wind speed. Specifically, the maximum average wind speed is 30.3 m / sec.	The reference wind speed will be set at 34m/sec, taking into account of the local average wind speed and a safety factor of 10% with reference to the Japanese Building Standard Law. This reference wind speed is equivalent to Tokyo.

Source：JICA Study Team

(6) Policy on facility development grade and level

In designing the Water Supply Administration Building and Administration Building in this Grant Aid Project, the Kenyan side requested to refer design of the existing facilities. Therefore, a facility design of the same grade (specifications and finishing) of similar facilities will be adopted. An overview of existing similar facilities as the Water Supply Administration Building and the Administration Building are shown in Table 2-2-13.

Table 2-2-13 Overview of Similar Facilities

Proposed Facilities	Similar Facilities	Remarks
Water Supply Administration Building	1) Kwale Water/Sewage Company Office 	RC structure, steel roof truss, 1 story Floor area: 200m^2 Air-conditioning in office
	2) Kayabombo Reservoir Annex Building 	RC structure, steel roof 2 stories Floor area: 80m^2 Pumps and CL chemical injection equipment
	3) Water quality laboratory 	Private contract management Floor area: 10m^2, tile finishing
Administration Building	1) KPA Administration Building 	RC structure 3~6 stories, Floor area approx..4,000m^2 Fully air-conditioned Elevator installed
	2) Kipeve KPA Administration Building 	Yen Loan Project completed in 2016 RC structure, 4 stories Floor area .2,500m^2 Fully air-conditioned Elevator installed

Source：JICA Study Team

2-2-1-6 Procurement Policy of Cargo Handling Equipment

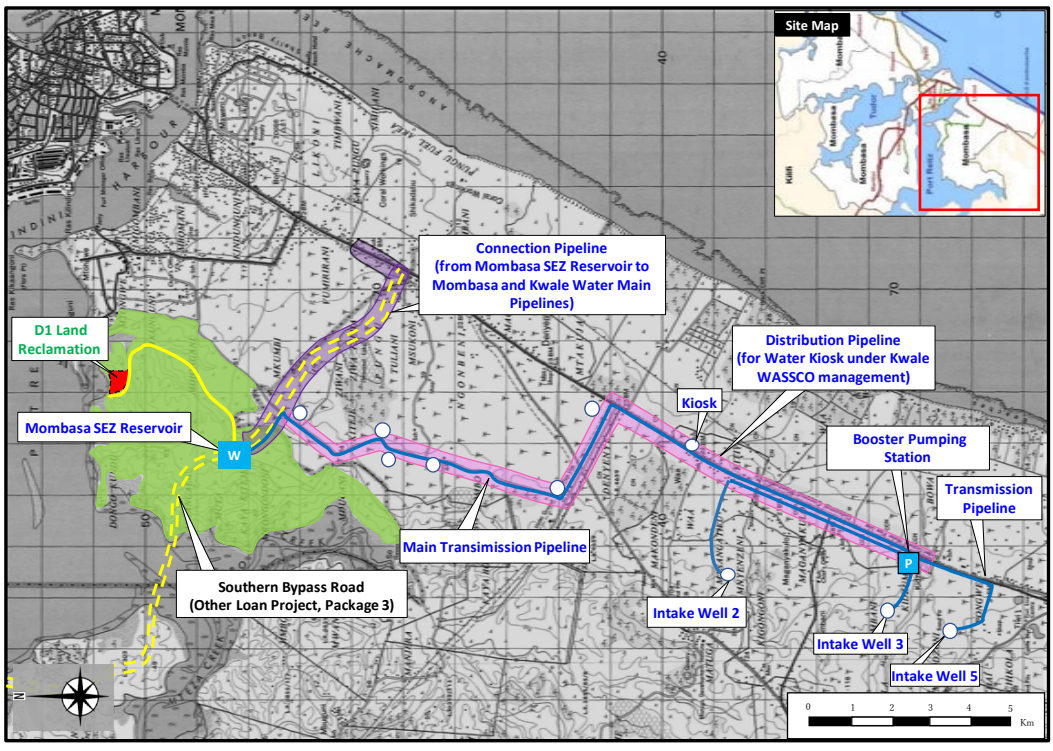
It is planned in the Grant Aid Project to procure self-propellent vehicles without installation work. In selection of the equipment, consideration will be given to convenience in use based on KPA's experiences of using similar equipment, easy procurement of spare parts and consumables as well as price. Therefore, the country of origin is not limited to Japan but the third countries are also accepted. In addition, final adjustment and trial run of equipment, provision of initial operation guidance and equipment management know-how to KPA is required to the contractor/manufacturers, upon completion of equipment delivery.

2-2-2 Basic Plan

2-2-2-1 Water Supply Component

(1) Water Supply Plan

Location map of the water supply component that will be developed in this Grant Aid Project is given in Figure 2-2-5.

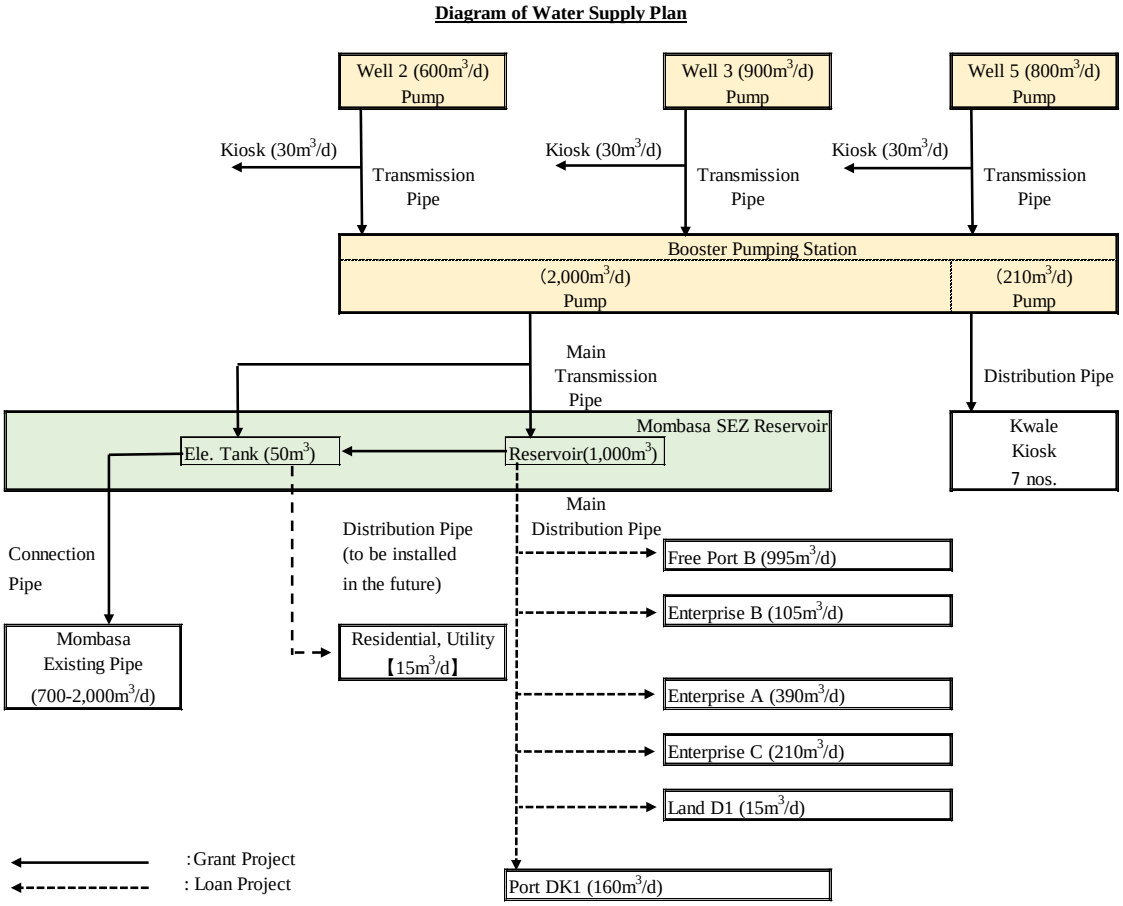


Source：JICA Study Team

Figure 2-2-5 Location Map of Water Supply Component

The water sources for this Project are three wells developed in the Mombasa SEZ D/M (2019/6). Water is sent to the Mombasa SEZ Reservoir by Transmission Pipe and Main Transmission Pipe through the booster pumping station, and a gravity flow distribution to the SEZ is conducted using

Main Distribution Pipe. Water supply to the SEZ is made targeting the land developed at Stage 1 of the Phase 1, on the basis of the land use plan that was established in the Mombasa SEZ M/P (2015/9). Also, a part of the water is distributed to the residents in Kwale County. The water supply plan in this Grant Aid Project is shown in the Figure 2-2-6.



Source：JICA Study Team

Figure 2-2-6 Diagram of Water Supply Plan

(2) Natural Condition

1) Topography

The biggest height difference along Transmission Pipe between well and Booster Pump Station was approximately 20m (horizontal distance is approximately 5.5km from well No.2) and that along Main Transmission Pipe (partly Distribution Pipe is to be installed in parallel) between booster pump station and Mombasa SEZ Reservoir was approximately 45m (horizontal distance is 16km). The slope of these roads is relatively flat. To avoid destroying asphalt-paved roadway in a national way, Main Transmission Pipe will be installed in an unpaved side road along the national way. At the point where the pipes will across the national road, tunneling method will be applied following the KeNHA Standard.

On the other hand, the route where Main Distribution Pipe is to be installed between Mombasa SEZ Reservoir and DK1 port is undulating although the height difference is approximately 45m and the horizontal distance is 14km.

Booster Pump Station is to be constructed in the flat area for the Tiwi Office of CWWDA where the elevation from the sea level is approximately 34m.

Mombasa SEZ Reservoir is to be constructed in a flat hilly area for the interchange connecting Southern Bypass Road with Port Access Road. The road dips down from Southern Bypass Road (the elevation from the sea level, approximately 50m) to Port Access Road (the elevation from the sea level, approximately 33m).

2) Geology

At the construction site near Booster Pump Station and Mombasa SEZ Reservoir, N values shows 17 or more, meaning enough bearing power of soil as foundation of structure. In addition, Transmission Pipe and Distribution Pipe will be installed along the existing road having also enough bearing power of soil. Figure 2-2-7 shows the situation about the on-going pipe laying work which JST met in Mombasa. JST judged that ground was so hard that it was possible to conduct the pipe laying work for a short time without trench timbering.

National Road NR-A14

Condition of On-going Pipe Laying Work

Source: JICA Study Team

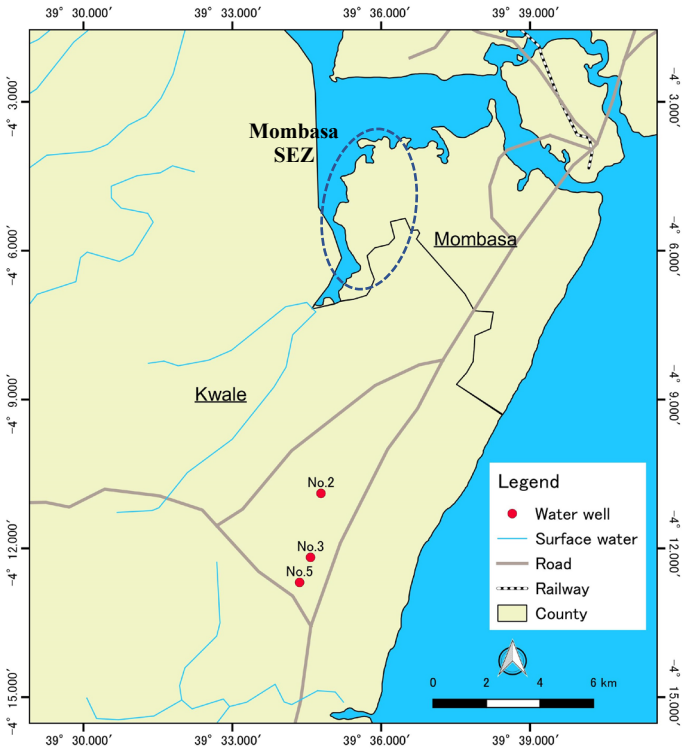
Figure 2-2-7 Status along National Road NR-A14

(3) Water Demand of Mombasa SEZ

The water demand for the development up to Stage 2 of Phase 1 in the Mombasa SEZ is 2,000m^3/day as mentioned in Chapter 1.

(4) Water Sources

During the 'Design Mission for Mombasa Special Economic Zone Development Project', eight sites have been selected for conducting well development survey from 2017 to 2018. Based on the results of pumping test, water quality analysis and numerical analysis through the survey, three wells (well No.2, well No.3 and well No.5) have been picked out as the wells of water source. As shown in Figure **2-2-8** the water wells are in Kwale County and are about 15km south from Mombasa SEZ.



Source: Made by JICA Study Team based on DIVA-GIS data

Figure 2-2-8 **Location map of water well**

Based on the results of pumping test, a proper discharge amount has been figured out for each water well (No.2: 25.2m^3/h, No.3: 38.5m^3/h, No.5: 35.0m^3/h). In order to verify if the water quality of the wells is meeting the water supply requirements of SEZ, water quality analysis has also been conducted. Furthermore, by using numerical model, groundwater simulation has been conducted for verifying if well interference problem and salinization pollution will occur on the water wells during pumping process.

The results of water quality analysis are summarized in Table 2-2-14, showing water quality standard in Kenya for drinking water as a reference. The results indicate that water of the wells

does not contain any harmful components to human health. According to the above groundwater simulation, by pumping water retaining the discharge amount of each well which was set up through the pumping test, neither interference to the adjacent wells nor salinization pollution are observed in the simulation period. Therefore, use of the above three wells is considered adequate in terms of both quality and quantity.

Table 2-2-14 Results of water quality analysis

Item	Unit	No.2	No.3	No.5	Kenya Standard (Drinking water)*
pH	pH scale	7.27	6.66	6.69	6.5-8.5
Colour	mgPt/l	5.0	6.0	<5	50
Turbidity	NTU	ND	0.25		25
Total Alkalinity	mg/L	408.0	176.0	98.0	500
Conductivity (25˚C)	µS/cm	999	977	776	2500
Calcium	mg/L	74.4	50.4	11.4	250
Iron	mg/L	0.12	0.21	0.04	0.3
Magnesium	mg/L	17.5	7.8	17.4	100
Total hardness	mg/L	258.0	158.0	100.0	500
Chlorides	mg/L	132	216.0	118.9	250
Fluorides	mg/L	0.87	0.20	<1.0	1.5
Nitrates	mg/L	1.8	0.2		45
Nitrites	mg/L	0.001	0.003		-
Sulphate	mg/L	19.0	47.0	29.3	400
Free Carbon Dioxide	mg/L	14.0	26.0		-
Total dissolved solids	mg/L	619.38	605.74	388.00	1500
Total suspension solids	mg/L	2.0	15.0	ND	-
Manganese	mg/L	0.05	0.08	0.07	0.1
Ammonia	mg/L	ND	ND		0.5
Sodium	mg/L	168	403	73.28	200
Potassium	mg/L	8	12	1.07	-
Arsenic	mg/L	< 0.01	< 0.01		0.05
Copper	mg/L	0	0	<0.01	0.1
Zinc	mg/L	0.04	0.05		5
Lead	mg/L	< 0.004	< 0.004	<0.01	0.05
Total Coliforms Count	cfu/mL	Nil		10	10

* KS 05-459: Part 1:1996 Not measured ND: Not detected

Source: Design Mission for Mombasa Special Economic Zone Development Project

The Mombasa SEZ D/M (2019/6) says that the pumping discharge volume is 2,300m^3/day; therefore, the water supply facilities for this capacity was designed. Also, 300m^3/day is distributed to Kwale.

A submersible pump is installed at the well, and water will be transmitted to the booster pumping station through the guard house. The existing commercial power is used for the submersible pump that is operated using a control panel which is installed in the guard house. Also, a cable is

installed together with the transmission pipe in order to use a generator at the booster pumping station in case of power outage.

All the necessary equipment for water pumping, such as pipes and valves, are installed, and the water kiosk is installed at each well. The operator and security guard stay in the kiosk to operate the equipment. Specifications of the well are shown below Table 2-2-15.

Table 2-2-15 Specification of Well

Item	Borehole Depth (m)	Casing Material	Casing Diameter (mm)	Statistic Water Level (m)	Dynamic Water Level (m)	Sustainable Discharge (m^3/hr)
Well No. 2	80	Steel	203	48.5	59.5	25.2
Well No. 3	80	Steel	203	43.8	65.3	38.5
Well No. 5	63	uPVC	152	45.0	47.3	35.0

Source：JICA Study Team

(5) Transmission Pipe

Installation of the transmission pipes from intake wells to the booster pumping station is planned near the rod boundary inside the right of way. The earth covering depth is decided based on the criteria defined by Kwale County and KeNHA. It must be more than 0.6m in the area of Kwale County and more than 1.5m along the road of KeNHA. Principal features of the transmission pipe are shown below Table 2-2-16.

Table 2-2-16 Specification of Transmission Pipe

Item	Transmission Pipe			Pump		
	Material	Diameter (mm)	Length (km)	Discharge (m^3/min.)	Head (m)	Power (kW)
Well No.2- BPS	HDPE	160	5.4	0.417	74	11
Well No.3- BPS	HDPE	160	1.4	0.625	77	15
Well No.5- BPS	HDPE	160	2.5	0.556	61	11

Source：JICA Study Team

(6) Booster Pumping Station

The booster pumping station is installed at the premises of TIWI Office of CWWDA. There exist intake wells and water supply facilities in the premises, that are used for water supply for Kwale County and Mombasa County. The proposed location of the booster pumping station is presented in Figure 2-2-9.

Source：JICA Study Team

Figure 2-2-9 Proposed Location of Booster Pumping Station

The transmitted water from each well is stored in the underground reinforced concrete suction tank. The dimensions of the suction tank are 8m in length, 5m in width and 3m in depth, respectively and the effective storage capacity is 80m^3. A periodical water quality test in the suction tank is planned considering a part of water to be supplied for the residents in Kwale County.

Two separate lines of pumps for the SEZ and the water kiosk are installed in the control house, which is beside the suction tank. The specifications of booster pumps are shown in Table 2-2-17.

Table 2-2-17 Specification of Booster Pump

Item	Discharge (m^3/min)	Head (m)	Power (kW)	Nos*
For SEZ	0.868	86	22	3
For Water KIOSK	0.146	147	7.5	2

*：Including standby pump
Source：JICA Study Team

Existing commercial power is used for the pumps however it will be switched to generator in case of power outage. The control panel at the booster pumping station is used to operate the intake pumps at the wells and transmission for the Mombasa SEZ Reservoir. A different control panel is installed for the pump for the water kiosk. Also, a chlorine injection facility is installed on the supply line for resident water supply.

(7) Main Transmission Pipe and Distribution Pipe

The main transmission pipe for water transmission to the Mombasa SEZ Reservoir and the distribution pipe for water supply to the water kiosks is also installed near a road boundary inside the Right of Way as above stated for the transmission pipe. In case of crossing the road of KeNHA, non-open cut method must be applied, according to the requirement. The distribution pipe is installed along the main transmission pipe, and the branch chamber is installed on it to distribute the water to residents through the water kiosk. Principal features of pipes are shown in Table 2-2-18.

Table 2-2-18 Specification of Pipes

Item	Material	Diameter (mm)	Length (km)
Main Transmission Pipe / BPS - MSR	HDPE	280	16.1
Distribution Pipe / BPS – Water KIOSK	HDPE	90	14.4

Source: JICA Study Team

(8) Mombasa SEZ Reservoir

Construction of the Mombasa SEZ Reservoir is planned inside the east interchange in the intersectional area of the Mombasa South Bypass Road and the Port Access Road to be constructed in the future. The present land use of the proposed location is a farmland adjacent to the Mombasa South Bypass road. The proposed location and the surrounding view are given in Figure 2-2-10.

Proposed Location of Mombasa SEZ Reservoir

View of Mombasa South Bypass Road under construction

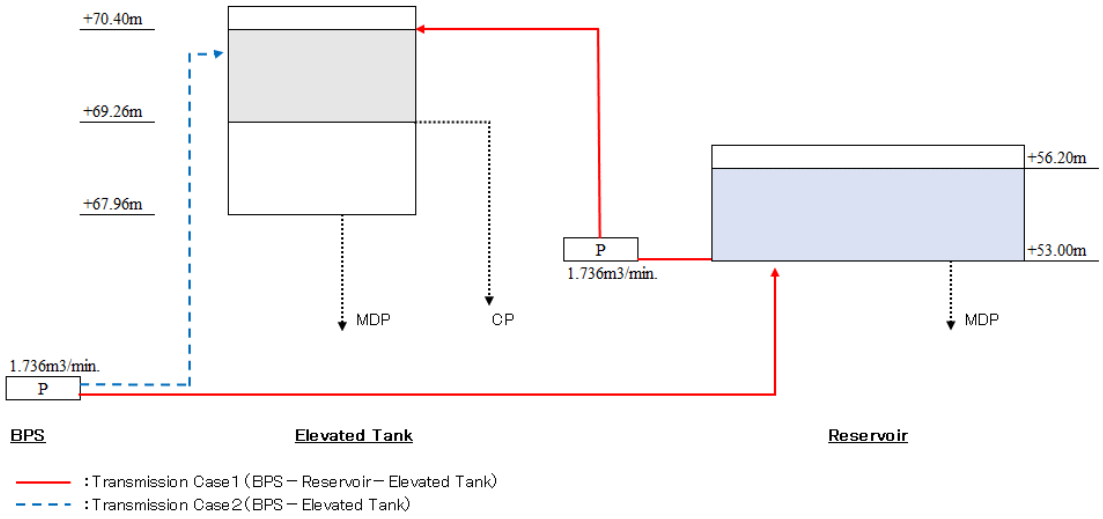
Source：JICA Study Team

Figure 2-2-10 Proposed Location of Mombasa SEZ Reservoir

An elevated tank as well as a ground reservoir is installed to distribute water to the related facilities including a power sub-station and residential areas. Water is pumped up to the elevated tank from the ground reservoir.

Water distribution to the Mombasa SEZ depends on the water demand at development stage of SEZ, that is divided into 3 Phases and the Phase 1 is further composed of 3 stages. The water demand is 0 m^3/day at the completion of this Grant Aid Project (beginning of Stage 1 of Phase 1), and thus 2,000m^3/day is allowed to transmit to the Mombasa and the Kwale WSP through the connection pipe. However, it is found that water transmission by gravity flow is difficult because of the undulated topography in a hilly area and the long distance of pipeline. In order to deal with the above difficulty in the facility plan, the water supply is proposed using an elevated tank constructed on the earth fill of 3m height on the original ground of the Mombasa SEZ Reservoir. The water flow diagram is shown in Figure 2-2-11.

Water supply to the Mombasa WSP is planned through the Mombasa SEZ Reservoir until water demand in the Mombasa SEZ reaches 2,000m^3/day (end of Stage 2 of Phase 1). This water supply is proposed to be conducted by gravity flow, and it is, therefore required to construct an elevated tank in the premises of Mombasa SEZ Reservoir. Regarding the water transmission method from the booster pumping station to this elevated tank, the following two water transmission patterns are examined from the viewpoints of the stagewise water requirement of SEZ mentioned above and energy consumption required for the pump operation.



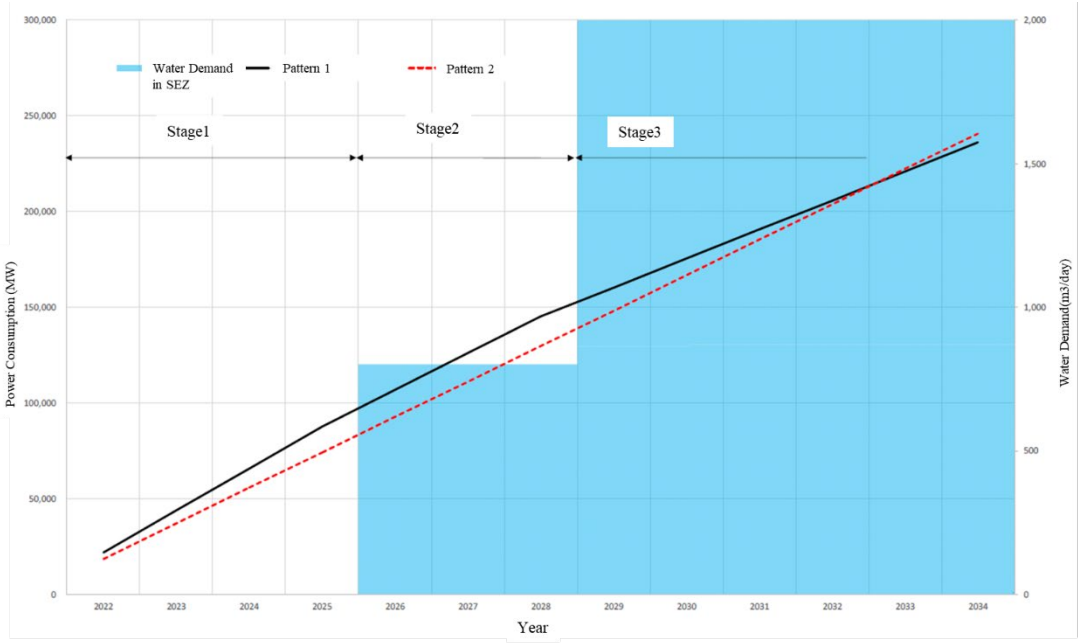
Source: JICA Study Team

Figure 2-2-11 Water Flow Diagram

Pattern 1: Water transmission by way of the ground reservoir in the Mombasa SEZ Reservoir

Pattern 2: Direct transmission to the elevated tank from the booster pumping station

The above two cases are compared from the viewpoint of economic efficiency and the result is provided in Figure 2-2-12.



