BASELINE ENVIRONMENTAL MONITORING REPORT

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Environmental Management and Monitoring Plan for Civil and Construction Works at Mombasa Port Berth 19B and Associated Infrastructure

Baseline Environmental Monitoring Report

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Executive summary

Kenya Ports Authority (KPA) contracted China Communications Construction Company (CCCC) Limited to implement the construction of Container Berth 19B and associated infrastructure at Mombasa Port. As part of environmental performance of the project and in compliance with its Environmental and Social Management Plan (ESMP), Environmental Monitoring Plan as well as Environmental Impact Assessment (EIA) licence conditions, China Communications Construction Company (CCCC) Limited prepared and submitted an Environmental Management and Monitoring Plan (EMMP) to Kenya Ports Authority (KPA) and National Environment Management Authority (NEMA) in May 2025. The EMMP requires CCCC to prepare and submit a Baseline Environmental Monitoring Report to KPA and NEMA prior to commencement of the works. This report is therefore prepared in fulfillment of this condition and focuses on four environmental media: water quality, biological communities, air quality, and noise and vibration measurements.

Water quality monitoring was conducted at eight (8) monitoring stations (three (3) inshore and five (5) offshore). Parameters assessed included turbidity, Total Suspended Solids (TSS), pH, Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), and Perspective Degree. Results showed that the average turbidity and TSS readings were 6.02 NTU and 16.03 mg/l, and 0 and 9.06 mg/l for inshore and offshore monitoring stations respectively. The high turbidity and TSS levels in inshore water quality are attributed to the ongoing port development activities, raw effluent discharging into the Port at Berth 14 and the storm water drain effluent (currently discharging raw sewage and industrial effluent from Mombasa West Mainland) as well as sediment load from upstream sources. The average Perspective Degree value for offshore monitoring stations was more than 20 times higher than inshore waters further indicating relatively low turbidity levels. Apart from the turbidity, TSS and Perspective Degree, the rest of the parameters (pH, DO and COD) were comparable. All parameters were within EMMP targets, providing reliable reference points for impact and compliance monitoring.

Biological monitoring was undertaken at Shelly Beach and Mombasa Marine Park and Reserve. Shelly Beach recorded high Macro Algae cover (62.5 ± 2.5%) and relatively low coral (15%) compared to Mombasa Marine Park and Reserve which had higher coral cover (50%) while fish family density was generally low in both monitoring stations (less than 10.0 ± 9.5 individuals/250 m^2). Higher invertebrates' density was recorded at Mombasa Marine Park and Reserve with a mean of 13.0 ± 1.0 individuals/50 m^2 compared to 10.5 ± 1.5 individuals/50 m^2 at Shelly Beach.

Air quality monitoring conducted at the project site, CCCC Office, and Blue Room Residence showed that all parameters (CO, NO_2, NOx, SO_2, H_2S, $PM_{2.5}$, PM_{10}) were within standards prescribed by the Environmental Management and Coordination (Air Quality) Regulations, 2024.

Noise and vibration measurements at the project site, CCCC Office, and Blue Room Residence recorded levels exceeding the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009. This was mainly attributed to to ongoing port operations, Standard Gauge Railway (SGR) activity, container handling, ships, among others.

In line with these findings, strict implementation of the EMMP is required throughout the construction phase to minimize potential adverse environmental effects and ensure compliance with safeguards policies and statutory environmental and social performance standards.

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Acronyms

AQM	Air Quality Monitoring
C.D.L	Chart Datum Level
CCCC	China Communications Construction Company
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DWT	Deadweight Tonnage
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
H_2S	Hydrogen Sulfide
ICT	Information and Communication Technology
KPA	Kenya Ports Authority
LAN	Local Area Network
NEMA	National