Source: JICA Study Team

Figure 2-2-12 Water Demand and Power Consumption

Energy consumption at Stage 1 (water demand at SEZ increases from 0 up to 800m^3/day) and at Stage 2 (water demand at SEZ increases from 800m^3/day up to 2,000m^3/day) in case of Patter 1 is larger than that in case of Patter 2, while the energy consumption at Stage 3 in case of Pattern 1 is less than that in Pattern 2. Based on the above result, the water transmission pattern is decided as follows.

- In Stage 1 and Stage 2, direct water transmission to the elevated tank (Pattern 2)
- In Stage 3, water transmission to the elevated tank through the ground reservoir (Pattern 1)

The storage capacity of the ground reservoir is 1,000m^3, which is equivalent to the water supply volume for 12 hours out of the planned daily supply (2,000m^3/day). The storage capacity of the elevated tank is 50m^3, and its height is 15m. In addition, a control chamber is constructed in the same premises in order to control water distribution to planned supply areas. Water filling function to a water truck is also proposed for the control chamber.

The water supply Administration Building is planned with the floor area of 120m^2. It is proposed as single story building of reinforced concrete structure with steel roof truss. The room names and building equipment are shown in Table 2-2-19.

Table 2-2-19 Features of Water Supply Administration Building

Room Name		Capacity/Use	Size/Floor Area
1	Ground Floor		
1)	Office	8 staffs	24m^2
2)	Water quality laboratory	Water quality test	16m^2
3)	Storage	Stock of equipment and chemical	8m^2
4)	Workshop/Electrical room	Maintenance service for water supply/ Distribution board	16m^2

5)	Toilet	Male 1, Female 1,	12m^2
6)	Tea serve kitchen	Sink, Outlet for Heater	4m^2
7)	External Corridor	Corridor	W=1.8m
2	Others		
1)	Apron	AC outdoor unit	W=1.5m

Source: JICA Study Team

The list of building equipment that provides an overview of the facility's electrical equipment, plumbing equipment, and air conditioning equipment is shown in Table 2-2-20.

Table 2-2-20 Building Equipment List

Building Equipment		Outline	Capacity/Rooms
1	Electrical Equipment		
1)	Electrical wiring and conduit	Low voltage income from outdoor pole*1	Indoor
2)	Distribution board: DB	Low voltage DB	Workshop
3)	Outlet	Normal type	Each room
4)	Lighting fixture	LED	Each room
5)	Lightning	Coper conductor	Roof
6)	Telephone	No appreciable	
7)	LAN Antenna, Pole	Antenna (Client work), Pole for Antenna, Joint box*2	Outdoor
8)	Fire alarm	Notice board, Smoke detector	Office
9)	Emergency Light	Buttery type	Each room
2	Plumbing Equipment		
1)	Water supply	Direct connection from main	Toilet, Sink
2)	Drainage	Sewage and normal drainage	Toilet, Sink
3)	Sanitary	Toilet ball, Basin	Toilet
4)	Fire extinguishing equipment	Fire extinguisher	Each room
5)	Kitchen	Sink	Tea serve kitchen
6)	Sewage treatment	Septic tank 10 persons	Outdoor
3	Air Conditioning and Ventilation Equipment		
1)	Air-conditioner	Separate type	Office, Lab
2)	Ventilation fan	Indoor type	Each room

*1: At the completion of the water supply Administration Building, power distribution work to the special economic zone and power supply work from the port (substation, building, etc.) have not been completed. Since power supply from the new distribution network will not be expected, the low voltage (240V, 415V) pull-in work from the existing power grid will be installed under the responsibility of the owner.

* 2: Since the specifications of communication equipment such as LAN antennas will be different type depending on the communication firms, a power pole (8m in height) for the installation of antennas, etc. will be planned, but installation of various antenna equipment on the power pole will be borne by the owner.

Source: JICA Study Team

An exterior finishing and an interior finishing that consider durability will be made with reference to the finishing of similar public facilities. the external finishing and the interior finishing of the planned facilities are shown in Table 2-2-21 and Table 2-2-22.

Table 2-2-21 Exterior Finishing Schedule

Item	Finishing
Roof	Ribbed painted galvanized steel
Wall	Paint on mortar

Eaves	Paint on exposed roof steel truss
Window/Door	Widow: Aluminum sliding window Door: Paint on steel swing door

Source: JICA Study Team

Table 2-2-22 Interior Finishing Schedule

Room Name	Floor	Wall	Ceiling	Door
Office	Hardener finish on mortar	Paint on mortar	Rockwool acoustic board	Paint on Steel door
Water quality laboratory	Porcelain tile	Paint on mortar	Paint on calcium silicate board	Paint on Steel door
Toilet	Porcelain tile	Glazed porcelain tile	Paint on calcium silicate board	Paint on Steel door

Source: JICA Study Team

(9) Connection Pipe

A connection pipe is installed to transmit water to the existing water supply pipe operated by Mombasa WSP on Likoni Road. It is installed along the Mombasa South Bypass road. Since the water transmission is planned by gravity flow, the pipeline is required to be installed alongside of the bypass road. The principal features of the pipe are provided in Table 2-2-23.

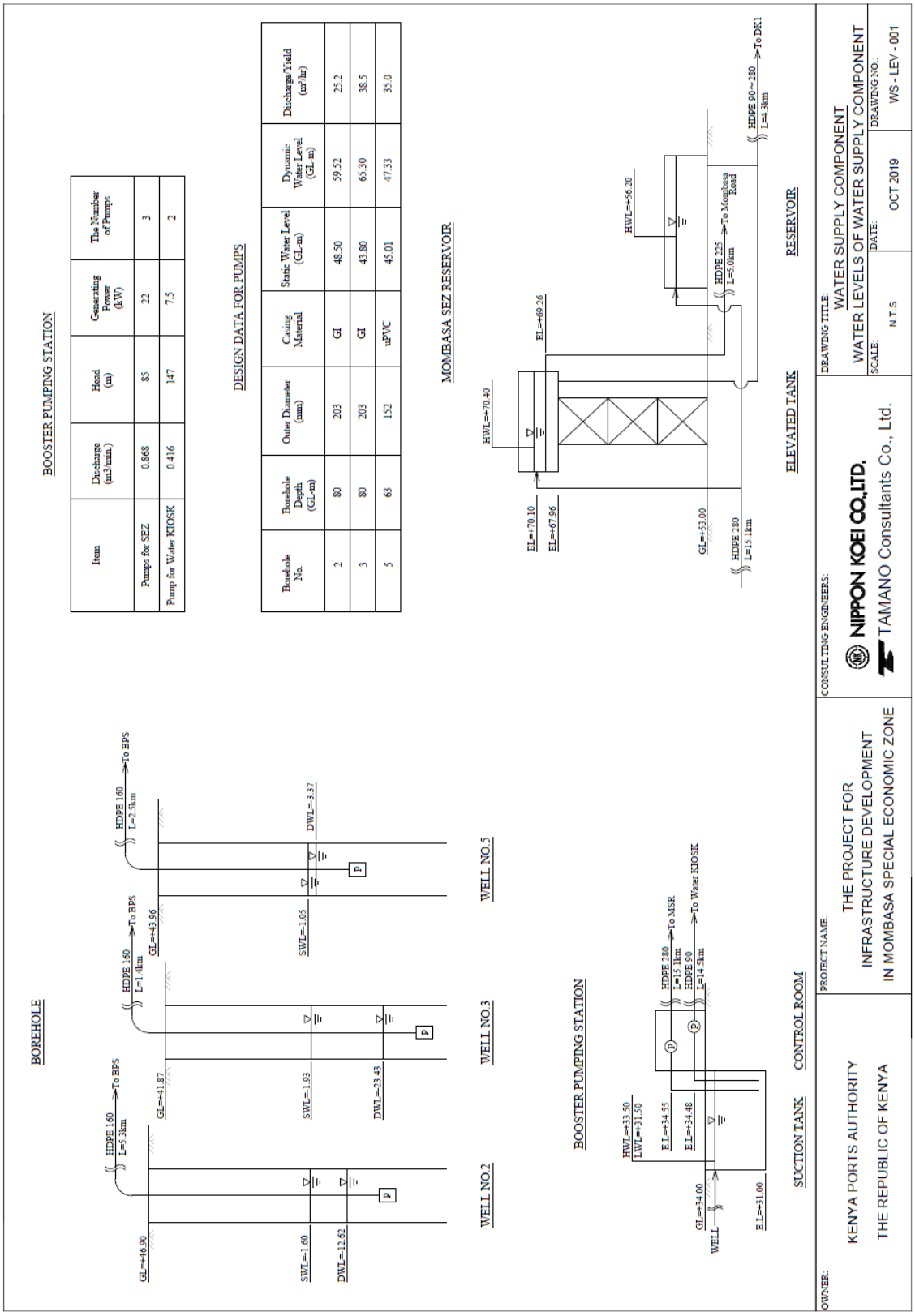
Table 2-2-23 Specification of Connection Pipe

Item	Material	Diameter (mm)	Length (km)
Connection Pipe	HDPE	225	5.7

Source：JICA Study Team

(10) Water Level Diagram of Water Supply Component

The water level diagram of the whole water supply component is shown in Figure 2-2-13.



Source：JICA Study Team

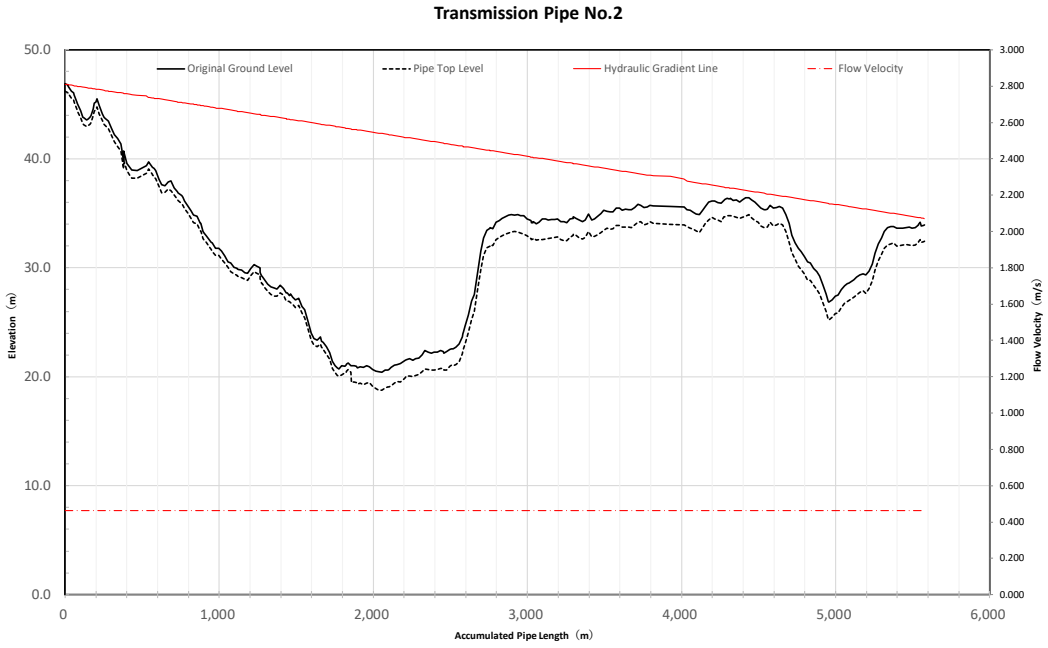
Figure 2-2-13 Water Level Diagram of Water Supply Component

(11) Hydraulic Analysis Result

Hydraulic analysis was conducted for each pipeline in determining the specifications of the pipelines. The analysis results are described below and presented in Figure 2-2-14 to Figure 2-2-19. For the hydraulic calculation, Hazen Williams formula was used, with the coefficient of flow velocity (C) of 130.

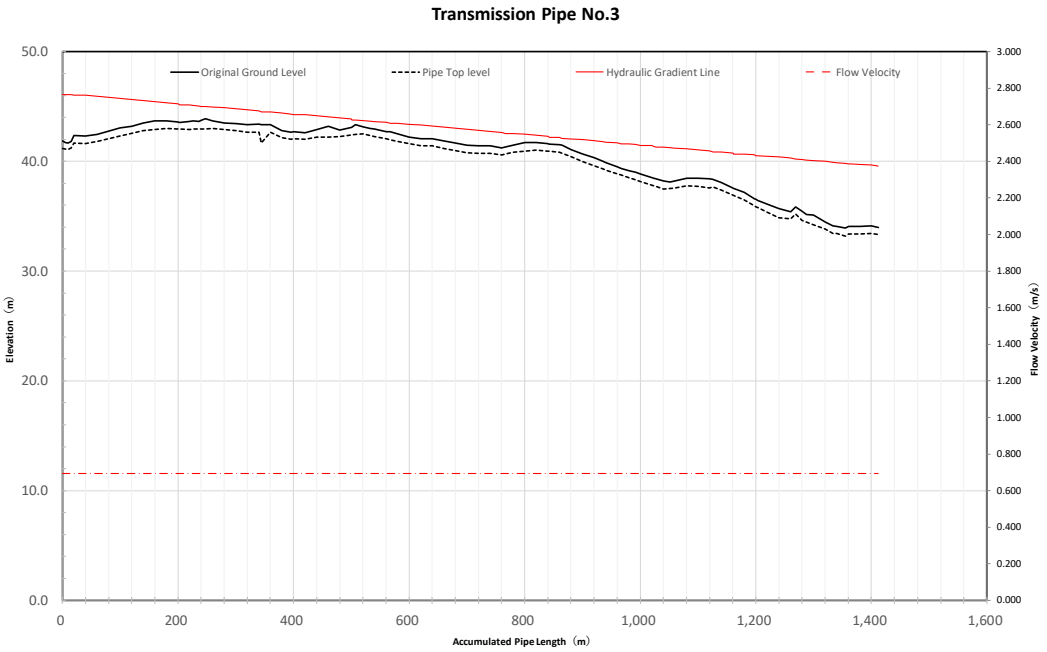
According to the hydraulic analysis results, the minimum static water pressure of the downstream end of transmission pipe and main distribution pipe is calculated at not more than 0.04MPa. Although this value of static water pressure falls around the minimum design requirement, it is hydraulically possible to transmit water from intake wells and to release the water into the underground suction tank of the booster pumping station. In case of water distribution using the main distribution pipe to the newly developed lands established in the Mombasa SEZ M/P (2015/9), a developer that will be a user of the developed land is expected to install a water supply facility so as to meet their water requirements.

On the other hand, considering the maximum hydraulic pressure is calculated at not less than 0.75MPa, HDPE pipe with the maximum allowable stress of 1.25MPa is used for the design.



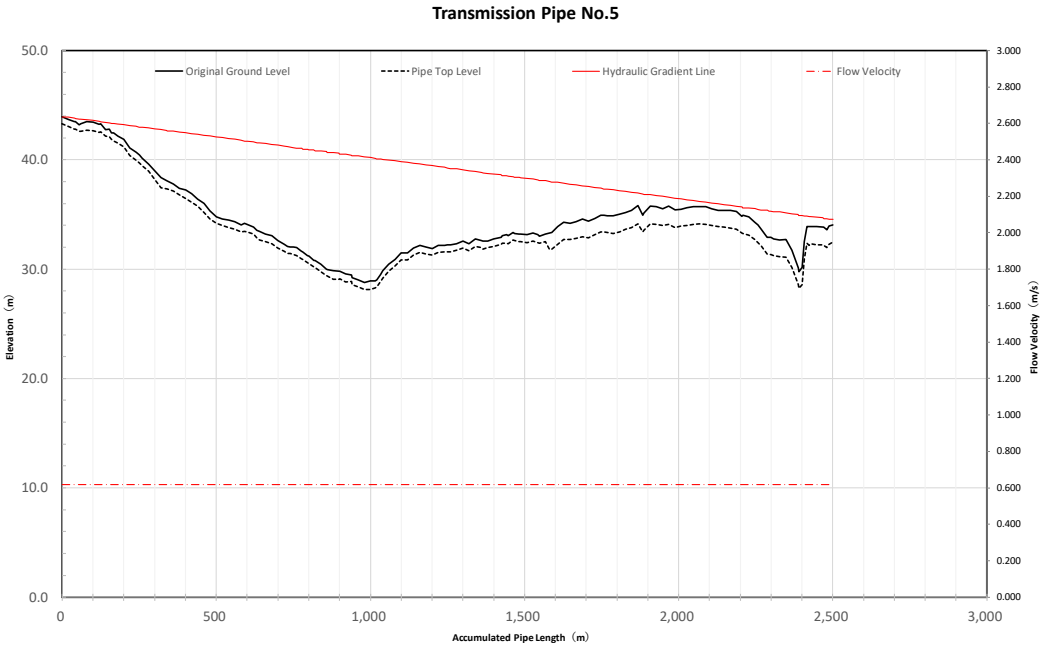
Source: JICA Study Team

Figure 2-2-14 Hydraulic Calculation Result of Transmission Pipe (Well No.2)



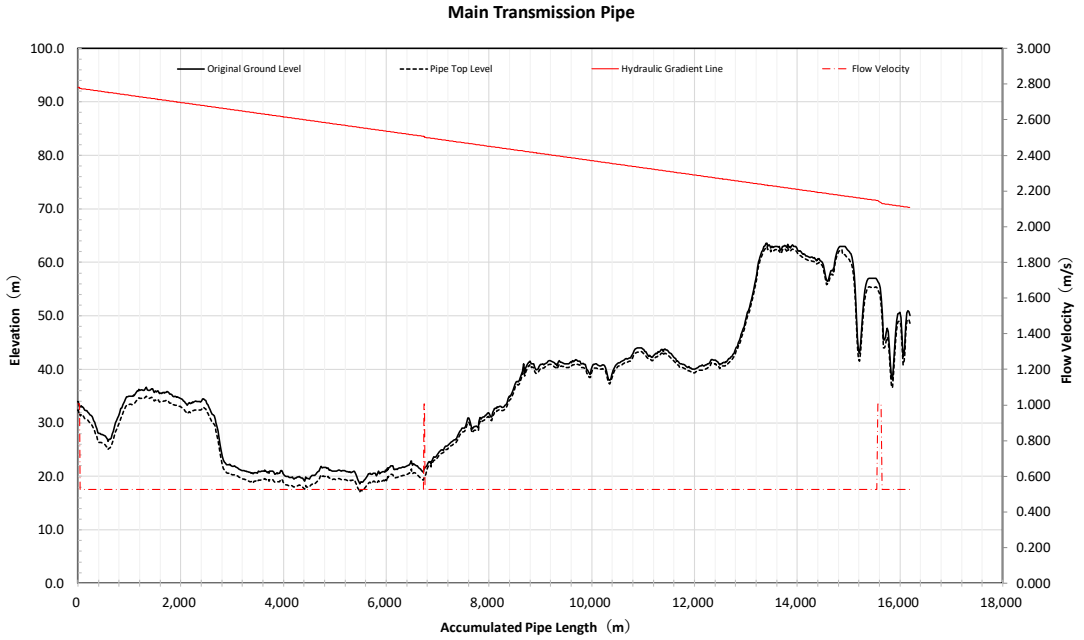
Source: JICA Study Team

Figure 2-2-15 Hydraulic Calculation Result of Transmission Pipe (Well No.3)



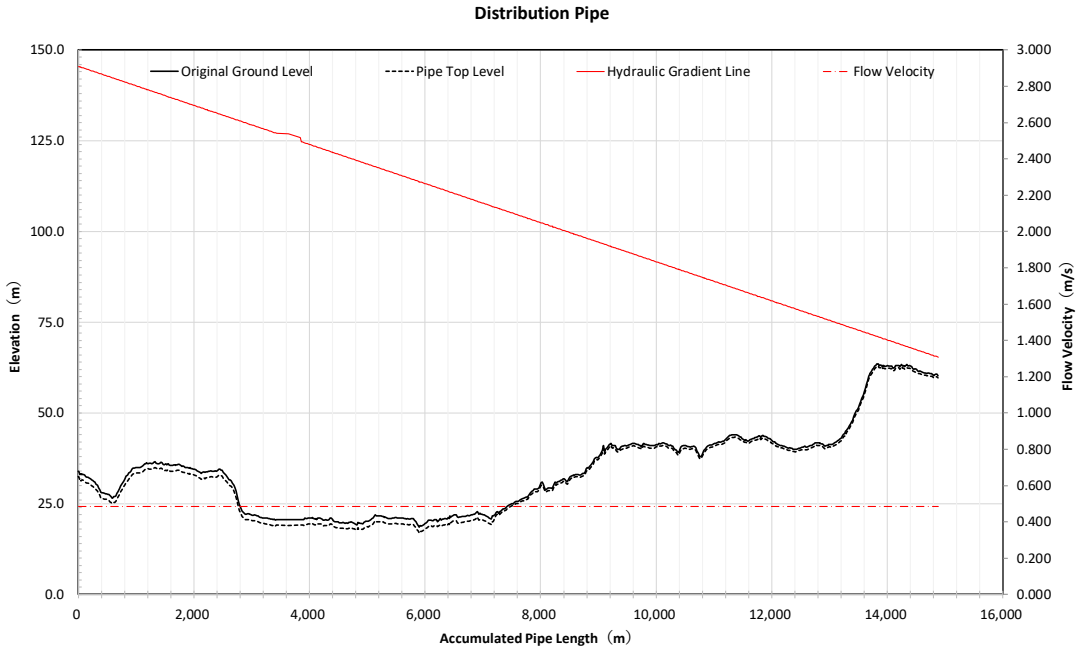
Source: JICA Study Team

Figure 2-2-16 Hydraulic Calculation Result of Transmission Pipe (Well No.5)



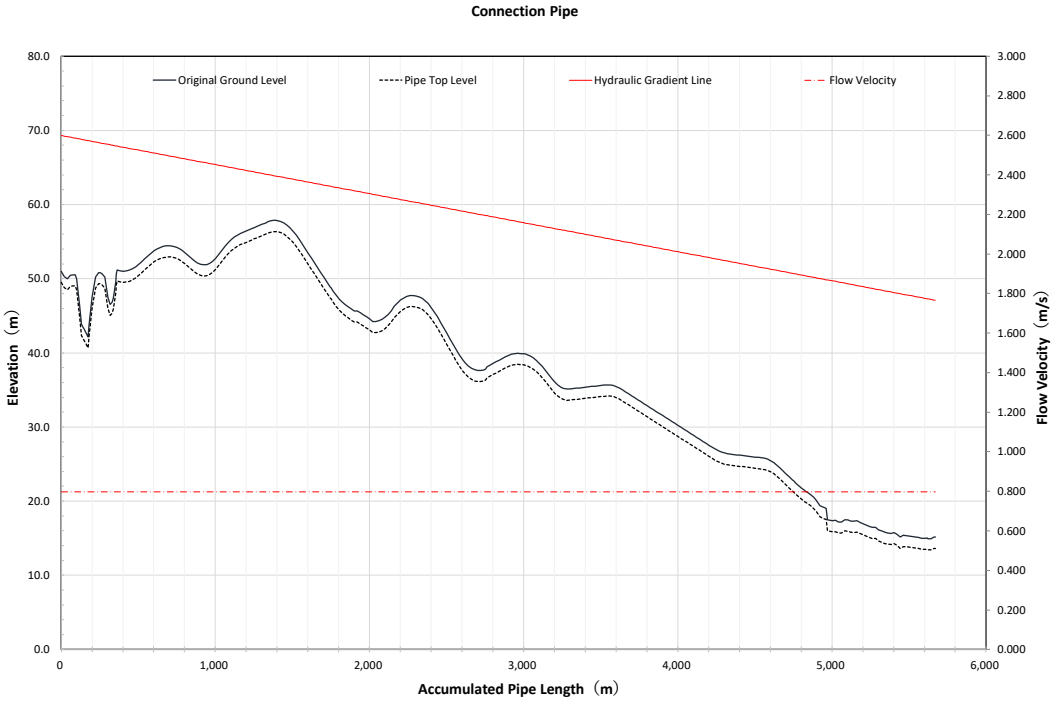
Source: JICA Study Team

Figure 2-2-17 Hydraulic Calculation Result of Main Transmission Pipe



Source: JICA Study Team

Figure 2-2-18 Hydraulic Calculation Result of Distribution Pipe



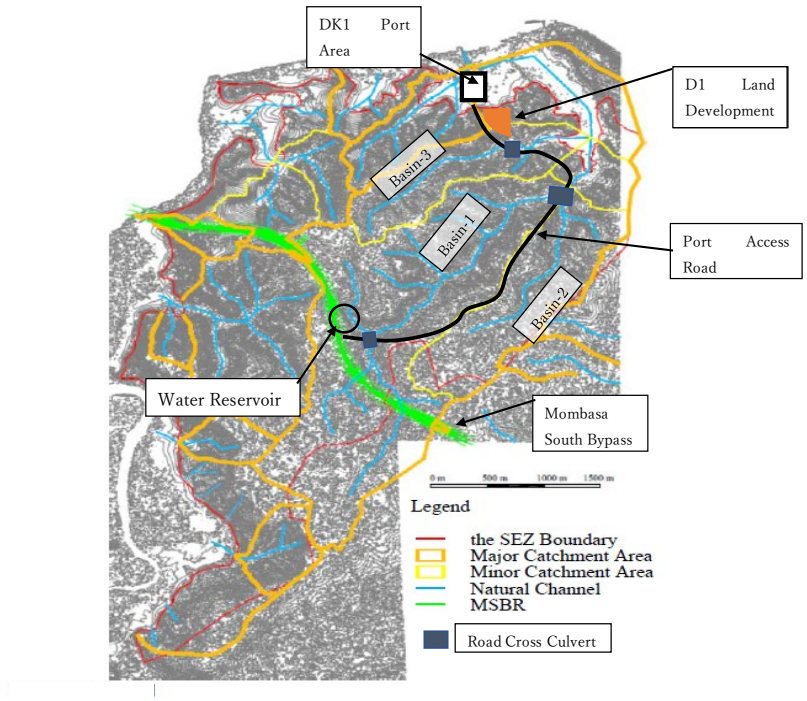
Source: JICA Study Team

Figure 2-2-19 Hydraulic Calculation Result of Connection Pipe（Q=2000m^3/day）

2-2-2-2 Drainage Component

(1) Objective Basin

As shown in Figure 2-2-20, the river basin that covers the entire Mombasa SEZ is divided by the Mombasa South By-pass, which is currently under construction. The objective basin in this JICA Study is located between the Mombasa South By-pass and the port area. Drainage facilities in the SEZ area will be constructed by developer in conjunction with the SEZ development including the residential area. A major part of rainfall on the developed area collected through the drainage facilities will be discharged into the three natural drain channels in Basin -1, Basin-2 and Basin-3 shown in Figure 2-2-20 and will be further drained into the sea.



Source：JICA Study Team

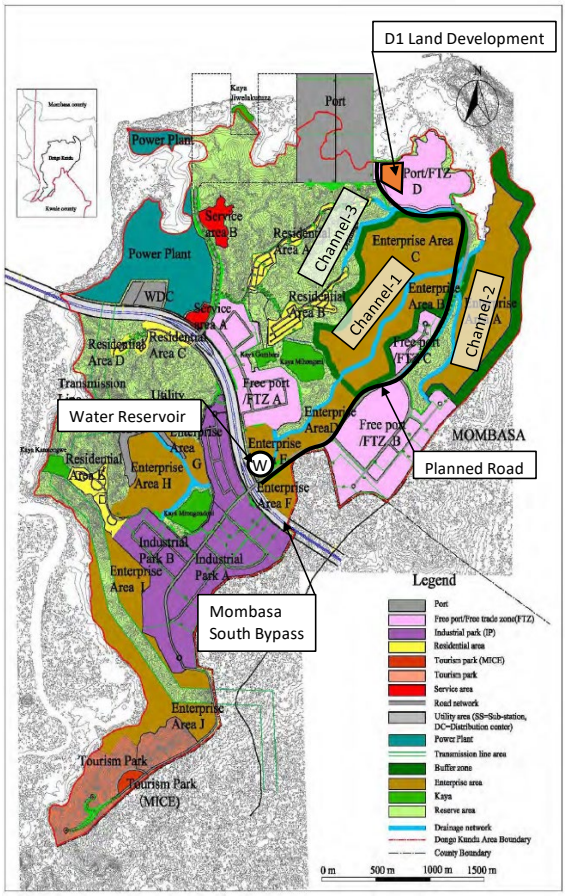
Figure 2-2-20 River Basin in the Project Area

The principal features of the above indicated basins are summarized in Table 2-2-24. drainage facility plan is prepared on the basis of the basin features and the future land use condition. The future land use plan of SEZ is shown in Figure **2-2-21**. Out of the above three basins, the area of Basin-3 is small compared to the other two basins and most of the area will be retained as natural reserve area even after completion of SEZ development, therefore any new drainage facility was not considered. For the Basin-1 and Basin-2, the facility plan is prepared incorporating information collected through field reconnaissance along the existing main channels.

Table 2-2-24 Principal Features of Basins

Location	Basin-1 (Road crossing point at the downstream)	Bain- 2 (Confluence with the channel from Basin- 1)	Basin-3 (Road crossing point)	Basin-1 * (Road crossing point at the upstream)
Basin Area (ha)	338	149	75	123
Flow Discharge (m^3/sec) 25-year Probable Flow	41.7	19.1	7.8	15.9
Specific Discharge (m^3/sec/ha)	0.123	0.128	0.104	0.129
Land Use Plan after Development of SEZ (Refer to Figure 2.2.22)	Residential area and natural reserved area in middle and downstream reaches, developed area (FTZ, etc.) in upstream area	Residential area and natural reserved area in middle and downstream reaches, developed area (FTZ, etc.) in upstream area	Major part of basin is natural reserved area and residential area.	Major part of basin is natural reserved area.

* Discharge point is located at the upstream reach of the Basin- 1.
Source: JICA Study Team



Source：Final Report of Design Mission for Mombasa Special Economic Zone Development Project, Jun 2019

Figure 2-2-21 **Future Land Use in SEZ（upon completion of SEZ development）**

(2) Natural Condition

1) Topography

Drainage Component targeted two natural waterways in SEZ to keep the current drain ability even after the construction of the Project. These natural waterways were located at the channel from the hill where road was to be constructed. The length of two waterways is approximately 2.7km in a westerly direction from the planned road and approximately 1.4km in an easterly direction from the planned road individually. Both bed slopes are approximately 1/100 and after meeting them, the slope was approximately 1/150 to the sea.

Upstream was a gentle steep and covered by trees and bushes, but middle stream was narrow, and erosion could be found at some places. At the downstream around the meeting point, it was difficult to clearly find the water pass because of the flat wetland. Contrary to the dry season, in a rainy season with heavy rain, the pass might be found clearly based on the erosion at middle stream. The current status is shown below. (Also refer to Figure 2-2-22)

(a) Natural Waterway (Upstream reach)

(b) Natural Waterway (Middle reach) (Bank Protection Site)

(c) Natural Waterway (Middle reach) (Bank Protection Site)

(d) Natural Waterway (Downstream reach)

Figure 2-2-22 Topography related with Drainage Component

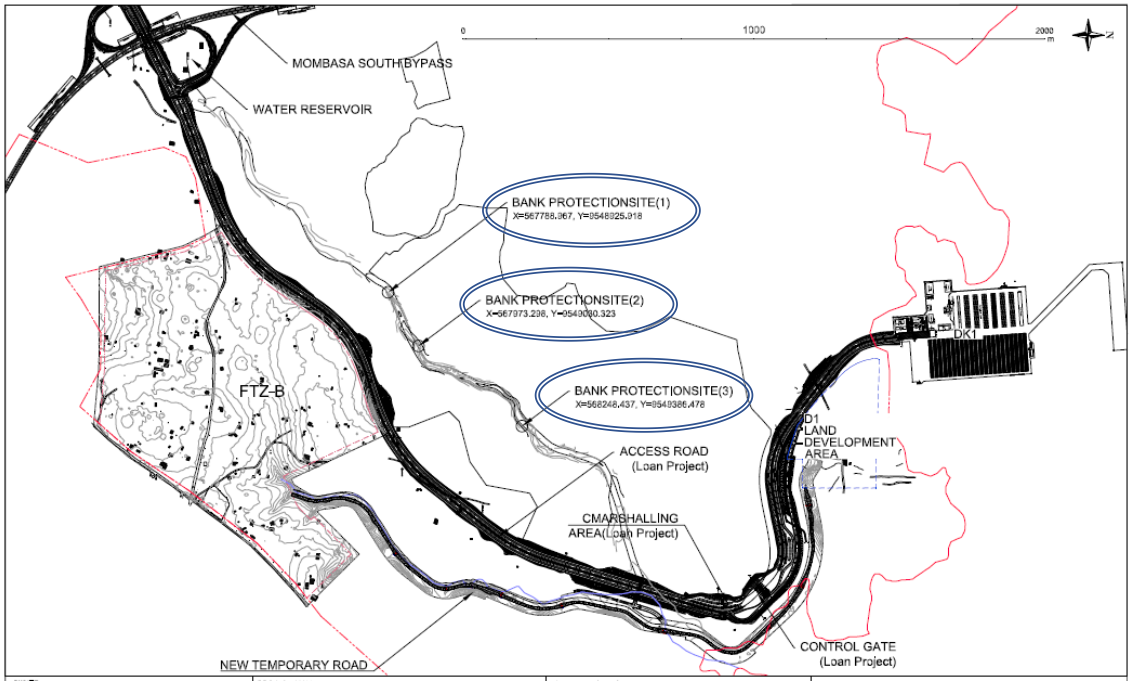
Source: JICA Study Team

2) Geology

Along natural waterway, no structure which requires high bearing capacity of soil is planned. However, according to the result of geological survey, it was expected that surface ground (the depth is less than 1.5m) near the point where two main natural waterways meets in SEZ consisted of silty clay with peat regarded as soft ground. The ground deeper than 1.5m was silty clay with the higher N value (more than 10), meaning that a construction of structure could be conducted.

(3) Objective Drainage Facilities

The planned drainage facilities in this project are the sets of river bank improvement at three locations in Channel-1 indicated in Figure 2-2-21, where a remarkable erosion/damage of the existing bank is observed. The locations of these drainage facilities ("BANK PROTECTION SITE") are indicated in Figure 2-2-23.



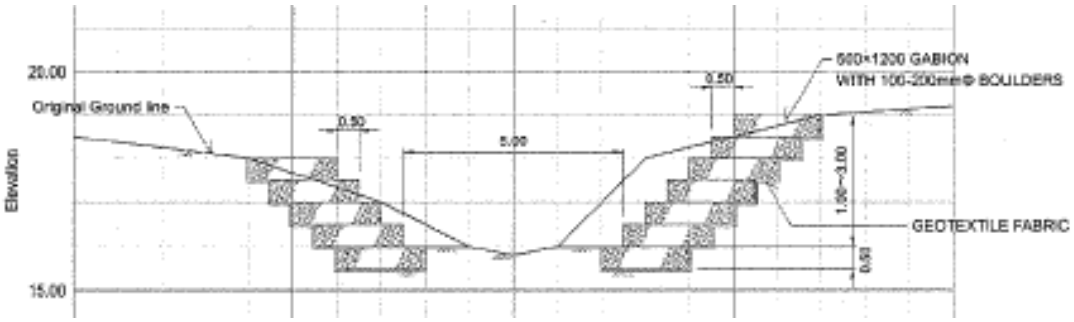
Source：JICA Study Team

Figure 2-2-23 Location Map of Drainage Facilities

1) River Improvement of Natural Channel

In the Final Report of Mombasa SEZ D/M (2019/6), a concrete channel is applied for the entire stretches of the existing Channel-1 and Channel-2 indicated in Figure 2-2-20. Irrespective of the small-scale channel, those are the main natural channels. Therefore, the above facility measure causes unnecessary increase of flood runoff and construction cost. Based on this consideration, in this project, only bank improvement is planned for the section where a comparatively large extent of bank erosion is observed. Bank protection using

gabion with the maximum side slope of 1:1.0 is applied. The typical cross section of bank improvement is shown in Figure 2-2-24.



Source：JICA Study Team

Figure 2-2-24 Typical Cross Section of Bank Protection (Gabion)

Proposed drainage facilities are summarized in the Table 2-2-25.

Table 2-2-25 Features of Proposed Drainage Facilities

No.	Facility	Structure Type	Material	Principal Features
Drainage Component				
1.	River Bank Improvement	Gabion revetment	Gabion mat	B5.0m, Max. s:1:1.0, H:2m~3m, 3 locations of river bank protection, total length of gabion mat: 2,250m (H=0.5m, B=1.2m)

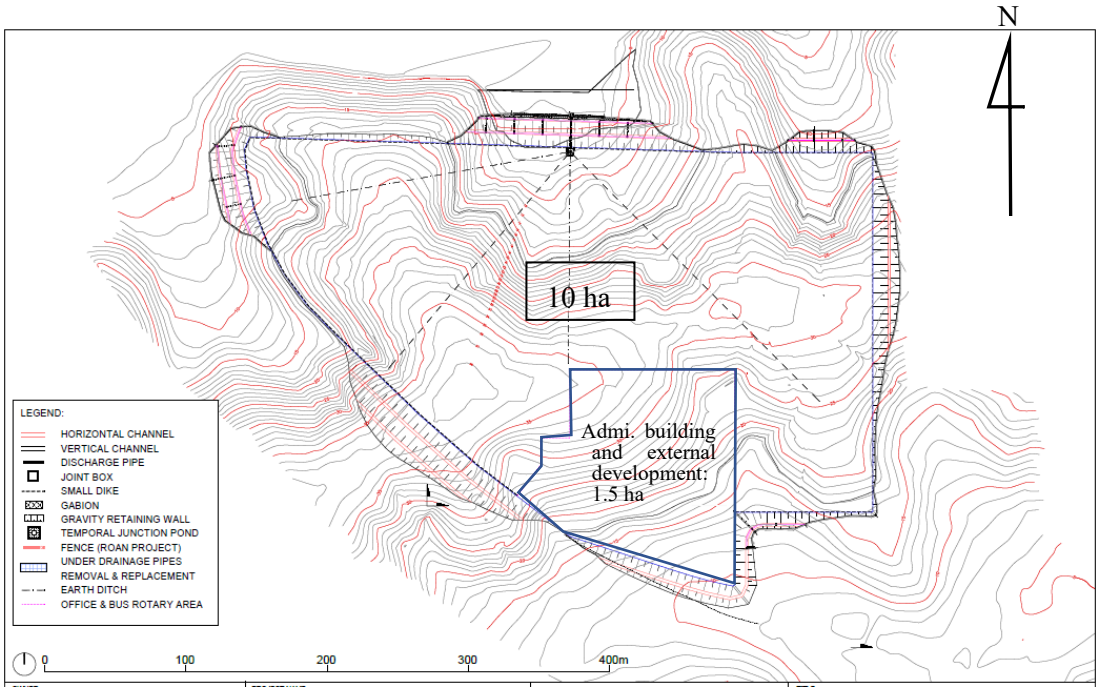
B: bottom width, H: height, s: side slope

Source：JICA Study Team

2-2-2-3 Land Development Component

(1) Land Development

D1 Area is located along side of the port access road and established as a part of Development Area D in the SEZ M/P. Considering the above condition, the shape of D1 Area is determined on the basis of the SEZ development boundary, stagewise development boundary of the Area D and alignment of the port access road. The area is shown in Figure 2-2-25.



Source: JICA Study Team

Figure 2-2-25 Layout Plan of Mombasa SEZ D1 Area

1) Contents of development design

The design includes earthworks and temporary facilities, such as drains and ponds. Permanent facilities, such as internal roads and drainage, are excluded.

2) Development area

The D1 Area is demarcated as a western segment of the D Area in the land use plan of Mombasa SEZ M/P (2015/9). Considering the land development cost that is dependent on the cut volume, fill volume and slope protection area, 10ha of the land area was determined as the most cost-effective area. The D1 Area is located to the port in the north and borders the Road from Control Gate to Port in the southwest, and therefore the east boundary across the steep hill and valley located at the east side of the D1 Area is a key factor to adjust the land area. The land area increases by putting the east boundary at more eastern side, however the earth work volumes including cut, fill and slope protection also increase as the land area increases. As the result, the cost for land development exceeding 10 ha is higher than that for the area of 10 ha, in terms of the development cost per unit area. Furthermore, a larger slope that appears behind the developed land may produce a negative impression to tenants which consider purchase of the land. In addition, an administration building and the external development, including restroom building, bus roundabout, car park, vehicle roads, foot path,

and other utilities (the total area of approximately 1.5ha) was set up in the D1 area. (Figure 2-2-25).

3) Elevation of development plan

The planned elevation of D1 area was set to Formation Height (FH) =18m in line with the highest elevation of the port access road on the front area (Figure 2-2-25), and a 1% drainage gradient is provided on the sea side. In addition, the horizontal alignment and vertical alignment of the port access road are based on the Mombasa SEZ D/M (2019/6). The road height is set as high as possible to reduce the amount of cutting soil of D1 area.

(2) Natural Condition

1) Topography

D1 Area is a fan shaped land of approximately 10 ha that faces to the sea at the north, as shown in Figure 2-2-25. The east-west length was approximately 330m and the north-south length was approximately 300m. As indicated in the Figures 2-2-28 and 2-2-29, the elevation above the sea level varies approximately from 3m to 38m. The land is inclined from the east-west ridge to north side and south side whose slope is approximately 30 degrees at most. Erosion could be found at a part of northern area, meaning that the tide level could reach 3m above the sea level. The current situation of the D1 land area is presented in Figure 2-2-26 below.

(a) From West to East

(b) From East to West

(c) From South to North

(d) From North to South

(e) Nothern Side in D1 Area

Source: JICA Study Team

Figure 2-2-26 Topography related with Land Development Component

The planned elevation of D1 Area was approximately from 16m to 18m, meaning that cutting must be major work during the land development. Embankment will be done at a part of the north and southeast side. Though heavy construction machineries were needed to conduct these works, the existing access road to the D1 Area was not wide enough and unpaved for traffic of heavy construction machineries. In addition, considering the transportation for soil disposal, a temporary road is to be constructed between D1 land area and FTZ-B area under the Grant Aid Project.

2) Geology

Considering the maximum elevation of the port access road (EL. 18m) and the linkage between D1 Area and the port access road, the maximum excavation depth of D1 Area from

the original ground surface is assumed at about 20m. Construction period is highly depended on the kind of construction machine and the way of excavation because the dominant soil is shale in the area. In addition, even if excavated soil is to be used as embankment material, much surplus excavation soil will remain. It means a disposal area should be carefully determined.

Shale easily becomes slaking. Figure 2-2-27(a) shows the surface of slaking shale near the hill due to alternating immersion. Actually, we found gully erosion occurred at the northern slope and the southern slope in D1 Area (Figure 2-2-27(b) and (c)). Based on the survey result, countermeasure to avoid weathering must be considered when excavation soil is used.

(a) Weathered Shale

(b) Gully Erosion due to Rain

(c) Gully Erosion due to Rain

Figure 2-2-27 Geology related with Land Development Component

(3) Earthwork

Depending on the planned elevation of D1, the maximum cutting depth is about 20m. This cutting soil is used for D1 banking, road banking, etc., and all remaining soil is discarded in the Phase 1 area.

1) Calculation of Cutting and filling volume

The cutting and filling volume of the D1 area was calculated using 3D CAD. Calculated by the following steps.

① First, creating a 3D planning model with a D1 planned elevation of 18m and a flat area of 10ha.

② Next, creating a 3D drawing by overlapping the port access road plan and the topographic map .

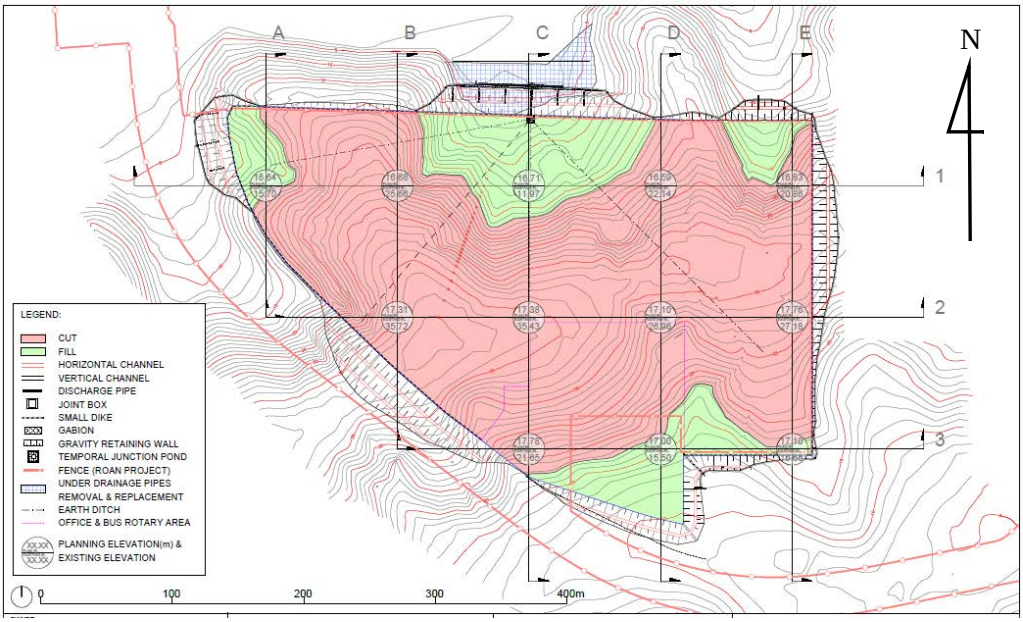
③ 3D-CAD's internal system automatically calculated cutting and filling volume from the comparison of ① and ②.

The calculation results are as follows.

- Cutting volume: 816,000m^3
- Filling volume: 94,700m^3

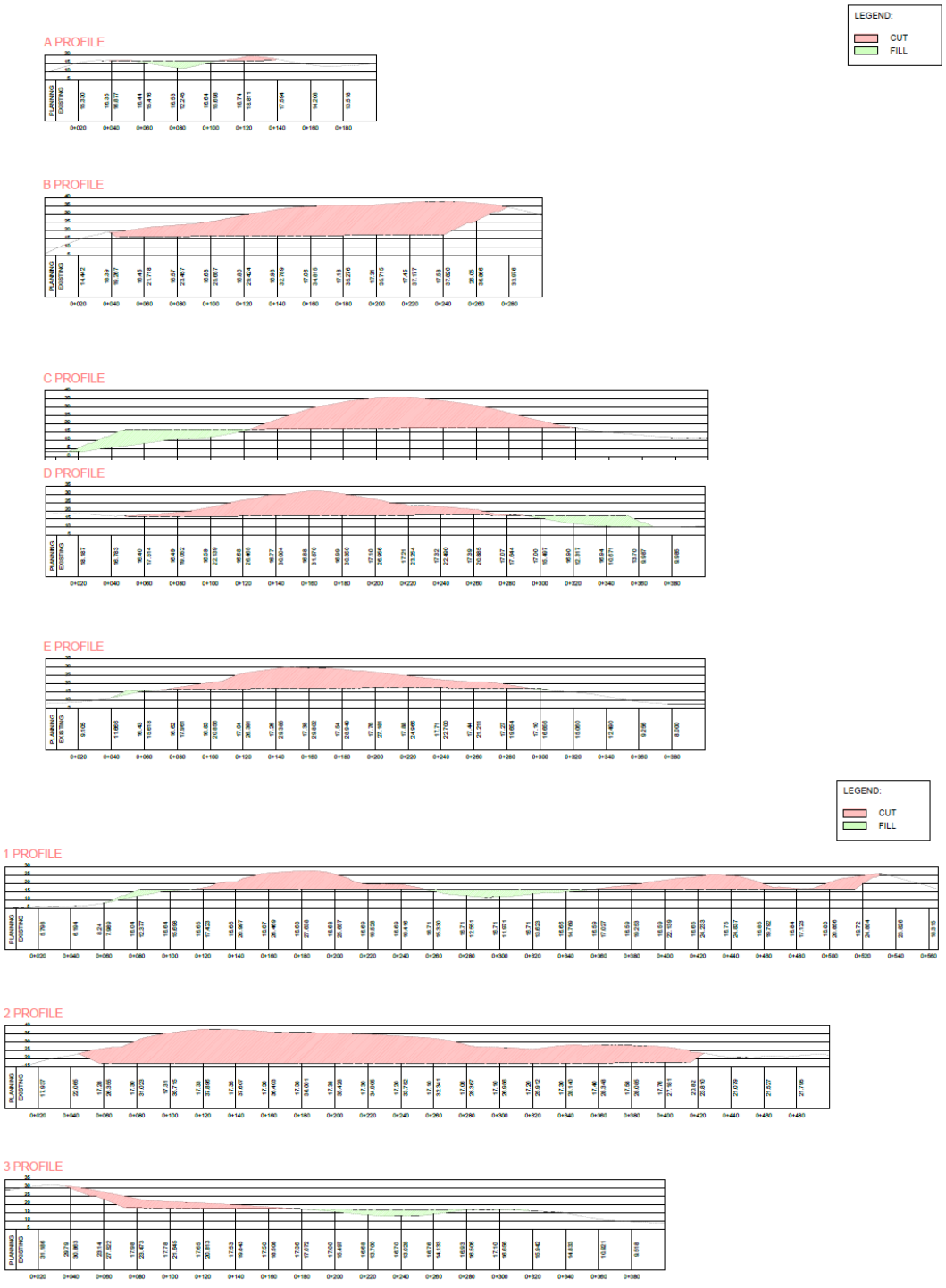
Part of the remaining soil will be used to the embankment of the temporary road and Mombasa SEZ Reservoir, and the surplus soil will be disposed in FTP-B area between the port and the southern bypass.

Plan of cutting and filling is shown in Figure 2-2-28 and section is shown in Figure 2-2-29.



Source: JICA Study Team

Figure 2-2-28 Plan of Cutting and Filling



Source: JICA Study Team

Figure 2-2-29 Section

(4) Slope

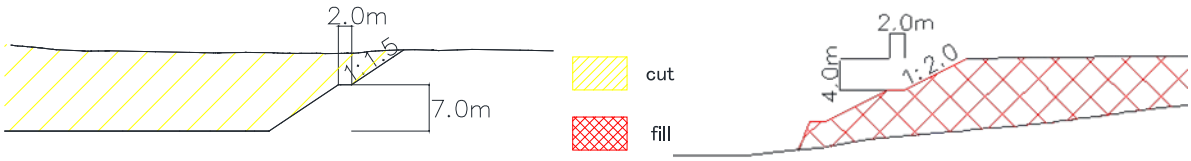
1) Structure and protection

The slope height of the reclaimed area is up to 15m on filling slope and 13m on cutting slope. Taking into account that the existing soil is shale and weathered rock that is liable to cause slaking, the design conditions of the slope structure and slope protection were determined. Table 2-2-26 and Figure 2-2-30 show the design conditions of the slope structure.

Table 2-2-26 Slope Structure Design Conditions

Item	Design conditions	Remarks
Cutting slope	Slope gradient 1:1.5, Small steps installed every 7m	Figure 2-2-30
Filling slope	Slope gradient 1:2.0, Small steps installed every 4m	Figure 2-2-30

Source: JICA Study Team



Source: JICA Study Team

Figure 2-2-30 Slope Structure

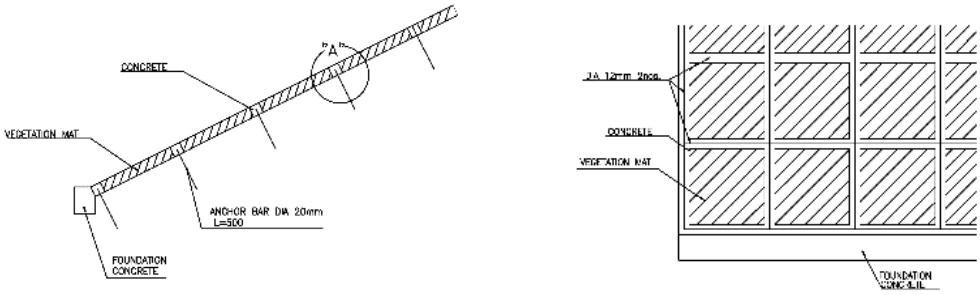
In order to secure a safety slope, the gradients for cutting and filling are 1:1.5 and 1:2.0, respectively. The slope protection is necessary because the material of cutting and filling slope has slaking feature that decreases the strength due to granulation when it is affected by repeatedly dry and wet.

The slope protection method is classified into planting method and structural method. The planting method is to tightly bind with root into the slope surface by plant growing, accordingly, it works for protection of slope erosion by rainwater, relieving of temperature change, preservation of natural environment and satisfaction of landscape. Meanwhile, the structural method is to prevent the slope erosion, surface slope and deeper slope collapses, and to be basis of the planting.

At the initial stage, the planting and structural method were applied for the entire slope surface. However, its method is costly and difficult to maintain on the steep slope. Therefore, the plating and structural method (cast in-place concrete crib and vegetation mat) are adopted only for filling slope that is an artificial structure and the structural method (shotcrete) is adopted for the cutting slope. The details are illustrated as follows.

・Filling slope

Cast-in-place concrete crib and vegetation mat (Figure 2-2-31).

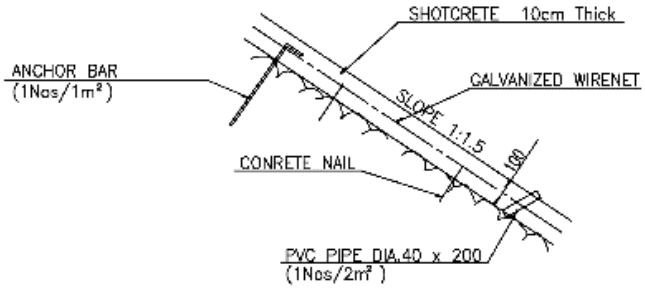


Source: JICA Study Team

Figure 2-2-31 Filling Slope Protection

・Cutting slope

Concrete shotcrete (Figure 2-2-32)

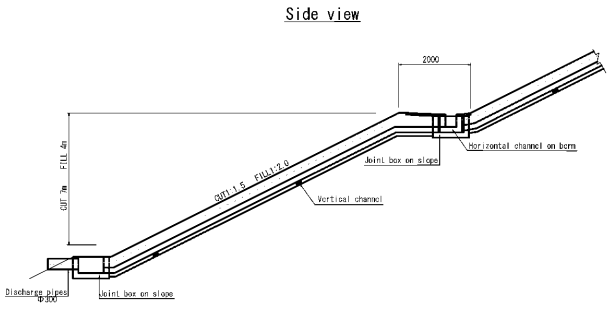


Source: JICA Study Team

Figure 2-2-32 Cutting Slope Protection

2) Slope drainage

The slope drainage facilities will be used to prevent slope erosion and stability degradation due to rainwater flowing down the filling slope and cutting slope. The facilities will drain the water through horizontal channel on steps, joint box on slope, vertical channel, and discharge pipes (Figure 2-2-33).



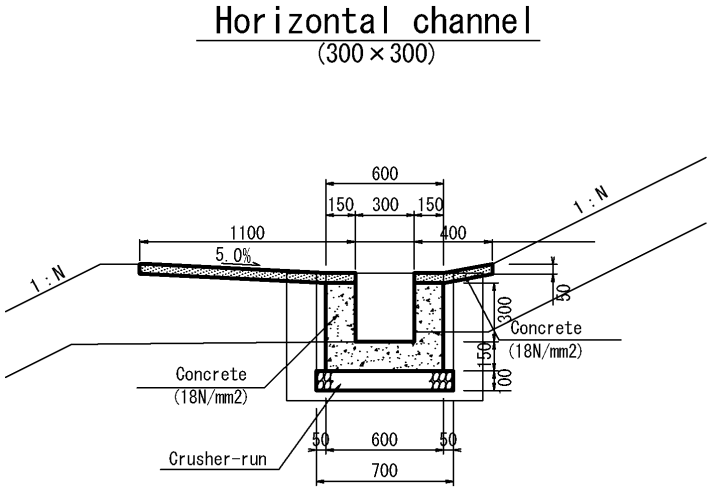
Source: JICA Study Team

Figure 2-2-33 Slope Drainage

・Horizontal channel (Figure 2-2-34)

The horizontal channel is installed on slope steps.

The water gradient is set in the direction of the vertical drainage.

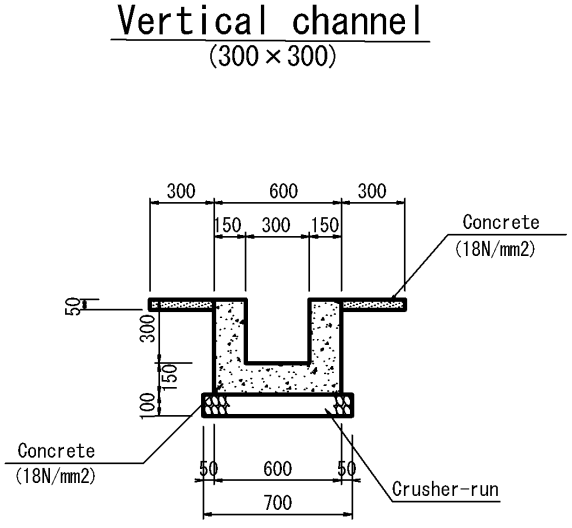


Source: JICA Study Team

Figure 2-2-34 Horizontal Channel

・Vertical drainage (Figure 2-2-35)

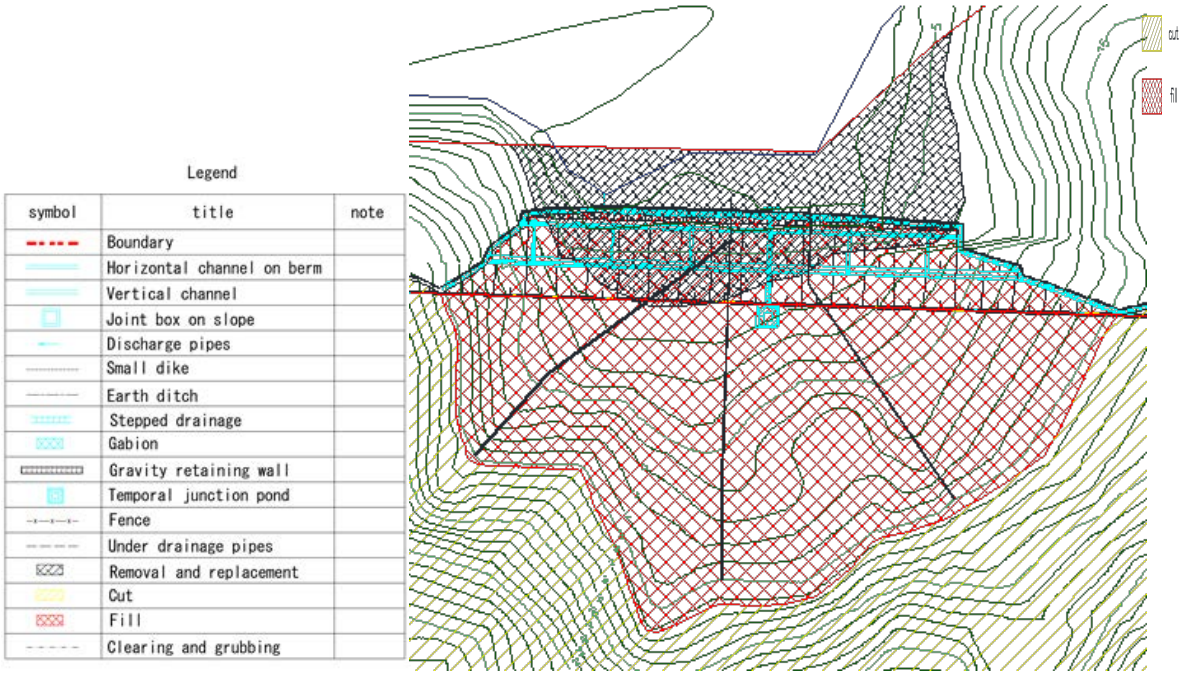
The vertical drainage is installed on the slope, at intervals of about 20m, to discharge water from the horizontal channel. The vertical drainage is connected to the horizontal channel by a joint box. Finally, water is discharged from a joint box in the foot of the slope through a discharge pipe.



Source: JICA Study Team

Figure 2-2-35 Vertical Channel

(5) Filling area on the North side



Legend

symbol	title	note
	Boundary	
	Horizontal channel on berm	
	Vertical channel	
	Joint box on slope	
	Discharge pipes	
	Small dike	
	Earth ditch	
	Stepped drainage	
	Gabion	
	Gravity retaining wall	
	Temporal junction pond	
	Fence	
	Under drainage pipes	
	Removal and replacement	
	Cut	
	Fill	
	Clearing and grubbing	

Source: JICA Study Team

Figure 2-2-36 Filling Area on the North Side

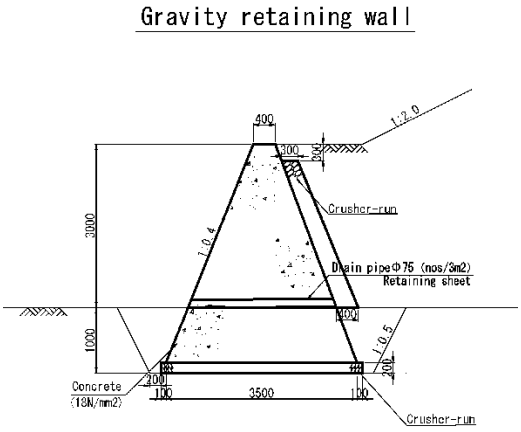
According to the results of geological survey, a soft layer with a thickness of 1m was confirmed on the surface of existing ground in the northern part of the D1 development area. The altitude of this area is about 3m, and embankment is planned on this part. Therefore, countermeasures for soft layer should be considered (Figure 2-2-36).

1) Countermeasures of soft ground (replacement work)

The soft layer with a thickness of 1m in the surface layer confirmed by the geological survey is replaced with good soil.

2) Wave breaking facilities

Since the tide level is expected to rise above the bottom of the filling slope, a gravity retaining wall is constructed as a wave breaking work (Figure 2-2-37). A gabion is installed on the entire front of the retaining wall.

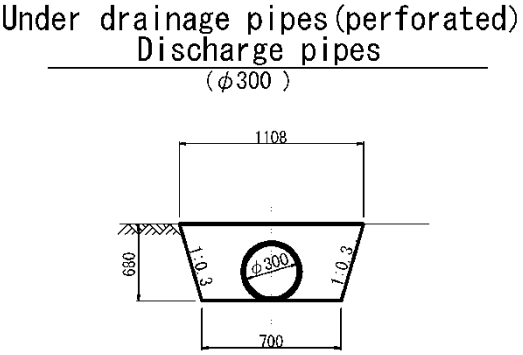


Source: JICA Study Team

Figure 2-2-37 Gravity Type of Retaining Wall

3) Underground drainage facility

An underground drainpipe should be installed to prevent rainwater from entering the embankment. Three perforated pipes of φ300 (Figure 2-2-38) is installed between the existing ground and the embankment. Rainwater is discharged to the seaside.

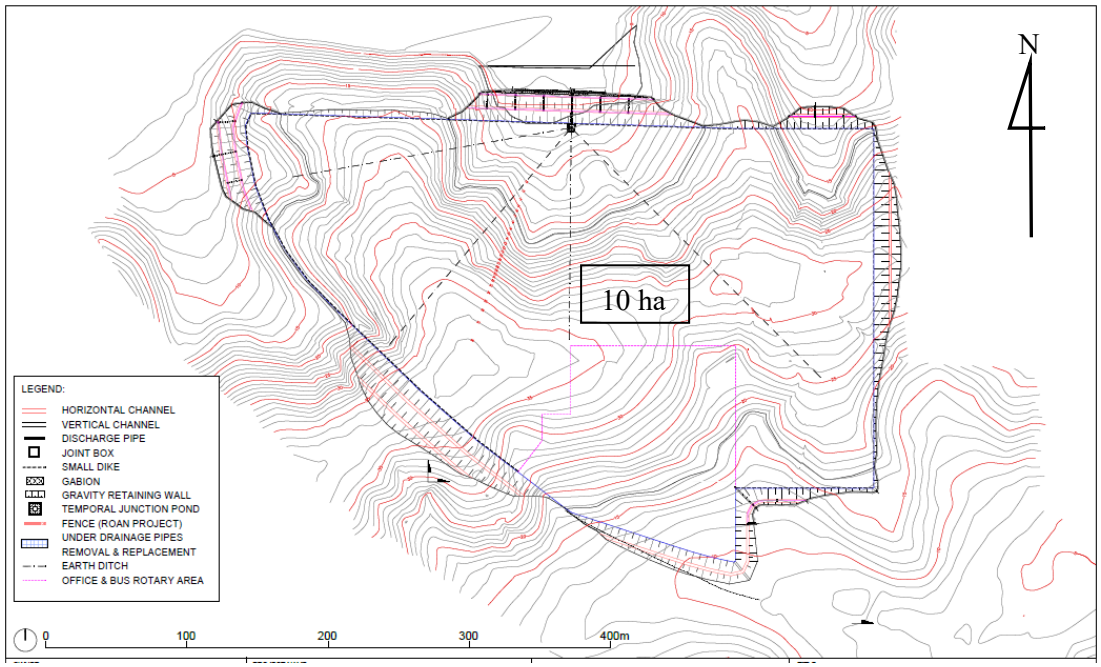


Source: JICA Study Team

Figure 2-2-38 Drain Pipe

(6) Rainwater drainage facilities in D1 area

In the D1 area, except for the layout of KPA Administration Building and the car park, future layout plan has not been decided. Therefore, temporary earth ditches are installed on the surface of the planned ground, and a temporary junction pond is installed on the sea side for discharging rainwater. In addition, surface gradient of 1% is planned for drain. The collected rainwater is discharged to the sea side from a stepped drainage (permanent facility) on the slope.



Source: JICA Study Team

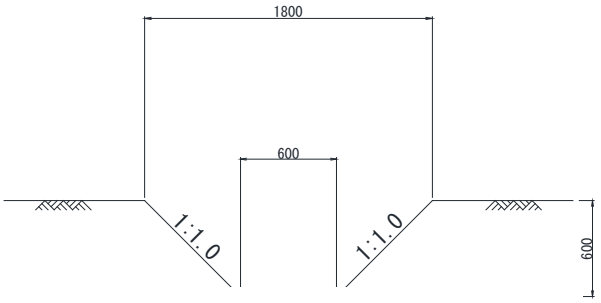
Figure 2-2-39 Area Rainwater Drainage Plan

1) Earth ditch (Figure 2-2-40)

The earth ditches are installed to discharge rainwater of 10 ha basin.

Rainwater flows down by surface gradient of 1%.

The catch basin at KPA site is connected to the earth ditch.

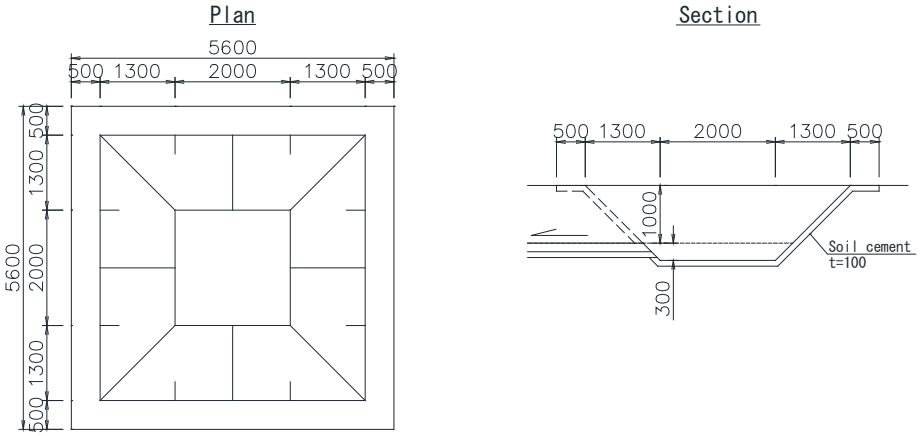


Source: JICA Study Team

Figure 2-2-40 Earth Ditch

2) Temporary pond (Figure 2-2-41)

Water from the earth ditch is collected in a temporary pond on the north side. A mud pool which is 300mm depth is provided at the bottom.

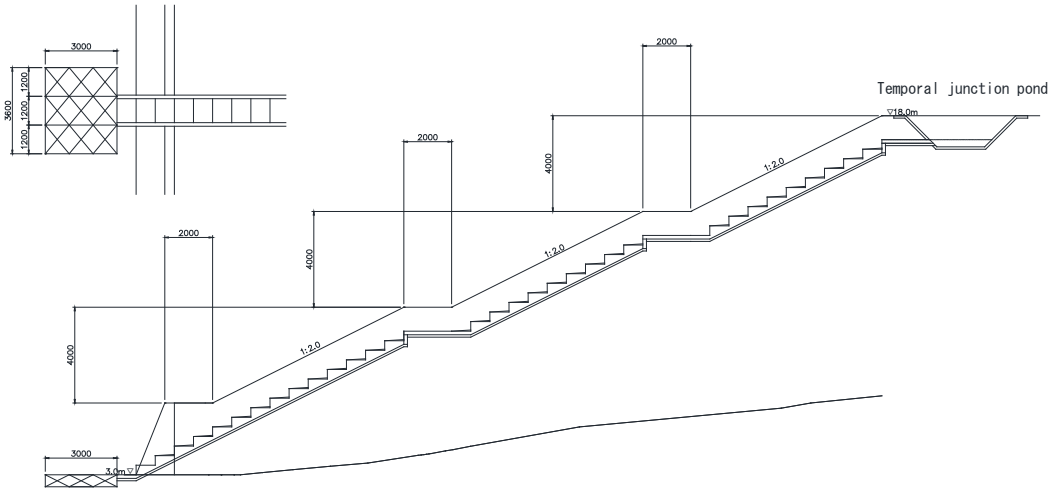


Source: JICA Study Team

Figure 2-2-41 Temporary Pond

3) Stepped drain (Figure)

A stepped drainage is installed on the north slope. A gabion is installed at the bottom to prevent erosion of the existing ground.

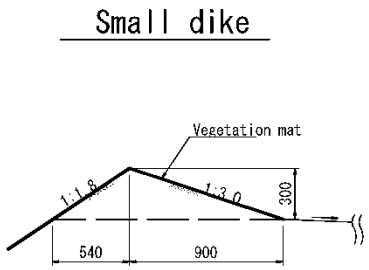


Source: JICA Study Team

Figure 2-2-42 Stepped Drain

4) Small dike (Figure 2-2-43)

A small dike for disaster prevention is installed on the slope shoulder in order to prevent rainwater from flowing to the slope and erosion.



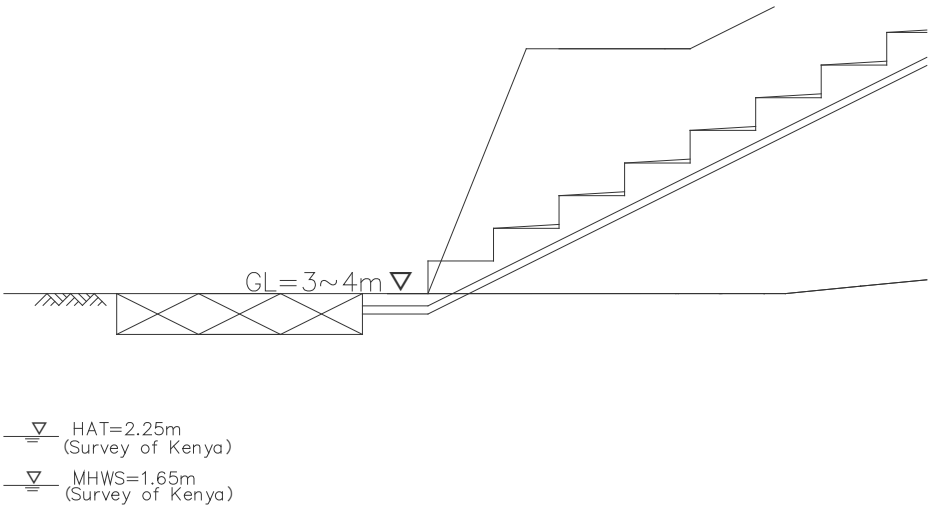
Source: JICA Study Team

Figure 2-2-43 Small Dike

(7) Relation between Wave breaking facilities and tide level

Relation between the wave breaking facilities and the tide level is shown in Figure 2-2-44.

Since both High Astronomical Tide (HAT) and Mean Hight Water Springs (MHWS) are located lower than the facilities, it is considered that there will be no significant impact such as scouring by waves directly.



Source: JICA Study Team

Figure 2-2-44 Relationship with Tide Level

(8) Fence

A fence is installed on the east side of the district for keeping out intruders from outside the district.

(9) Administration Building and Restroom Building

The outline of the Administration Building is as follows: 2 stories, RC structure, floor area: 866.32m^2.

The outline of the Restroom Building is as follows: 1 story, RC structure, floor area: 84m^2.

The outline of the Administration Building and the Restroom Building, which shows the room composition of the building is shown in Table 2-2-27.

Table 2-2-27 Outline of the Administration Building,

	Room Name	Capacity	Size/Floor Area
Administration Building			
1	**Ground Floor**		
1)	Entrance Hall	Main entrance	112m^2
2)	Office (1)	One Stop Service Center	201m^2
3)	Office (2)	Security / Maintenance and Fire alarm panel	28m^2
4)	Machine Room	PC server, Telephone exchange PBX	14m^2
5)	Toilet	Male 1, Female 1, Multi-purpose1	
6)	Tea Serve kitchen	Sink, Outlet for Heater	6m^2
7)	Staircase	Main stair	W=1,500mm
8)	Outdoor Stairs	Emergency stair	W=800mm
2	**First Floor**		
1)	Corridor	Both way width	W＝1,800mm
2)	Office (3), (4)	36 staffs	172m^2
3)	Office (5)	10 staffs	17m^2
4)	Office (6)	Director, Secretary, Waiting room	57m^2
5)	Toilet	Male 1, Female 1	
6)	Tea Serve kitchen	Sink, Outlet for Heater	6m^2
7)	Staircase	Main stair	W=1,500mm
8)	Outdoor Stairs	Emergency stair	W=800mm
3	**Others**		
1)	Flag poles+ Plaque	Outdoor	
2)	Garbage collection	Trash bucket rack, Sink	
Restroom Building			
4	**Ground Floor**		
1)	Toilet	Male 1, Female 1, Multipurpose 1	

Source: JICA Study Team

The building equipment list that outline of building equipment of the Administration Building is shown in Table 2-2-28.

Table 2-2-28 Building Equipment List

	Building Equipment	Outline
1	**Electrical equipment**	
1)	Electrical wiring	Low voltage income from pole
2)	Distribution board: DB	Low voltage DB
3)	Outlet	Normal type
4)	Lighting fixture	LED
5)	Emergency generator	Emergency use type
6)	Lightning	Coper conductor
7)	Telephone	2-main line exchanger
8)	LAN Antenna, Pole	Antenna (Client work), Pole for Antenna, Joint box
9)	Fire alarm	Smoke detector, Notice board
10)	Emergency Light	Activated during power outage
11)	Elevator	1set, Max 450kg, 6person, 1.0m/sec
2	**Plumbing Equipment**	
1)	Water supply	Direct connection from main
2)	Drainage	Sewage and normal drainage
3)	Sanitary	Toilet ball, basin
4)	Fire extinguishing equipment	Fire extinguisher, hose reel
5)	Kitchen	Sink, outlet for heater
6)	Sewage treatment	Septic tank 60 persons
3	**Air Conditioning and Ventilation Equipment**	
1)	Air-conditioner	Outdoor unit: Last proof type
2)	Ventilation fan	Indoor type

*1: At the time of completion of the Administration Building, power distribution work to the special economic zone and power supply work from the port (substation, building, etc.) have not been completed. Since power supply from the new distribution network will not be expected, a power pole (8m for others) will be planned, and the low voltage (240V, 415V) pull-in work from the existing power grid will be burdened by the owner.

*2: Since the specifications of communication equipment such as LAN antennas will be different type depending on the communication firms, a power pole (8m in height) for the installation of antennas, etc. will be planned, but installation of various antenna equipment on the power pole will be borne by the owner.

Source: JICA Study Team

*3: The need for elevating facilities shall be confirmed at the term of detailed design.

An exterior finishing and an interior finishing that consider durability will be made with reference to the finishing of similar public facilities. the external finishing and the interior finishing of the planned facilities are shown in Table 2-2-29and Table 2-2-30.

Table 2-2-29 Exterior Finishing Schedule

Item	Finishing
Roof	Tile, Insulation waterproof layer
External wall	Paint on mortar, Coral stone cladding Lover: Paint on precast concrete
Eaves	Paint on concrete
Window and Door	Window: Aluminum sliding window, Door: Paint on steel hanging door

Source: JICA Study Team

Table 2-2-30 Interior Finishing Schedule

Room Name	Floor	Wall	Ceiling	Door
Office/Meeting Room	Unglazed porcelain tile	Paint on mortar	Rockwool acoustic board	Paint on Steel door
Tea Serve Kitchen	Unglazed porcelain tile	Paint on mortar	Paint on calcium silicate board	Paint on Steel door
Toilet	Porcelain tile	Glazed porcelain tile	Paint on calcium silicate board	Paint on Steel door

Source: JICA Study Team

In addition to construction of the Administration Building in the D1 land development site, the surrounding area is also developed including the facilities as listed below.

- Restroom building
- Bus roundabout
- Foot path and vehicle road around the administration building
- Car park
- Street lighting apparatus
- Guard rail and fence
- Utilities (water supply pipe, sewerage, drain ditch, sleeve pipes for electric and communication cables)

The drawings of outline design (Layout plan, Floor Plan, Elevation, Section) of the Administration Building and the external development are shown in the following Section 2-2-3 Outline Design Drawing.

2-2-2-4 Road Component

(1) Natural Condition

1) Topography

The topography of the area where the temporary road is to be constructed is generally characterized by rough and bumpy hill. The road stars from FTZ-B area that is planned to be used as a soil disposal area and reaches the D1 land development area. The total length is 2.4 km and the road stretch of the initial 1.2 km is located in a comparatively narrow valley along the natural drain channel. The road crosses a low and flat area where the elevation varies 6m to 7m for approximately 300 m in length after passing the valley. Furthermore, after passing the low and flat area, the road starts climbing up towards the hill where D1 land development is planned along a comparatively wide valley. Figure 2-2-45 shows the current status of the hill where the road will be constructed.

(a) The Area for Temporary Road (near D1 land development site)

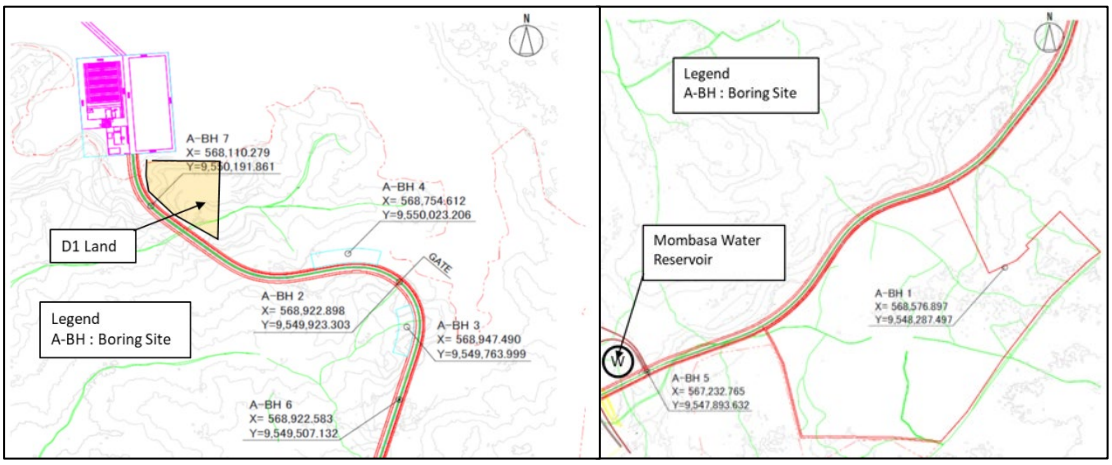
(b) The Area for Port from the highest point of the D1 Area

Source: JICA Study Team

Figure 2-2-45 Current Status related with Road Component

2) Geology

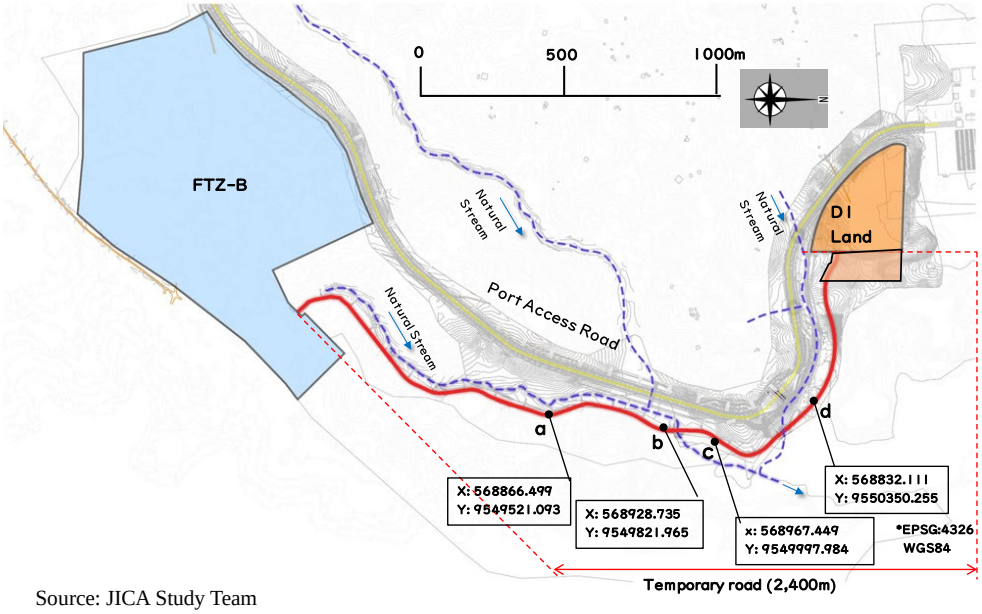
As shown in Figure 2-2-47, in February 2022 geotechnical investigation at four locations was conducted for the proposed area of the temporary road between FTZ-B area and D1 land area. Geological survey were conducted at seven points on the way of the road constructed by the Project. According to the result of the survey, the dense silty sand lay, and the silty clay layer whose N-value was 10 or more was dominant at the northern part of the area where road is to be constructed. Especially, the hill close to the coast tended to have weathered shale layer whose N-value was 30 or more as the D1 Area. On the other hand, it was estimated at the point where two main natural waterways along the planned road meets in SEZ consisted of silty clay with peat regarded as soft ground. Considering the ground condition, surface protection must be done to prevent wreathing after cutting work around the area where weathered shale layer was dominant, and stripping must be done before embarkment work at the area where silty clay with peat was dominant.



Source: JICA Study Team

Figure 2-2-46 Location of Geological Survey (June 2019)

As shown in Figure 2-2-47, in February 2022 geotechnical investigation at four locations was conducted for the proposed area of the temporary road between FTZ-B area and D1 land area.



Source: JICA Study Team

Figure 2-2-47 Location of Geological Survey along Temporary Road

It should be noted that the soil feature observed at the location d is soft dark grey clayey soil with low N-value (around 2 to 3) from the ground surface through to the layer at around 5m below surface.

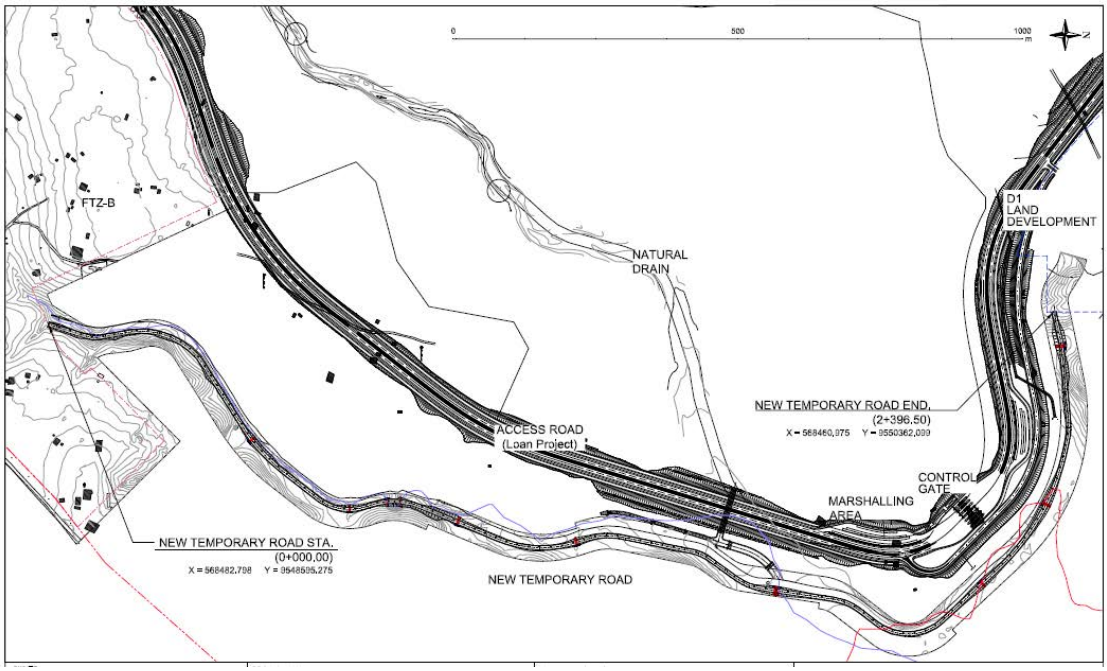
(2) Road and the Related Structures

In order to secure the work access to the D1 land development that is to be implemented under the Grant Aid Project, a temporary road was designed applying the alignment almost in parallel with the Port Access Road. The total length is 2.4 km and the carriage way width is 7 m of 2 lanes to keep sufficient space for frequent traffic of heavy construction vehicles. The carriage way is designed to provide crush stone placing of 200mm thickness. For the road section where soft clayey soil is observed, replacement of the original soil of around 1m or deeper with cut soil from D1 land is considered. At the location where the temporary road crosses the natural drainage channel, precast concrete pipe culvert of 1.2 m diameter is used for water flow. Layout Plan of the temporary road is indicted in Figure below.

Table 2-2-31 Summary of the road

No.	Facility	Length	Width	Sidewalk	Pavement
Road facility					
1	Temporary road	2.4 km	7m（2lanes）	Not equipped	Crush stone placing

Source：JICA Study Team



Source：JICA Study Team

Figure 2-2-48 Layout Plan of Temporary Road

Administration Building is shown in the following Section 2-2-3.

2-2-2-5 Procurement of Cargo Handling Equipment

Cargo handling equipment of which procurement is considered is listed below, providing the expected principal features of the equipment.

Table 2-2-32 Principal Features of Equipment

Equipment	Principal Features of Specifications	
Reach Stacker (Empty) Quantity: 4 nos.	Min. lifting capacity Stacking capacity Boom Engine Wheel base Truck width Turning radius	: 9 ton : 3 rows, 5 stage with 9′6″ container height and 6 with 8′6″ container height : Two stage Telescopic Type : Six-cylinder turbocharged diesel : 4.4 – 5.4m : 4.0 - 4.2m : 5.4 – 7.0m
Forklift (10 ton) Quantity: 3 nos.	Min. lifting capacity Wheel base length Overall length Overall width, max. Turning radius, max.	: 10 ton at 600~1,200 mm load center, mast height of 4.7~5.7m : 2,900~3,300mm : 4,900~5,800mm : 2,490~2,550mm (front), 2,000~2,025mm (rear)

Equipment	Principal Features of Specifications	
	Travel speed Engine Torque at low rpm	: 4,200~4,600mm : 28km/h (with load), 30km/h (w/o load) : 6- cylinder turbocharged diesel, Tier III or equiv. : over 590 Nm at rotation 1,400 - 1500 rpm
Forklift (5 ton) Quantity: 4 nos.	Min. lifting capacity Max. overall dimensions Max. ground clearance Engine Min. power output Max. lift height Fork carriage	: 5 ton at 600 mm load center : l x h x b: 4.2~4.5m x 2.4~2.7m x 1.4~1.5m : 190~240 mm at center of wheel base : water-cooled 4-cylinder in-line direct injection diesel : according to ISO 1585 or EU2016/1628 stage V : 4 m : according to ISO 2328, Type IVA
Terminal Tractor Quantity: 14 nos.	Engine Engine output Torque at low rpm Exhaust pipe Cabin Hydraulic system Pneumatic system Min. lifting capacity	: 6- cylinder turbocharged diesel, Tier III or equiv. : 150kWor more at rotation 1,800-2,200 rpm : 800Nm or more at rotation 1,100-1,500 rpm : Vertical muffler and exhaust stack : Single man in right-hand drive configuration : Heavy-duty hydraulic system for steering and lifting 5th wheel plate : Suitable high-capacity air compressor for the system 450cm^3 or more : 32,000kg
Container Chassis Quantity: 14 nos.	Min. loading capacity Dead weight Total length Total width Total height Max. traveling speed Axle load Load on 5th wheel	: 65 ton : 6.6~9.5 ton : 12.7~14.4 m : 2.7~2.86 m : 1.50~1.89 m : 40km/h(with load)、47km/h(w/o load) : 46~50 ton : 23~28 ton

Source: JICA Study Team

2-2-3 Outline Design Drawing

2-2-3-1 Water Supply Component

The drawing list is shown below. The outline drawings are attached in Appendix-2.

Drawing List

DRAWING NO.	TITLE
WS-GEN-001	LOCATION MAP OF PLANNED FACILITIES (WATER SUPPLY)
BOREHOLE FACILITY	
WS-BH-001	SUBMERSIBLE MOTOR PUMP
WS-BH-002	LAYOUT PLAN OF WELL NO.2
WS-BH-003	LAYOUT PLAN OF WELL NO.3
WS-BH-004	LAYOUT PLAN OF WELL NO.5
WS-BH-005	PIPE WORK AT GUARDHOUSE
WS-BH-006	GANTRY CRANE DETAILS
WS-BH-007	GUARDHOUSE WITH KIOSK (1/4)
WS-BH-008	GUARDHOUSE WITH KIOSK (2/4)
WS-BH-009	GUARDHOUSE WITH KIOSK (3/4)
WS-BH-010	GUARDHOUSE WITH KIOSK (4/4)
WS-BH-011	GATE AND DRAIN DETAILS
WS-BH-012	FENCE DETAILS
PIPELINE STRUCTURE	
WS-TP-037	AIR VALVE CHAMBER
WS-TP-038	BLOW-OFF CHAMBER
WS-TP-039	PIPE INSTALLATION, LINE MARKER AND THRUST BLOCK
WS-TP-040	RIVER AND ROAD CROSSING OF PIPE
BOOSTER PUMPING STATION	
WS-BPS-001	LAYOUT PLAN
WS-BPS-002	LAYOUT OF SUCTION TANK
WS-BPS-003	DETAIL OF SUCTION TANK (1/2)
WS-BPS-007-1	CONTROL ROOM PLAN(1/3)
WS-BPS-007-2	CONTROL ROOM PLAN(2/3)
WS-BPS-007-3	CONTROL ROOM PLAN(3/3)
WS-BPS-008	CONTROL ROOM SECTION
MOMBASA SEZ RESERVOIR	
WS-MSR-002	LAYOUT PLAN OF MOMBASA SEZ RESERVOIR

DRAWING NO.	TITLE
WS-MSR-003	SECTION OF MOMBASA SEZ RESERVOIR
WS-MSR-004-1	LAYOUT OF RESERVOIR(1/3)
WS-MSR-004-2	SECTION OF RESERVOIR
WS-MSR-005-1	DETAIL OF RESERVOIR (1/3)
WS-MSR-005-2	DETAIL OF RESERVOIR (2/3)
WS-MSR-005-3	DETAIL OF RESERVOIR (3/3)
WS-MSR-008	ELEVATED TANK (1/3)
WS-MSR-009	ELEVATED TANK (2/3)
WS-MSR-010	ELEVATED TANK (3/3)
WS-MSR-011	CONTROL CHAMBER PLAN AND SECTION
WS-MSR-012	CONTROL CHAMBER VIEWS
WS-MSR-015	BRANCH CHAMBER 1
WS-MSR-016	BRANCH CHAMBER 2
WS-MSR-017	BRANCH CHAMBER 3
WS-MSR-018	CHAMBER 1
WS-MSR-019	CHAMBER 2
WATER KIOSK	
WS-DP-006	WATER KIOSK (1/4)
WS-DP-007	WATER KIOSK (2/4)
WS-DP-008	WATER KIOSK (3/4)
WS-DP-009	WATER KIOSK (4/4)
WATER SUPPLY ADMINISTRATION BUILDING	
WS-AB-001	LAYOUT PLAN
WS-AB-002	FLOOR PLAN, ELEVATION, SECTION

2-2-3-2 Drainage Component

The drawing list is shown below. The outline drawings are attached in Appendix-2.

Drawing List

DRAWING NO.	TITLE
LOCATION MAP OF PLANED FACILITIES (DRINAGE)	
DR-GEN-001	LOCATION MAP OF PLANNED FACILITIES (DRINAGE)
BANK PROTECTION	
DR-BPT-001	BANK PROTECTION SITE
DR-BPT-002	TYPICL CROSS SECTION OF BANK PROTECTION

2-2-3-3 Land Development Component

The drawing list is shown below. The outline drawings are attached in Appendix-2.

Drawing List

DRAWING NO.	TITLE
LR-MSL-001	LAYOUT PLAN OF MOMBASA SEZ D1 LAND
LR-MSL-002	GENERAL PLAN OF CUT-FILL WORK
LR-MSL-003	LOCATION OF CROSS SECTIONS
LR-MSL-004	TYPICAL SECTION (1/3)
LR-MSL-005	TYPICAL SECTION (2/3)
LR-MSL-006	TYPICAL SECTION (3/3)
LR-MSL-007	STRUCTURAL DRAWING (1)
LR-MSL-008	STRUCTURAL DRAWING (2)
LR-MSL-009	STRUCTURAL DRAWING (3)
LR-MSL-010	GENERAL DRAWING OF CAST-IN-PLACE CONCRETE CRIB
LR-MSL-011	GENERAL DRAWING OF SHOTCRETE WORK
ADMINISTRATION BUILDING	
LR-AB-001	LAYOUT PLAN
LR-AB-002	FLOOR PLAN
LR-AB-003	ELEVATION, SECTION

2-2-3-4 Road Component

The drawing list is shown below. The outline drawings are attached in Appendix-2.

Drawing List

DRAWING NO.	TITLE
LOCATION MAP OF PLANNED FACILITIES (ROAD)	
RD-GEN-001	LOCATION MAP OF ROAD FACILITIES
RD-GEN-002	GENERAL LAYOUT OF TEMPORARY ROAD
TEMPORARY ROAD	
RD-TMP-001	TYPICAL CROSS SECTION OF ROAD
RD-TMP-002	TYPICAL SECTION OF ROAD CROSS DRAIN CHANNEL
RD-TMP-003	PLAN AND PROFILE (1/9)
RD-TMP-004	PLAN AND PROFILE (2/9)
RD-TMP-005	PLAN AND PROFILE (3/9)
RD-TMP-006	PLAN AND PROFILE (4/9)
RD-TMP-007	PLAN AND PROFILE (5/9)
RD-TMP-008	PLAN AND PROFILE (6/9)
RD-TMP-009	PLAN AND PROFILE (7/9)
RD-TMP-010	PLAN AND PROFILE (8/9)
RD-TMP-011	PLAN AND PROFILE (9/9)

2-2-4 Implementation Plan/Procurement Plan

2-2-4-1 Implementation Policy/Procurement Policy

(1) Implementation Policy

Assuming that the Project is implemented under the Japanese Grant Aid Project, the following principles should be applied for implementation:

1) The executing agency of the Kenyan government is KPA.
2) At the signing of the E/N between the Japanese and Kenyan governments, KPA should commence the preparation works in the relevant two counties and proceed with the necessary actions for implementation of the Project.
3) After the signing of the G/A for the implementation of the Project between JICA and Kenyan governments, a Japanese consulting firm will sign a contract with KPA, and the consultant will prepare the detailed design and tender documents, and then commence the tendering procedure.
4) The Japanese contractor will sign a contract with KPA and execute construction works under the supervision of the consultant.
5) This project contains a variety of components including water supply, drainage, land

development, road and equipment procurement, and further the project area is broadly located inside and outside of the SEZ. In addition to the complexity due to a variety in components and wide spreading project area, it is noted that huge amount of surplus soil generated from the D1 land development has to be successfully disposed so that any negative impact to the local residents in the soil disposal area can be avoided. Taking account of the unique situation of this project, a Civil Engineer, who has broad knowledge and experiences over the above project components and the construction management, is planned to be assigned at site for almost entire construction period in order to jointly manage the construction supervision in association with the Resident Engineer. Furthermore, it is planned to assign an expert in each component at necessary timing according to the construction progress, centering the above Resident Engineer and Civil Engineer.

6) Considering the above-mentioned project background and the limited assignment period of Japanese engineers, local supervision engineers are planned to be assigned in order to assist the Japanese engineers under their instruction. One local supervision engineer is planned to be assigned to the position that is responsible for the entire work across the components, and local supervision engineers are assigned to the positions for water supply pipelines, road, architecture (buildings), architecture (equipment) and electric/mechanical works, respectively.
7) The Japanese contractor will establish a site management office for construction works.
8) As local personnel of the contractor, it is planned to utilize construction engineers or facility engineers for the construction management for water supply pipelines, pump facilities, drainage, land development and road that are the components of this project. These local engineers are expected to manage the construction works under the instruction of Japanese engineers of the contractor. In addition, it is planned to utilize local topographic surveyors, as well.
9) The Project should be implemented for the Special Economic Zone in Dongo Kundu located on the southern side of the Mombasa Port, comprising of development of D1 Area (10ha), construction of the temporary access road of 2.4km, construction of drainage facilities (bank protection of natural channel in total length of 135m), and construction of water supply facilities (three intake facilities, one booster pump station for supplying water to the SEZ, one distribution reservoir of 1,000m^3, one elevated tank of 50m^3 and water supply pipe lines of the total length of approximately 45km). In addition, for water supply to the residents in Kwale County where water sources used for the Project are located, one distribution pump, distribution pipelines and 10 water kiosks are also installed in the Project. In parallel with the civil/building works, procurement of cargo handling equipment is planed utilizing surplus fund after concluding the implementation cost for civil/building component.

10) At the completion of construction works, the responsibility for the constructed facilities is to be handed over to KPA. Subsequently, water supply component, including wells, transmission pipelines, booster pump station, distribution pipelines, 10 water kiosks, main transmission pipelines, reservoir and connection pipeline, will be handed over by KPA to CWWDA that is to be a responsible organization for the operation and maintenance.
11) To stimulate the economy in the target area, create job opportunities and enhance the technology transfer, the local labor and material are to be utilized at the maximum in the Project.
12) Most of all the construction material for the Project should be procured in Kenya. These include the submersible pumps, galvanized steel pipes, HDPE pipes, valves, reinforcing, cement, timber, fuel, oils and so on. The architectural material (aluminum window and steel door) will be procured from Japan or a third country because local material has the lower airtightness and rusts easily.

(2) Procurement Policy of Operation and Maintenance Equipment

O&M equipment such as submersible pump, surface pumps for transmission and distribution, and O&M tools, which are available in the Kenyan market should be procured in Kenya taking into account of the procurement of spare parts. These should be procured by the contractor.

(3) Procurement Policy of Cargo Handling Equipment

Cargo Handling equipment is not limited to products made in Japan, and the procurement includes necessary spare parts and initial training by equipment manufacturer(s). After delivery of the equipment or handing over of the Grant Aid Project, KPA can use the equipment at the existing terminal, with following conditions:

1) After completion of the Loan Project, KPA shall move the equipment to DK1 under own cost and responsibility.
2) KPA shall inspect operation condition of the procured cargo handling equipment before expiry of the defect notification period (one year after handing over). If any defects are observed through the inspection, KPA shall take necessary action to the manufacturer(s).
3) KPA shall make maintenance contracts after the defect notification period of the equipment.

2-2-4-2 Implementation Conditions

(1) Compliance with the Labor Standards Act

The contractor must hire workers in a state and comply with the Labor Standards Act in Kenya. To avoid conflict with workers and ensure their safety during the work, the contractor must respect the working conditions and relevant customs.

(2) Tax Exemption

Tax exemption in accordance with the E/N shall conduct necessary procedure. The main tax to be exempted are the corporate tax, personal income tax, value added tax, custom duties and related fiscal charges with respect to the import and/or re-export of materials and equipment and etc. On account of involvement by many organizations of KPA, Ministry of Roads, Transport and Public Works (MoRTP), National Treasury (NT) and KPA, it is assumed that these will take a lot of time for the complicated application and approval system. The consultant and contractor should understand the laws and regulations, prepare required documents, apply and process them.

(3) Environmental Protection

Environmental impacts that originate in construction works are generally related to 1) noise, 2) dust, 3) vibration and 4) traffic accidents due to heavy construction equipment. Particularly, the construction areas of the water supply component are located outside of the SEZ and there exist schools and dispensaries adjacent to the wok areas as well as individual houses, therefore it is necessary to consider sufficient precautionary measures to minimize such impacts due to construction activities. Avoidance of traffic accidents could be achieved by strict management of traffic rules and driving speed, application of a registration system of drivers, restriction of private vehicle use, education of drivers, creation of awareness by periodic meetings, control of traffic, and so on.

(4) Technical Supervision

For the water supply component, CWWDA will provide technical supervision through KPA.

2-2-4-3 Scope of Works

Work demarcation between Japanese side and the Government of Kenya in the project implementation is given in Table 2-2-33.

Table 2-2-33 Work Demarcation in the Project Implementation

No.	Items	Japanese Side		Government of Kenya
		Consultant	Contractor	
1	Detailed design of the project facilities	○		
2	Preparation of tender documents, tender evaluation, assistance to the executing agency in contract procedure	○		
3	Construction supervision	○		
4	Construction work of the project facilities		○	
5	Construction and removal of temporary facilities for construction works such as camp yard		○	
6	Precautionary measures against negative impacts to environment due to the work		○	
7	Procurement of construction materials and equipment according to the procurement plan		○	
8	To execute resettlement and land acquisition prior to the project implementation			○
9	To provide land required for camp yard to contractor			○
10	Tree cutting inside the construction areas of project facilities, and the compensation			○
11	To secure power intake facilities required for operation of water supply facilities, and the cost arrangement			○
12	Arrangement for commercial power supply to the intake pumps and the booster pumping station			○
13	Connection of the Connection Pipe to be installed under the project with the existing pipe			○
14	Budgetary arrangement and payment of all taxes, duties and other levies for procured materials and equipment for the project implementation			○
15	Arrangement for construction permits and building certificates, including the application and payment for the application fees			○
16	Arrangement for counterpart personnel and the budgetary arrangement for employment			○
17	O & M of the constructed facilities			○
18	To move the procured cargo handling equipment to DK1 in case those are used in the existing terminal before completion of DK1 or freeport.			○
19	To inspect operation condition of the procured cargo handling equipment before expiry of the defect notification period and take necessary action to the manufacturer(s) if necessary.			○
20	To make a maintenance contract for the procured cargo handling equipment after the defect notification period.			○

Source：JICA Study Team

2-2-4-4 Consultant Supervision

(1) Detailed Design and Tendering

1) Detailed Design for Civil and Building works

Based on the results of the basic design study, detailed design and tender documents will be prepared for:

- Detailed design for water supply facilities, drainage facilities, land development and road facilities.
- Geological survey at the pipe installation point and land development area.
- Assistance for KPA in finalizing the terms and conditions for the provision of water supply components.
- Preparation of design reports and drawings.
- Quantity calculations and cost estimates.
- Preparation of construction plans and tender documents.
- Confirmation of the progress of compensation and resettlement for the project affected persons and coordinate to avoid any interference with the construction plan.

The following table presents the personnel plan and the work scope at the detailed design stage.

Table 2-2-34 Detailed Design System

Position	Grade	Work Period at Site	Home Assignment	Work Scope
Team Leader	2	1.00 M/M（1 trip） 30 days	2.00 M/M 40 days	➢ Overall management of detailed design works ➢ Coordination with the executing agency and assist in tender procedure
Civil Engineer	3	1.50 M/M（1 trip） 45 days	2.00 M/M 40 days	➢ To conduct geological survey at D1 Area ➢ Detailed design of civil facilities ➢ To prepare technical specifications
Pipeline Engineer	3	1.00 M/M（1 trip） 30 days	2.00 M/M 40 days	➢ To verify pipeline routes and locations of related facilities ➢ Detailed design including hydraulic calculation, drawings, etc. ➢ To prepare technical specifications
Electric/Mechanical Engineer	3	1.00 M/M（1 trip） 30 days	2.00 M/M 40 days	➢ Electric and mechanical design of water supply facilities ➢ To prepare technical specifications
Building Architect	3	0.40 M/M（1 trip）	0.70 M/M	➢ General building design

Position	Grade	Work Period at Site	Home Assignment	Work Scope
1		12 days	10 days + 4 days	➢ To prepare technical specifications
Building Architect 2	4	0.00 M/M	2.30 M/M 10 days + 36 days	➢ General building design ➢ To prepare technical specifications
Building Structure Engineer	4	0.00 M/M	1.40 M/M 4 days+ 24 days	➢ Building structure design (foundation and building structure) ➢ To prepare technical specifications
Building Electrical Engineer	4	0.00 M/M	1.20 M/M 24 days	➢ Building electric facility design ➢ To prepare technical specifications
Building Water Supply and Drainage Engineer	4	0.00 M/M	2.00 M/M 40 days	➢ Building water supply and drainage facility design ➢ To prepare technical specifications
Building Cost Estimate Expert *1	4	0.40 M/M（1 trip） 12 days	1.10 M/M 22 days	➢ Cost estimate of building works
Cost Estimate Expert *1	3	0.93 M/M（1 trip） 28 days	1.50 M/M 30 days	➢ Estimate of the construction cost
Total		6.23 M/M（7 trips）	18.20 M/M	

*1: The site investigation for cost estimate includes collection of updated data/information of prices, procurement conditions, design and construction conditions

Source: JICA Study Team

2) Tender Assistance

Prior to the tender, a pre-qualification of applicants will be carried out. This announcement will appear in the name of KPA in major Japanese construction-related newspapers. The pre-qualification documents will be prepared and distributed by the consultant. Tender documents will then be distributed to the qualified contractors. The proposals of the tenderers will be received by the consultant and opened by the consultant in the presence of the staff of KPA. The proposals will be evaluated by the consultant and the staff of KPA immediately after opening them. The contract documents will be drafted and finalized by negotiation with the selected tenderer. The consultant will assist KPA in the following work:

- Tender announcement
- Preparation, distribution, and evaluation of pre-qualification documents
- Distribution and evaluation of tender documents and contract negotiation
- Confirmation of the progress of compensation and resettlement for the project affected persons and coordinate to avoid any interference with the construction plan

The tender assistance is conducted at two steps, that is Tender work 1 (preparation of P/Q documents and tender documents) and Tender work 2 (procedure related to P/Q and tender,

including announcement, distribution and evaluation, and contract negotiation). Tender assistance system is presented in Table 2-2-35 and Table 2-2-36.

Table 2-2-35 Tender Assistance System (Tender Work 1)

Position	Grade	Work Period at Site	Home Assignment	Work Scope
Team Leader	2	0.37 M/M（1 trip） 11 days	0.00 M/M	➢ Preparation of P/Q documents and tender documents ➢ To obtain approval on the documents from the Government of Kenya
Building Architect 1	3	0.40 /M（1 trip） 12 days	0.00 M/M	➢ Preparation of P/Q documents and tender documents regarding buildings (general design) ➢ To obtain approval on the documents from the Government of Kenya
Tender Documents (Preparation and Approval)	3	0.37 M/M（1 trip） 11 days	1.50 M/M 30 days	➢ Preparation of P/Q documents and tender documents ➢ To obtain approval on the documents from the Government of Kenya
Contingency	3	0.00 M/M	0.50 M/M 10 days	➢ Preparation of P/Q documents and tender documents
Total		1.14 M/M（3 trips）	2.00 M/M	

* Allocated assignment periods for Team Leader and Tender Documents (Preparation and Approval) are 11 days (0.37 M/M) per trip, respectively consisting of 7days for assignment in Kenya and 4 days for travelling time.

Source: JICA Study Team

Table 2-2-36 Tender Assistance System (Tender Work 2)

Position	Grade	Work Period at Site	Home Assignment	Work Scope
Team Leader	2	0.37 M/M（1 trip） 11 days	0.25 M/M 5 days	➢ Announcement of P/Q and tender, and evaluation ➢ To assist the Executing Agency in tendering
Building Architect 2	4	0.00 M/M	0.10 M/M 2 days	➢ Announcement of P/Q and tender regarding building (general design), and evaluation ➢ To assist the Executing Agency in tendering
Tender Documents (Preparation and Approval)	3	0.37 M/M（1 trip） 11 days	0.25 M/M 5 days	➢ Announcement of P/Q and tender, and evaluation ➢ To assist the Executing Agency in tendering
Contingency	3	0.00 M/M	1.00 M/M 20 days	➢ Announcement of P/Q and tender, and evaluation ➢ To assist the Executing Agency in tendering
Total		0.74 M/M（2 trips）	1.60 M/M	

* Allocated assignment periods for Team Leader and Tender Documents (Preparation and Approval) are 11 days (0.37 M/M) per trip, respectively consisting of 7days for assignment in Kenya and 4 days for travelling time
Source: JICA Study Team

In addition, CWWDA will provide technical supervision support to KPA for the water supply component for the following tasks.

- Preparation, distribution, and review of bid qualification forms
- Distribution of bidding documents, bid evaluation, and contract negotiation

3) Detailed Design and Tender Assistance for Procurement of Cargo Handling Equipment

Based on the results of the outline design, procurement plan is reviewed, and tender documents are prepared for procurement of the cargo handling equipment. Since the procurement is implemented after tender of civil and building works, result of detailed design, if necessary, will bring adjustment of the number of equipment to be procured.

The following table presents the personnel plan and the work scope at the detailed design stage.

Table 2-2-37 Detailed Design and Tender Assistance of Equipment Procurement

Position	Grade	Work Period at Site	Home Assignment	Work Scope
Equipment Plan Engineer	3	Detailed design: 0.33 M/M（1 trip） 10 days	0.25 M/M 5 days	➢ Review of procurement plan based on the final budget to be allocated to equipment procurement ➢ Coordination with the executing agency on the final procurement scope
Procurement Plan Engineer	3	Tender Assistance -1: 0.33 M/M（1 trip） 10 days Tender Assistance -2: 0.33 M/M（1 trip） 10 days	0.40 M/M 8 days 0.25 M/M 5 days	➢ To prepare tender documents and get approval on it from Gov. of Kenya ➢ Public notification of tender ➢ To organize Pre-bid meeting ➢ To assist executing agency in tender open, tender evaluation and contract signing
Total		0.99 M/M（3 trips）	0.90 M/M	

Source: JICA Study Team

(2) Construction Supervision

After certification of the contract by JICA, the consultant will publish notification of the commencement of the work to the contractor. During the construction period, the consultant will propose a technical improvement way about quality and safety matter, environment and social consideration and construction supervision. In addition, the consultant will deal with administrative works related with the payment.

One resident engineer will supervise construction work and report work progress to the Embassy of Japan in Kenya, the JICA Kenyan office, and KPA. Because the Project consists of civil works, pipeline works, road works and architectural works, experienced engineers are allocated to keep the quality and the progress.

The following are the major items of the supervision work:

1) Approval of construction drawings: Evaluation and approval of construction drawings, permission for construction work, material, specification of equipment and machinery, and so on.
2) Supervision of construction work: Instructions for the construction schedule, overseeing progress of work, implementing the necessity examines during construction, and instructing other required work.
3) Inspection for completion: Inspection of as-built drawing and construction quality.
4) Approval for payment: Issuance of certificate for payment and completion of works.
5) Inspection at the end of defect liability period: Inspection of constructed facilities.

6) Monitoring the progress of resettlement and coordinate to avoid any interference with the construction works.

Based on the above scope of supervision works, a long-term assignment of one supervision engineer (Civil Engineer) is planned to supervise the construction work that includes four components, in association with the Resident Engineer. In addition, spot assignments of experts are also planned so as to deal with specific subjects of each component in timely manner.

The following table is the personnel plan and the work scope at the construction supervision stage.

Table 2-2-38 Construction Supervision System

Position	Grade	Work Period at Site	Work Scope
Team Leader	2	1.60 M/M（4 trips） 15 days + 9 days + 9 days + 15 days	➢ Overall management of construction supervision ➢ Supervise preparatory works at the initial stage of work with the Resident Engineer ➢ Inspection at completion ➢ Procedure of taking over ➢ Attend quality control meeting (3 times)
Resident Engineer	2	22.00 M/M（4 trips） 660 days *Entitled to home leave	➢ Check and approval of work drawings, equipment to be used for all works included in the Project ➢ Instruction and study on construction plan and work sequences ➢ Monitor, study and instruction on work progress ➢ Inspection at completion ➢ Attend quality control meeting (3 times)
Supervision（Civil Engineer）	3	19.00 M/M（3 trips） 570 days *Entitled to home leave	➢ Monitor and instruction on work sequences and progress of the entire civil works (temporary road, land development, drainage and water supply） ➢ Carry out required tests on necessary timing
Supervision（Pipe Engineer）	4	3.50 M/M（4 trips） 30 days + 30 days + 30 days + 15days	➢ Monitor and instruction on work sequences and progress of the entire pipe installation works ➢ Carry out required tests on necessary timing
Supervision (Building Architect）	3	1.50 M/M（3 trips） 15 days + 15 days + 15 days	➢ Quality control and progress control of architectural works ➢ Check of work drawings and reports ➢ Organize periodic meeting ➢ Inspection of architectural work
Supervision (Building Facility Engineer）	4	1.00 M/M（2 trips） 15 days + 15 days	➢ Quality control and progress control of building facility works ➢ Check of work drawings and reports
Supervision (Electric/Mechanical Engineer）	4	3.93 M/M（4 trips） 30 days + 30 days + 45 days + 13days	➢ Monitor and instruction on work sequences and progress for electrical/mechanical works of water supply facilities

Position	Grade	Work Period at Site	Work Scope
			➢ Carry out required tests on necessary timing
Inspection Engineer*1	3	0.23 M/M（1 trip） 7 days	➢ Defect liability inspection at one year after completion of works
Total		52.76 M/M（25 trips）	

*1 Inspection Engineer has assignment of 7 days in every trip (0.23 MM, consisting of three days at site and four days for travel)
Source: JICA Study Team

CWWDA will provide technical supervision support to KPA for the water supply component.

(3) Supervision of Procurement of Cargo Handling Equipment

All the equipment to be procured under the project are generic items and not equipment that are manufactured based on any specific design, and further planned to be procured through the local agents. Therefore, some inspections of products before shipping are not required and inspection just before expiry of the defect notification period is to be managed by the equipment owner.

Based on the above, the following table presents the personnel plan and the work scope at the equipment procurement stage.

Table 2-2-39 Supervision of Equipment Procurement

Position	Grade	Work Period at Site	Home Assignment	Work Scope
Equipment Inspection Engineer-1	3	Not assigned	0.25 M/M 5 days	➢ Re-confirmation with the procurement contractor on equipment type and specifications
Equipment Inspection Engineer-2	3	Not assigned	Not assigned	Factory inspection and pre-shipping inspection are not applicable.
Procurement Supervising Engineer	3	0.63 M/M（1 trip） 19 days	Not assigned	➢ Inspection at site for trial operation, initial training, and operation training by manufacturer(s) before handing over to the executing agency.
Total		0.63 M/M（1 trip）	0.25 M/M	

Source: JICA Study Team

2-2-4-5 Quality Control Plan

(1) Quality Control Plan of Materials and Work

Target items of materials and works for quality control in this Project are concrete, aggregate, embankment, pavement, pipe works, pump, valves and high voltage power incoming facility. Required test for each item is set up based on “Quality Control Standard for Civil Works, Ministry of Land and Transportation”, “Standard Specification for Public Architectural Works”, “Standard of Construction Supervision for Mechanical Works” and so on. Quality control items and the test methods for respective works and procured products are provided in Table 2-2-40.

Table 2-2-40 Quality Control Plan

Target Item for Control	Test item	Specification/Method	Test Frequency
1. Concrete	Compressive strength test	JIS A 1108	Once per 50m^3 (7days strength, 28 days strength)
	Slump test	JIS A 1101	In principle, for all concrete mixer trucks
	Cement material test	JIS R 5210 etc	Before start of work and when changing materials
2. Aggregate	Sieve test	JIS A 1102	Once a day
3. Embankment	Soil compaction test	JIS A 1210 etc	Before start of work and when soil feature is changed
	Grain size distribution test	JIS A 1204 etc	Before start of work and when soil feature is changed
	Insitu density test	JIS A 1214 etc	Once per 3,000m^3 at three locations
4. Road Base	CBR test	AASHTO T193 etc	Before start of work and when changing materials
	Aggregate sieve test	JIS A 1102 etc	Before start of work and when changing materials
	Insitu density test	AASHTO T180	Once per 3,000m^3 at three locations
5. Asphalt Pavement	Aggregate sieve test	JIS A 1102 etc	Before start of work and when changing materials
	Aggregate density・water absorption test	JIS A 1109,1110 etc	Before start of work and when changing materials
	Filler test	JIS A 5008 etc	Before start of work and when changing materials
	Marshall test	ASTM D1559 etc	Before start of work and when changing materials
5. Pipe Installation	Water pressure test	1.5 times higher than the highest operating pressure for each pipe	Applying 1.5 times of max. allowable pressure of pipe
6. Pump Performance	Head	Following Blueprint Design	On completion of manufacturing in factory
	Discharge rate	JIS B 8301,8325 etc	On completion of manufacturing in factory
	Rotation speed	JIS B 8301,8325 etc	On completion of manufacturing in factory
7. Valves	Pressure test, leakage test, dimensions, performance test, confirmation of painting	JIS B 2031,2003 etc	On completion of manufacturing in factory
8. Power Receiving and Transforming Equipment	Insulation resistance test	JIS C 4620 etc	On completion of manufacturing in factory and completion of construction
	Power-frequency withstand voltage test	JEM 1425 etc	On completion of manufacturing in factory
	Sensing resistance measurement		On completion of manufacturing in factory

Source：JICA Study Team

2-2-4-6 Procurement Plan

(1) Construction Materials

Many supplies are concentrated at the capital city, Nairobi, and thus equipment for construction materials such as steel reinforcement bars, cement, interlocking blocks are planned to be procured in Nairobi. Although inland transportation of 500km from Nairobi to Mombasa is required, considering the good road condition, the transportation time is assumed as one day. Crashed stone and sand that are used for construction aggregates are available in suburb area of Mombasa. There exist some stone quarry sites in Jaribuni located around 100km north of the project site, and sand quarry sites are available along the Galana river in Malindi which is located around 150km apart from the project site. Construction aggregates produced in the above quarry sites are broadly used by many contractors including Japanese contractors and local contractors. B8 route and C107 route that are paved road are available for transportation of the materials from the above quarry sites. In addition, fuel and lubricants are also available in Mombasa, therefore major construction materials are planned to be procured in Mombasa.

Submergible pump facilities, transmission・distribution pump facilities, pipe materials including HDPE pipe and steel pipe, and valves, that are main equipment for water supply component, can be procured in the local markets of Kenya. These equipment and materials are manufactured in principle conforming to international standard such as ISO. Procurement of pump and tank materials are planned as below.

1) Submergible pump for deep well that is available in the local agent is selected. There are many actual uses of deep well in Kenya and European products such as Grundfos Pump are popular in Kenya. Therefore, procurement of spare parts through local agents is possible and is not a constraint in O&M. It is also easy to procure generators required for power source of pumps in local market. In addition, a gantry crane, which is used for many existing deep wells and planned to be installed at the intake well sites of this project as well, is a popular equipment in Kenya. Based on the above-mentioned background, for procurement of submergible pumps, it is planned to use the 3rd country's products which are available in Kenya.

2) Horizontal vortex pump is selected for transmission pump from booster pump station to Mombasa SEZ Reservoir (distribution tank and elevated water tank). For vortex pump also, European products are popular in Kenya, and thus the products that are available in Kenya are selected. There observed insufficient maintenance of pumps in existing water supply facilities. A reason of this situation is considered improper maintenance by staff who is not familiar with the pump and the related facilities. Therefore, it is planned to solve the

problem through operation guidance to be carried out by the Japanese contractor at the initial operation period.

3) Raw water supply from booster pump station to residents in Kwale County, a distribution pump unit of constant pressure is adopted. For the pumps used for this pump unit also, European products such as Grundfos Pump are popular in Kenya. Therefore, procurement of spare parts through local agents is possible. Based on this background, distribution pump unit is planned to use 3rd country's products which can be procured in Kenya.

4) Water tank materials that are mainly used in Kenya are steel, wet masonry, concrete and plastic. In this Project, steel tank is adopted, considering the low price, short construction period and stability of quality, subject to application of rust resistance treatment with galvanization. A plastic water tank is planned to be used for water kiosks.

5) Aluminum window frame and steel door frame that are architectural materials are to be procured in Japan or the third country, considering poor airtightness and low rust resistance of the local materials.

The places of procurement of construction equipment are indicated in Table 2-2-41.

Table 2-2-41 Place of Procurement of Construction Materials

Item	Procurement Place			
	Nairobi	Mombasa	Japan	The 3rd country
1) Steel (steel plate, shaped steel)	○			
2) Steel reinforcement bar, frame	○			
3) Cement	○			
4) Crushed stone, sand, stone		○		
5) Wooden material	○			
6) Gasoline, diesel oil		○		
7) Concrete block	○			
8) Interlocking block	○			
9) Concrete fume pipe for drainage	○			
10) Plastic pipe for drainage	○			
11) Joint filler and filter	○			
12) Submergible pump*1	○			
13) Transmission pump*2	○			
14) Distribution pump*3	○			
15) Pipe and accessories	○			
16) Flow meter, valves	○			
17) Plastic tank steel elevated tank*4	○			
18) Fixture	○		○	

Source : JICA Study Team

(2) Concrete and Asphalt

In order to secure the quality of concrete and asphalt, those materials are expected to be transported and placed at site in short time after mixing in batching plant. Currently, no suppliers

that own concrete plant and/or asphalt plant are available in and around the project site and suppliers are available in Mombasa town area. It is, therefore, unavoidable to take time for transportation of concrete and asphalt including the sea crossing by ferry boat on the way to the construction site. However, considering the required volume and timing of these materials and cost inefficiency for construction of temporary batching plants, it was decided to procure ready mixed concrete and asphalt from the existing plants except for concreting of small size structures.

(3) Construction Equipment

All main heavy construction equipment is to be procured through suppliers in Nairobi. The prices are estimated on Free on-Board basis and freight cost is added. The freight cost is composed of inland transportation cost by trailer for 500km from Nairobi to the project site and ferryboat fare. The planned procurement place of heavy construction equipment is presented in Table 2-2-42.

Table 2-2-42 Place of Procurement of Heavy Construction Equipment

Item	Procurement Place			
	Nairobi	Mombasa	Japan	The 3rd country
1) Bulldozer	○			
2) Backhoe	○			
3) Dump truck	○			
4) Tire roller	○			
5) Vibration roller	○			
6) Rough terrain crane	○			
7) Concrete mixer truck	○			
8) Concrete pump truck	○			
9) Asphalt finisher	○			

Source：JICA Study Team

2-2-4-7 Operation Guidance Plan

The initial operation and operation guidance to be provided under this project will be aimed at improving the capacity for operation and maintenance of the water supply facilities. At the end of the construction period, the contractor will take the lead in instructing the technical staff of CWWDA, who will be provided by KPA, on how to operate and maintain the facilities and equipment that have been developed and procured under this project.

2-2-4-8 Soft Component (Technical Assistance) Plan

Soft component scheme for Grant Aid Project aims 1) to smoothly start the Project and 2) to secure the sustainability of the project output by properly operating the installed and procured facilities and equipment. In the component after construction, the counterpart is continuously supported from viewpoint of management, for example, to develop a daily operating plan and a financial plan for O&M.

This Project consists of four components and the below points are related with O&M.

1) Through drainage, land development and road component, civil engineering structures will be mainly constructed which are not operated based on a daily O&M plan.
2) Water supply in SEZ using the facilities to be developed under the water supply component will be implemented by CWWDA, and is not directly managed and operated by the implementing agency.
3) The initial operation guidance of the facility equipment and materials by the contractor and the explanation of maintenance and management methods are included in the facility construction and equipment procurement services, and the participation of CWWDA technical staff is planned. The team leader of the consultant and the resident construction supervisor will supervise the construction work during the construction period to ensure that the above-mentioned operational and operational guidance by the contractor is implemented at the appropriate time.

Therefore, this Project does not have to set Soft Component scheme.

2-2-4-9 Implementation Schedule

The project is planned to be implemented dividing into two packages, that is, one is for civil/building works and the other is procurement of cargo handling equipment. The two packages are to be implemented based on the following time period allocated for each stage.

(Civil/building package)

As earth work predominates in the construction work of this project, the work progress is assumed to be considerably affected by rainfall condition at site. Therefore, the construction schedule is formulated taking account of unworkable days due to rainfall.

Detailed Design Stage:	3.5 month
Tendering Preparation I:	2.5 month (Partial overlapping with Detailed Design Stage)
Tendering Preparation II:	3.5 month
Construction Stage:	22.0 month

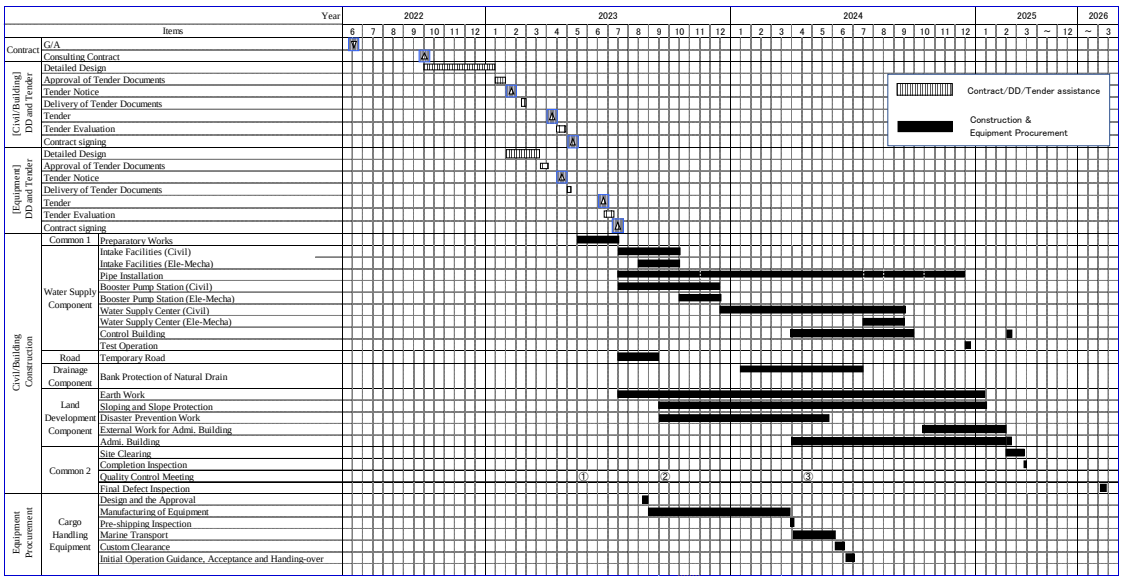
(Equipment procurement package)

Detailed design is scheduled to be commenced after completion of the detailed design for the civi/building works. The time periods allocated to the procurement sequence are as follows:

Detailed Design Stage:	1.5 month
Tendering Preparation I :	1.0 month
Tendering Preparation II :	2.5 month

Re-confirmation of equipment type and specifications :	0.25 month
Manufacturing of equipment :	7.0 month
Sea transportation of equipment :	2.0 month
Custom clearance, initial training/guidance and hand-over :	1.0 month

The implementation schedule is given in Figure Figure 2-2-49.



Source: JICA Study Team

Figure 2-2-49 Implementation Schedule

2-2-5 Safety Plan

(1) Purpose

A safety plan is formulated aiming at preventing occupational disasters and public disasters in implementing a public infrastructure project under Japanese Official Development Assistance (ODA), in accordance with “Safety Control Guidance for ODA Construction Works of Japan (September 2014)”, and ensuring integrated safety of construction personnel, taking into account of the public security condition in the project area as well.

(2) Current Condition of Occupational Safety and Health in Kenya

It is presumed that the occupational safety and health in Kenya, particularly that of construction industry is poorly managed and the safe and healthy conditions to construction workers at site is not properly maintained, and it would be the current condition that even use of personal protective equipment (PPE) such as gloves, helmet and safety boots that is a very basic measure to reduce workers exposure to hazards at construction site is not secured. It is further considered that employers/contractors are also in difficult situation to maintain the work site safe and healthy through adequate safety and health management, involving a properly educated/trained

manpower resources because of low priority to safety issues, cost burden and lack of safety and health management system of companies.

On the other hand, in Kenya Occupational Safety and Health Act (OSHA) was enacted in 2007. This act was enacted for the purpose of protecting workers and all persons at workplace against risks to safety and health arising out of, and securing the safety, health and welfare of persons at work. Furthermore, OSHA provides for the legislations and the enforcement mechanisms on health and safety matters in the construction industry, and thus as an enforcement measure the health and safety officers are required to inspect the work sites. However, it is the current condition that the inspections are hardly carried out and the enforcement of OSHA is inadequate. In "CONSTRUCTION INDUSTRY POLICY (DRAFT) in 2018" of Kenya, it is taken up as a challenge in the safety and health management that activities to ensure the safety and health of workers and all persons at construction site are weak and insufficient. The Government expresses to enforce relevant legislation in regard to the occupational safety and health as an improvement strategy. In addition, it should be recognized that there still exists risk of pandemic of COVID-19 in Kenya and the Kenyan authorities are currently (as of April 2022) maintaining COVID-19 measures, irrespective of the shot-term trend of infection.

(3) Public Security Condition in the Project Area

According to the travel warning of Ministry of Foreign Affairs, Japan, the public security condition in Kenya is generally poor due to heinous crime, terrorism, conflicts amongst tribes and so on, and sufficient caution for travel and stay is always required. The warning level of the project area, including Mombasa County and Kwale County is low, namely Warning Level 2 in Mombasa County and Warning Level 1 in Kwale County, compared to the other areas in Kenya, according to the travel warning of Ministry of Foreign Affairs, Japan as of February 2020, however the public security condition is unstable and JICA also gives constant warning to concerned persons/parties and imposes a restriction upon travel to the area. In commencement of construction works in the project, the related activities are presumed to increase, due to installation of working facilities, mobilization of construction materials and equipment, and frequent travel to the work sites of construction personnel including foreigners, therefore it is necessary to take measures for securing the safety of personnel and avoiding damages to those construction resources.

(4) Safety Plan

In implementation of the construction work under this project, it is necessary to formulate safety measures for construction works, based on the enacted policy in Kenya for occupational safety and health, and the public security condition in the project area. Japanese contractors have sufficient know-how and consciousness for safety and health management in implementing a construction project and the proactive use of those know-how is expected. In order to ensure the

safety and health of the construction personnel at the construction work site, applying "Safety Control Guidance for ODA Construction Works of Japan" as well, a framework for formulating a safety plan is provided below.

1) Employer/contractor is the party that takes proactive actions for formulation of safety and health plan and the implementation. At first, they should formulate a safety and health plan conforming to relevant laws and regulations of Kenya, of which planning concept is to maintain construction site safe so as to minimize risks and accidents which leads to injury or death. For the preparation of safety and health plan, "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects[1]" shall also be considered. Its requirement is summarized at the footnote of this page.
2) Employer/contractor assigns a safety control manager who has sufficient knowledge and experiences for monitoring proper implementation of the plan.
3) Employer/contractor should always assess the safety and health risks to which workers are exposed at construction sites, through the safety control manager, and takes precautionary measures based on the risk assessment.
4) If an occupational accident takes place, the Employer, Engineer and Contractor shall suspend construction work to the extent necessary during the necessary period and investigate the cause. The Contractor shall remove the cause in accordance with the basic principles of safety management, clarify measures to prevent the risk of accidents occurring and resume work with the approval of the Employer.
5) Employer/contractor should give all employees regular training for safety and health actions based on a safety plan, so that they can take smooth actions required for emergency case.
6) Project executing organizations should clearly specify the requirements of safety and health measures during the construction work in the bid documents and incorporate the required cost into the project cost, so that safety and health measures can be ensured through a fair bidding.

[1] "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" requires the Contractor to formulate a) Safety Plan in pre-construction stage and b) Method Statements on Safety in the construction stage. The contents of each are summarized as follows:

i) **Safety Plan**: i) Basic Policies for Safety Management, ii) Internal Organizational Structure for Safety Management, iii) Promotion of the PDCA Cycle, iv) Monitoring, v) Safety Education and Training, vi) Voluntary Safety Management Activities, vii) Sharing Information, and viii) Response to Emergencies and Unforeseen Circumstances.
ii) **Method Statements on Safety**: i) Construction plant and machinery, ii) Equipment and tools, iii) Materials, iv) Necessary qualifications and licenses, v) The order of command for the works, vi) Work items, vii) Procedure for the execution of the works, viii) Foreseeable risks, ix) Precautionary measures

7) Site supervisory staff should be educated and trained so as to ensure them to have knowledge and consciousness regarding occupational safety and health and to share the knowledge with workers.
8) Employer/contractor should provide works at construction sites with information regarding their safety (or risk) at the sites before commencement of works in a language that they understand.
9) Site supervisory staff should direct workers to wear PPE properly and not to misuse them.
10) Safety plan for construction works is formulated and operated by a contractor. In parallel, the consultant shall, in collaboration with the Employer, make sure the work is carried out as per the Safety Plan and the Method Statements on Safety prepared by the Contractor and provide notice, suggestion or guidance for improvement. Furthermore, it is recommended to establish an organization for cooperative activities such as safety committee that consists of contractor, consultant and project executing organization, for monitoring of operation status and review of plan as required. These three parties should undertake safety and health activities for construction works through such cooperative system.
11) It is indispensable to take all possible precautionary measures against occurrence of infectious diseases due to COVID-19. The serious negative impact is critical to continuation of the project implementation and the cost required for the precautionary measures is included in the project cost.

2-3 Obligation of Recipient Country

The Government of Kenya is responsible for undertaking the following subjects in implementing the Project.

(1) Clarify the land boundary and owners of each zone where is related to this Project and secure land use right especially at the area for "D1 Area" and "Temporary Road from soil disposal area (FTZ-B) to D1 Area".

(2) Secure the following sites necessary for the project implementation before the start of its construction works.
   a. Lands for related facilities including intake wells, water kiosks and Mombasa SEZ Reservoir
   b. Lands from the abovementioned lands to public roads necessary for installing and maintaining the pipes

(3) Carry out landing of construction materials and equipment, import customs clearance procedures and duty exemptions

(4) Ensure value-added taxes, customs duties and other taxes imposed as well as various taxes including financial surcharges charged in Kenya on materials and equipment procured by the Japanese citizens and companies engaged in the project implementation based on the approved project implementation contract as well as on the performance of their business; and carry out necessary procedures for duty exemption.

(5) Accord facilities necessary for entering and staying in Kenya to ensure that the Japanese and third citizens engaged in the Project as well as the procurement of materials and equipment under the approved project implementation contract shall perform smoothly.

(6) Bear all expenses that cannot be covered by Grant Aid Project among the expenses necessary for construction of facilities, transportation of materials and equipment, and installation of materials and equipment during the project implementation.

(7) Maintain and use the facilities/equipment constructed in this Project appropriately and effectively, secure the staffs and budget, and bear all expenses that cannot be covered by the Grant Aid Project necessary for O&M.

(8) KPA makes a Bank Arrangement (B/A) and bears advising fee of Authorization to Pay (A/P) as well as commission paid to the bank that signed the B/A.

(9) KPA shall be responsible for following environmental and social issues:
   1) Secure the necessary budget for the implementation of EIA and obtain its approval from NEMA, and
   2) Secure the necessary budget for resident compensation and perform compensation procedures based on RAP.

(10) KPA/CWWDA shall be responsible for obtaining water permits from the Water Resources Authority (WRA) for three intake wells and for fees and charges necessary for using intake wells.

(11) The transmission and distribution pipes for this Project will be laid on the KeNHA, KeRRA and public roads in Mombasa and Kwale counties. KPA obtains construction permit from these public institutions and bear the costs. Also, KPA/CWWDA obtains construction permit from the relevant public institution and bear the costs necessary for application for the management building to be developed in D1 Area and for the water supply management building at the Mombasa SEZ Reservoir.

(12) Since there is no plan to develop the communication infrastructure facilities for the management building in D1 Area and the water supply management building at the Mombasa SEZ Reservoir, the installation of communication receiving utility poles is planned. KPA shall apply for receiving communications (telephone, wireless) to related organizations and bear the application and installation costs.

(13) KPA shall apply for and receive the permission to borrow the land at TIWI Office from the CWWDA as a site for the construction and O&M of the booster pumping station.

(14) KPA shall provide land necessary for access roads, temporary field offices, warehouses and material storage during the construction work period.

(15) KPA shall bear to apply for commercial power distribution to the below project sites and bear connection and usage costs.

a. Three intake wells
b. Booster pumping station
c. Mombasa SEZ reservoir
d. Administration Building, outside toilet and street lights (to be developed in D1 Area)

(16) Water shall be supplied to residents through water kiosks to be installed in three intake wells. In addition, water shall be supplied to residents through some pumps at the booster pumping station, connection pipeline and water kiosks. KPA shall form a consensus with CWWDA about the transfer of the equipment necessary for the supply of water up to 300m^3/day as well as its O&M as a condition to guarantee the supply of 2,000m^3/day of water to be sent to Mombasa SEZ.

(17) KPA can utilize water efficiently by connecting to the existing water pipeline in Mombasa County through the connecting pipeline, if KPA can fully supply water for the demand of SEZ and if there is surplus. KPA should agree with CWWDA on the supply of surplus water provided that SEZ water demand is not compromised.

(18) Execute the Environmental Monitoring Plan in accordance with the Environmental Management Plan, prepare and submit a quarterly report to JICA during the construction work.

(19) Conduct compensation and resettlement of project affected persons located inside the project area, conforming to the compensation policy authorized by the Kenyan Government and concurred by JICA so as to ensure the implementation of construction works.

(20) KPA is responsible for coordinating with the staffs in charge of design works for the following changes related to the Loan Project.

a. The location of security fence to be provided by the Loan Project inside the D1 development area
b. Management building location
c. Completion of any facilities and structures to be constructed by the Project on the work boundary between the Project and the Loan Project

(21) KPA implements customs clearance and tax exemption related to unloading and import of cargo handling equipment as well as construction equipment and material. With regard to tax exemption, KPA is required to coordinate with the authorities concerned so that these procedures can be smoothly made.

(22) After delivery of the equipment or handing over of the Grant Aid Project, KPA can use the equipment at the existing terminal in case construction of DK1 new terminal is yet completed, with following conditions:

a. After completion of DK1 terminal under the Loan Project, KPA shall move the equipment to DK1 under own cost and responsibility.
b. KPA shall inspect operation condition of the procured cargo handling equipment before expiry of the defect notification period (one year after handing over). If any defects are observed through the inspection, KPA shall take necessary action to the manufacturer(s).
c. KPA shall make maintenance contracts after the defect notification period of the equipment.

(23) In order to properly use cargo handling equipment to be procured and to perform expected effect in parallel with development of DK1 and SEZ, KPA as management body is required to budget O&M for the equipment and securing necessary human resources.

2-4 Project Operation Plan

Organizations mentioned below are responsible for the O&M of the water supply, drainage improvement and land development components of this Project.

Table 2-4-1 Organizations for O&M

Component	Facilities	Organization responsible for O&M
Water supply	1. Intake wells (3 wells)	CWWDA
	2. Transmission pipelines (from intake wells to booster pumping station)	
	3. Booster pumping station	
	4. Main transmission pipeline (from booster pumping station to reservoir)	
	5. Distribution pipeline (for water supply to Kwale County)	
	6. Water reservoir and tank	
	7. Connection pipelines (for water supply to Mombasa County)	
Drainage	1. Bank protection	KPA
Land grading	1. Earthwork	KPA
	2. Building external development	
	3. Administration building	
Procurement of Equipment	1. Cargo handling equipment	KPA

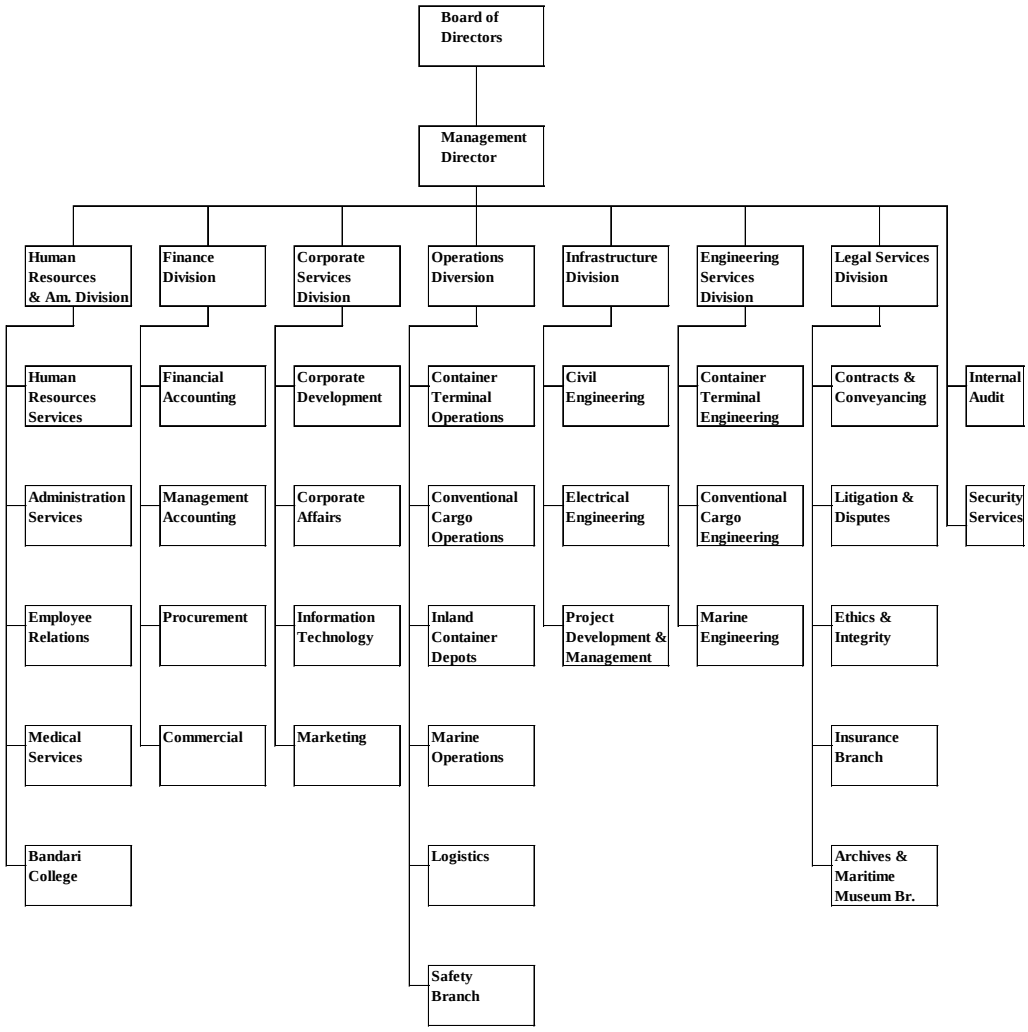
Source: JICA Study Team

2-4-1 Operation and Maintenance Structure

The organizational structure of KPA and CWWDA are shown below.

(1) KPA

The organizational structure of KPA is as shown in Figure 2-4-1.



Source: JICA Study Team

Figure 2-4-1 Organizational Structure of KPA

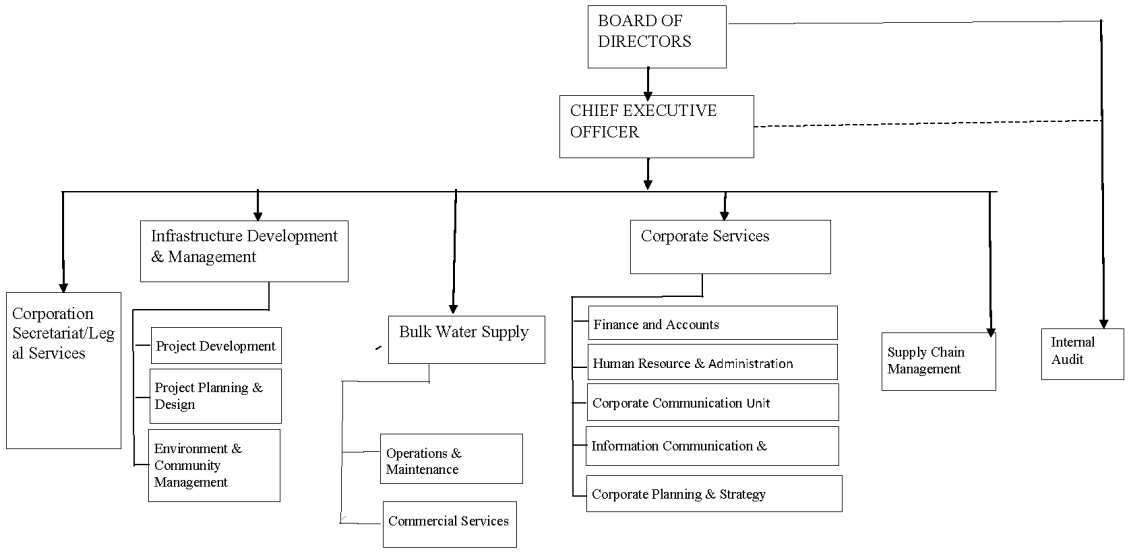
According to the "Annual Report and Financial Statements for the year ended 30 June 2017," the total number of KPA staff is approximately 6,600. The infrastructure-related facilities currently operated and maintained by KPA are civil engineering, architecture and electrical structures in the port area, and the "Infrastructure Division" shown in Figure 2-4-1 is in charge.

When this Project is completed, the "Infrastructure Division" will be in charge of O&M, but it will result in the placement of personnel and new employment.

Water kiosks which will be provided by KPA shall be operated and maintained by Kwale WSP which are conducting the O&M of the existing water supply system.

(2) CWWDA

The organizational structure of CWWDA is as shown in Figure 2-4-2.



Source: CWWDA

Figure 2-4-2 Organizational Structure of CWWDA

2-4-2 Operation and Maintenance Method

(1) Water Supply Component

The CWWDA is a government organization that manages and supervises water supply projects in coastal areas throughout Kenya, and Mombasa, where the Project is located, is included in the target area. CWWDA has owned and operated similar facilities near the wells to be used in the Project, and has sufficient experience in the area, so it is suitable as the operator of the Grant Aid Project.

The capacity of pump secured by the Preparatory Survey for the Project for Infrastructure Development in Mombasa is 2,300m^3/day. The O&M of water supply for this Project will be divided into 2,000m^3/day to cover SEZ's water demand and 300m^3/day to supply water to residents in Kwale County as surplus water.

KPA will outsource 2,000m^3/day-water supply to SEZ to the public authority or a private company. The supposed O&M works are as shown below:

- Maintenance and management of intake well facilities;
- O&M of transmission pipelines, main transmission pipeline, main distribution pipeline and connection pipeline;
- O&M of booster pumping station facilities, pump operation, generator operation and water quality inspection; and
- O&M of Mombasa SEZ reservoir facilities, water distribution to SEZ, pump operation, generator operation, water quality inspection and water sales.

The following are the assumed personnel and roles necessary for above operations.

Table 2-4-2 Operation and Maintenance Structure

Facilities	Personnel		Remarks
	Position	No.	
Mombasa SEZ reservoir Water supply management building	Director Administrative staff Test engineer Construction staff Others	1 2 1 2 2	To be outsourced to a private company
	Total	8	

Source: KPA Annual Review and Bulletin of Statistics 2018

Meanwhile, KPA will provide 300m^3/day of surplus water to residents living in the vicinity of the facilities for the purpose of conservation of water supply facilities (including water intake wells facilities and water supply facilities) and improve their accessibility to safe water.

Water kiosks to be developed at the intake wells and distribution pump, distribution pipeline and water kiosks at the booster pumping station to the WSP in Kwale County will be provided and CWWDA will operate and maintain these facilities.

(2) Drainage Component

The degree of erosion of revetments in natural waterways should be checked through site survey. The status of the gabions and stonework waterways installed through this Project will be checked and repaired when necessary. KPA's “Infrastructure Division” will carry out these operations.

(3) Land Development Component

KPA will divide the lands into ones to be provided for developers and others for common spaces (internal roads, green areas, outside toilet, street lights, drainage/sewerage facilities, etc.). KPA shall operate and maintain common area as well as developer’s lands until the they move in. Common infrastructures will be inspected regularly: repair works, and removal of deposits will be conducted as necessary. KPA's “Infrastructure Division” will carry out these operations. Table 2-4-3 shows the personnel and their roles that will be required for the above tasks in the future.

Table 2-4-3 Operation and Maintenance Structure

Facilities	Personnel		Remarks
	Position	No.	
D1 area (land development) and other related facilities (roads, car park, greens, outside toilet, street lights and drainage/sewerage facilities)	Director Accounting Human Resources & Administration Sales & Market Law Engineering Others	1 2 2 8 2 10 50	New recruits are included. "Others" include personnel dispatched from other organizations, as OSS is also included.
	Total	75	

Source: JICA Study Team

2-4-3 Smooth Transfer to External Organization for O&M

While KPA is the implementation organization responsible for the Grant Aid Project, whole of the water supply component constructed under the Grant Aid Project is to be transferred to the external O&M organization (CWWDA) for the operation and maintenance. For the smooth transfer on completion of the construction, CWWDA is expected to be involved in the project through the detailed design, tender and construction stages. MOU regarding conditions of facility transfer and the O&M between KPA and CWWDA has been already signed and the consultant can proceed with the project works through the above stages in cooperation with CWWDA based on the MOU. The work demarcation among the three parties (Consultant, CWWDA and KPA) during the project implementation period is shown in the subsequent sections.

(1) Detailed Design Stage

The work demarcation during the detailed design stage is given in Table 2-4-4.

Table 2-4-4 Work Demarcation at Detailed Design Stage

Design Consultant	O&M Organization	KPA	Remarks
1)Determine design conditions 2)Design (Preparation of specifications, drawings and calculation report) 3)Project Cost Estimate 4)Prepare construction program 5)Prepare tender documents 6)Coordinate with implementation agency, and the related organizations	1)Confirm design conditions for the facilities to be transferred 2)Review and confirm design documents for the facilities to be transferred 3)Participate in coordination meeting among 3 parties	1)Approve design conditions 2)Approve design documents 3)Approve tender documents 4)Organize coordination meeting among 3 parties （Approvals in the design work are subject to confirmation by O&M organization.	Water supply component is to be transferred to CWWDA. CWWDA will provide KPA with technical assistance in work supervision.

Source：JICA Survey Team

(2) Tender Stage

The work demarcation during the tender stage is given in Table 2-4-5.

Table 2-4-5 Work Demarcation at Tender Stage

Design Consultant	O&M Organization	KPA	Remarks
1)Prequalification of tender 2)Delivery of tender documents 3)Arrange joint site inspection and pre-bid meeting with applicants 4)Tender evaluation 5)Contract negotiation 6)Prepare contract documents 7) Coordinate with implementation agency, and the related organizations	1)Confirm prequalification result 2) Participate in joint site inspection and pre-bid meeting with applicants 3) Confirm tender evaluation result 4) Observer in contract negotiation 5) Confirm contract conditions and witness signing 6) Participate in coordination meeting among 3 parties	1) Approve prequalification result 2) Participate in joint site inspection and pre-bid meeting with applicants 3) Approve tender evaluation result 4) Contract negotiation 5)Contract signing 6) Participate in coordination meeting among 3 parties	Water supply component is to be transferred to CWWDA. CWWDA will provide KPA with technical assistance in work supervision.

Source：JICA Survey Team

(3) Construction Supervision Stage

The work demarcation during the construction supervision stage is given in Table 2-4-6.

Table 2-4-6 Work Demarcation at Construction Supervision Stage

C/S Consultant	O&M Organization	KPA	Remarks
1)Construction supervision（progress control, quality control, cost control, safety control） 2)Arrange regular progress meeting with the contractor 3)Final inspection 4)Assist implementation agency in transfer of completed facilities 5)Defect liability inspection 6) Coordinate with implementation agency, and the related organizations	1) Participate in regular progress meeting with the contractor 2)Progress site inspection at major milestone for the facilities to be taken over 3)Joint final inspection 4)Execute the transfer procedure for the facilities to be taken over 5)Joint defect liability inspection 6) Participate in coordination meeting among 3 parties	1) Participate in regular progress meeting with the contractor 2) Progress site inspection at major milestone in the construction period 3) Joint final inspection 4) Payment approval 5) Execute the transfer procedure for the facilities to be handed over 6) Joint defect liability inspection 7) Participate in coordination meeting among 3 parties	Water supply component is to be transferred to CWWDA. CWWDA will provide KPA with technical assistance in work supervision.

C/S: Construction Supervision

Source：JICA Survey Team

2-5 Preliminary Project Cost Estimate

2-5-1 Preliminary Cost Estimate for Grant Aid Project

(1) Cost Burden of Japan

This part is closed due to the confidentiality.

(2) Cost Burden of Kenya

Table 2-5-1 Total Cost Burden of Kenya (Direct Cost for Construction Stage

Item	Cost Burden of Kenya (Ksh million)	Yen Equivalent (Yen million)
Compensation for RAPs and Land Acquisition	253	259
Construction permission for pipeline (KeNHA, KeRRA, Mombasa County and Kwale County)	0 *1	0
Connection cost between the connection pipe and the existing water supply pipe for Mombasa County	1	1.0
Construction permission for Administration Building in Reservoir and D1 Area	*2	*2
Usage permission for water source (for 5 years)	0 *1	0
Application for installation of electricity for wells, booster pumping station, reservoir and Administration Buildings	6	6.1
Application for commissions to the Agent Bank for the banking services	*2	*2
Application for installation of telecommunication	*3	*3
Custom duty for imported equipment and construction materials, and other taxes	0 (tax exemption)	0
Administration cost for PIU, including staff salary, allowance and transportation during project implementation period	87	89.1
Total	347	355.2

*1: already paid by KPA
*2: not known
*3: It depends on the decision of the KPA because mobile phone is available instead of cable.
Exchange Rate shall be Ksh 1 = Yen 1.0236 on December 2021
Source: JICA Study Team

Table 2-5-2 Total Cost Burden of Kenya (Annual)

Item	Cost Burden of Kenya (Ksh mil.)	Yen Equivalent (Yen mil.)
Usage fee for water source	0.09 *1	0.09
Usage fee for electricity	11.0 *1	11.3
Usage fee for telecommunication	0*2	0
O&M costs for Water supply component	0 *3	0
O&M costs for Land development component	0 *4	0
O&M costs for cargo handling equipment	83.96*5	85.94
Total	95.05	97.33

*1: Cost estimated applying annual price escalation rate of 6% for the cost at Sep. 2019.

*2: It depends on the decision of the KPA because mobile phone is available instead of cable.

*3: Cost covered by water tariff or land and building rental fee

*4: Cost is paid by enterprise that KPA rent land to.

*5: It is currently assumed that KPA, which is project execution organization, is responsible for O&M of all equipment to be procured under the Grant Aid Project.

Exchange Rate shall be Ksh 1 = Yen 1.0236 in December 2021,

Source: JICA Study Team

(3) Condition of Cost Estimate

1) Time of cost estimate	Civil/Building works (Civil/Building): December 2021 Procurement of cargo handling equipment (Procurement of equipment): May 2022
2) Exchange rates	Civil/Building 1 USD = ¥113.48 1 Ksh = ¥1.0236 Procurement of equipment 1 USD = ¥121.02 1 Euro = ¥134.06 1 Ksh = ¥1.0586
3) Schedule	The schedule is described in Section 2-2-4-9.
4) Others	The cost was estimated based on the Grant Aid Scheme of the Government of Japan.

2-5-2 Operation and Maintenance Costs

(1) Water Supply Component

The O&M costs of facilities related to the water supply component were estimated as shown in Table 2-5 3. Each unit price was based on the quotations collected in Kenya, and the costs for spare parts of O&M equipment for pumps were set at 20% of O&M costs for pumps and the costs for spare parts of O&M equipment for generator were also set at 20% of the costs for generator. The maintenance period of pumps and generators were set to 12 years and 10 years based on the past experiences and interviews with local suppliers. Depreciation is not taken into account. However, as indicated in Table 2-5 3, the estimated annual O&M cost for water supply component is covered by water tariff.

Table 2-5-3 Annual O&M Cost for Water Supply Component

Item	Contents	O&M Cost (Ksh/year)
Equipment Costs		
Submersible Pump (No.2)	Ksh 597,000/12 years	49,800
Submersible Pump (No.3)	Ksh 463,000/12 years	38,600
Submersible Pump (No.5)	Ksh 388,000/12 years	32,400
Booster Pump	Ksh 1,250,000/12 years	104,200
Pump	Ksh 25,000/10 years	2,100
Generator-1	Ksh 2,126,000/10 years	212,600
Generator-2	Ksh 917,000/10 years	91,700
Fuel	Ksh 4,840 x 365 days	1,766,600
O&M by WUA Spare Parts	Lump sum	45,000
O&M by Technician Spare Parts	Lump sum	60,900
Inspection Cost	1 time/year	2,500
Labor costs		
Pump Operator	1 person x Ksh 64,600 x 12 months	755,200
Well and Reservoir Keeper	4 persons x Ksh 64,600 x 12 months	3,100,800
Transportation Cost	Lump sum	2,700
Incidental (Stationary etc.)	Lump sum	14,000
Total		6,299,300

*The diesel oil required for the generator 100kVA is 21L/h, and the diesel oil required for the generator 5kVA is 1.6L/h. It is assumed that a power outage occurs for about 2 hours a day. Considering that the unit price of diesel oil is 107Ksh/L, the daily required cost of diesel oil was 4,840Ksh/day.

Source: JICA Study Team

(2) Drainage Component

Drainage component includes only gabion structures for the bank protection and the regular maintenance will not be necessary. When serious degradation or damages due to flooding is observed, any repair work will be required according to the extent of the damage. Therefore, a maintenance cost as annual O&M works is not estimated.

(3) Land Development Component

The O&M costs of the land development component was estimated under the following conditions.

- Repair of the earth ditches and small dikes will be conducted once a year. The annual costs for repair were estimated assuming that the repair target was 50% of the total length of the earth ditches and small dikes.
- Dredging of drainage facilities (temporary junction pond, horizontal channels on berm and joint boxes on slope) will be conducted once a year. The annual costs for dredging were estimated assuming that the annual amount of sediment is 20% of the cross-sectional area of drainage facilities.
- It was assumed that the lifetime of the asphalt pavement in the car park is 20 years, and the

surface layer will be replaced once every 20 years.

- The basic unit prices of O&M costs were based on the unit prices of the preliminary cost estimate of the project.

The summary of the O&M costs of the developed land development is shown in Table 2-5 4. However, as indicated in Table 2-5 4, the estimated annual O&M costs for the developed land and the administration building are covered by the rental fees.

Table 2-5-4 Summary of Annual O&M Cost for Land Development Component

Item	Contents	O&M Cost (Ksh/year)
Repair of earth ditches and small dikes	Excavation and filling	1,455,000
Dredging of temporary junction pond, horizontal channels on berm and joint boxes on slope	Excavation and transportation of sediment soil	34,000
Replacement of asphalt pavement (parking area)	Ksh 18,578,560 /30 years	619,000
Incidental	10%	211,000
Total		2,319,000

Source: JICA Study Team

(4) Road Component

A temporary road for the construction works is only the structure constructed in the road component under the Project and not assumed to be maintained after completion of the construction works. Therefore, the O&M costs of the road component is not estimated.

(5) Cargo Handling equipment

O&M cost related to cargo handling equipment is estimated at Ksh 83.96 million/year for operation, repair and maintenance of the equipment.

Chapter 3 PROJECT EVALUATION

3-1 Precondition for Project Implementation

3-1-1 Land Acquisition and Construction Permit

(1) Land Acquisition

Many of the infrastructure as well as facilities to be developed in four components of the Grant Aid Project will be located inside the Mombasa SEZ site managed by KPA. However, there are non-titleholder residents and assets belong to them in the SEZ site. To ensure smooth implementation of the project, KPA allocated land within the SEZ area for the resettlement of all affected non-titleholders. The costs for the development of the proposed resettlement land will be incurred by KPA. Additionally, all the affected non-land assets will be compensated as per the Kenyan laws before the affected non-titleholders will be relocated to the resettlement land.

As Mombasa SEZ itself has a vast area, it is possible to select a site necessary for the Grant Aid Project even after all the affected non-titleholders relocated to planned resettlement land. Those include sites for contractors' site offices, material storage, temporary storage, disposal sites, construction access roads. The location of camp yard for contractor has been designated at the opposite side of water supply center across the Southern Bypass, covering an area of about 1 ha.

Regarding the water supply component, the land between the water resources and the water supply center in Mombasa SEZ where the water supply facilities will be installed belong to Kwale County. Some of the lands are located on privately owned land, while other land plots are public land belong to diverse government institutions including KeNHA, KeRRA, Kwale County etc. Therefore, KPA should acquire land and pay compensation in accordance with the laws and regulations of Kenya for the private lands, and for the public land, acquire necessary permit to use the land or land transfer needs to be obtained from relevant institutions. Ministry of Water and Irrigation currently holds ownership of the three boreholes as water intake facilities. KPA is doing procedure of the ownership transfer.

(2) Construction Permit

The required construction permits by responsibility of KPA together with CWWDA are as follows.

a. Permit from WRA to take water from wells developed at Mombasa SEZ D/M (2019/6).

b. Permit from KeNHA, KeRRA, Kwale County and Mombasa County to install pipelines under public roads. Regarding connection pipe, permit from KeNHA is required to install them on the side of roadway in the southern bypass road.

c. Permit from KPLC (Kenya Power and Lighting Company) to draw in existing

commercial power for powering water intake and transmission as well as distribution. Application for power supply to the booster pumping station, water supply center and Administration Building is also required.

3-1-2 Acquisition of Approval for Environmental Impact Assessment

According to JICA Guidelines for Environmental and Social Considerations, this preparatory study for the Grant Aid Project of Mombasa SEZ is classified into Environmental Category "B". The report of the ESIA study conducted in this preparatory study was submitted by KPA in December 2019 to NEMA in accordance with the relevant regulations on environmental impact assessment in Kenya. The final report of ESIA study was submitted by KPA to NEMA in early February 2020 and EIA license was successfully issued by NEMA on May 2022 with some approval conditions. KPA will be required to comply with and take necessary actions to respond to the conditions of EIA license.

Following the ESIA, the update information of the ESIA report according to the revised scope of the Project has been prepared as a Supplementary Environmental and Social Impact Assessment (S-ESIA) report. The S-ESIA report needs to be submitted to NEMA by KPA and is expected to be acknowledged by NEMA shortly.

3-1-3 Tax Exemption

In conformity with the E/N, the corporate tax, personal income tax, value added tax, custom duties of import and/or equipment and etc. are exempted. In terms of the prompt procedure, KPA is required to coordinate with the relevant authorities such as Ministry of Roads, Transport and Public Works (MoRTP), National Treasury (NT) and Kenya Revenue Authority (KRA).

3-2 Project Implementation Policy

The development site is public land under the control of the KPA, but SEZ development is supervised and implemented by SEZA. In this condition, D1 development area (Freeport: FP), which is a value-added function of port, will be developed and operated by KPA as a business owner, under SEZA supervision.

The business and operations of FP are specified in the Protocol Annex VIII Part C Article 31 of the East African Community as follows:

a. Warehousing and storage
b. Labeling, packing and repacking
c. Sorting, grading, cleaning and mixing
d. Breaking bulk
e. Simple assembly

f. Grouping and packages

At the time of the project implementation, following policies are proposed and considered:

A. KPA alone: considered very difficult because of the lack of similar track record or experience.

B. Joint venture or SPV established among KPA and other organizations: considered to be unrealistic because of difficulties of required procurement procedures in accordance with the Public Private Partnership (PPP) Act when selecting a private business operator, which brought many PPP projects in difficulty or relinquishment.

C. Lending land to other agencies that operate the KPA FP: Trading Company, Ships, logistics companies and warehousing companies are likely to show interest in FTZ (Free Trade Zone), such as FTZ adjacent to Laem Chabang Port in Thailand.

Therefore, considering the operational capacity of KPA, it is highly probable that the project will be implemented with Option C above for D1 development area that contains FP. The option to be implemented in the future will be discussed and decided at the Joint Committee with the relevant ministries of Kenya including SEZA.

To develop the water supply facilities is the purpose of the Project, the design and construction by KPA and the transferring of the O&M to CWWDA. When KPA manages the design, the water of 2,000m^3/day shall give priority to supply to the SEZ and the water of 300m^3/day shall make efficient use of supply to the region by CWWDA.

Cargo handling equipment is intended to use for FP that will be developed in the D1 land area and the entire SEZ including the new port terminal (DK1) as well. The equipment is expected to be delivered at the Mombasa Port prior to completion of DK1 terminal. Therefore, the equipment will be available for operation of the existing terminal, and then those will contribute to enhancing the cargo handling capacity of SEZ immediately after completion of DK1 new terminal and SEZ.

KPA will form a Project Implementation Team (PIT) to implement Grant Aid Project and operate D1 FP. PIT is made up of following staff members of KPA, and overall responsibility will be assigned to KPA's Corporate Development:

- Corporate Service Division
- Infrastructure Division
- Legal Services Division
- Security Services

3-3 Necessary Inputs (Burdens) for Recipient Country to Achieve Overall Project Plan

Infrastructure facilities developed through the Grant Aid Project will be operated and maintained by KPA. As for water supply facilities, in order to outsource the work to the CWWDA, an organization to monitor the contractor for water supply to priority to the SEZ will be established in KPA.

In addition, as described in Section 3-4, KPA's "Infrastructure Division" will implement the development, drainage, and maintenance of road infrastructure facilities.

In order to secure the budget for operation and maintenance, proper operation by water supply facilities and the other field is indispensable. KPA will build the system that the O&M cost of land, road and drainage shall pay by the rental cost of D1 Area, and the O&M cost of water supply facilities and fuel cost of generator shall pay by the selling of water to CWWDA. CWWDA is required to understand that the finance is improved by the selling of water to the SEZ (business) and the profitability and continuance is guaranteed than that of the water supply to household. Infrastructure Division of KPA will be responsible for maintenance of bank protection in the natural drainage channel.

Cargo handling equipment to be procured will be used for the entire SEZ area including the new port terminal (DK1). In addition to development of port infrastructure and SEZ, through proper operation of the equipment that is used in the SEZ area, cargo distribution capacity of the entire SEZ will be enhanced. Therefore, KPA needs to secure the budgets required for continuous operation and maintenance of the equipment and securing human resources.

3-4 External Conditions

The external conditions to achieve the objective of the Grant Aid Project are described below:

a. The intension of Kenya where a business agency of D1 is the KPA will not be changed.

b. The related policies of KPA, SEZA, KPA, Kwale WSP and Mombasa WSP will not be significantly changed.

c. The budget for operation and maintenance by KPA will not be sharply and significantly reduced.

d. The security situation in Kenya, Mombasa County and Kwale County will not deteriorate.

3-5 Project Evaluation

3-5-1 Adequacy

a. The Grant Aid Project contributes to Kenya's Vision 2030 and is consistent with its policies. The economic policy indicated in Kenya's Vision 2030 aims to develop the economy in Mombasa as the logistic base towards the East countries. Accordingly, the expansion of existing port and the construction of south bypass road and bridge are in progress. In parallel with the construction of port and road, the development of infrastructure in Mombasa SEZ by the Grant Aid Project meets the economic policy of the Kenya.

b. Implementation of the Grant Aid Project is unlikely to have any negative environmental impact. The natural environmental impact from the Project is not assumed practically, and the social impact of noise, mine dust and vibration by the operation of the construction machine from the Project is possible to minimize by the measure. In this project, neither a large-scale land acquisition nor resettlement of a large number of local residents are presumed, and it is planned to provide timely compensation and assistance to the residents affected by the project.

c. The implementation of the Grant Aid Project is corresponding to the purpose for development of the current project for port expansion and road construction.

d. Operation and maintenance by Kenya's budget and human resources is possible and does not require excessively advanced technology. The content of the Grant Aid Project is similar of the facilities in Kenya, and the budget, human resource and O&M of the Project is adequate scale.

3-5-2 Efficacy

The Grand Aid Project contains four components including water supply, drainage, land development and road, and in addition procurement of cargo handling equipment. Several effects as shown below are expected through implementation of three components except road component that includes only a temporary access road for land development work, and procurement of equipment.

(1) Quantitative Effect

1) Land for FP is developed, and it's become possible to attract enterprises in the land of 10 ha.
2) Water of 2,000m^3/d from three wells is secured, and it is possible to supply for the stage 2 of Phase 1 in accordance with the development plan of Mombasa SEZ. Also, it is

effective for land development of about 180ha for port, FP, enterprise area, residential are and etc.

3) Out of the total water extraction of 2,300 m^3/day from the wells developed in the Project, 300m^3/day is supplied for the residents near the wells and along the distribution pipeline in Kwale. All the remaining water volume of 2,000 m^3/day will be eventually used to meet the water requirement in the SEZ which will increase by development stage. It is, therefore, possible to supply part of the water (2,000m^3/day in the maximum) to the Mombasa WSP, according to the water requirement at the development stage.

(2) Qualitative Effect

1) By implementing the Grant Aid Project based on the Mombasa SEZ M/P and in parallel with the Loan Project, the early realization of the Mombasa SEZ will be expected. The Project is also expected to contribute to Kenya's economic development and the possibility of becoming a middle-income country in 2030, and to promote the development of Mombasa SEZ.

2) Infrastructure of water supply, drainage and land development will be available in the project area and used for the development of Mombasa SEZ as basic infrastructures.

3) The cargo handling equipment that are to be used for FP in D1 area will be an incentive of the FP in use. Furthermore, these equipment will be used for the port operation of new terminal DK1 as well, and thus contribute to earlier start-up of SEZ including the new port.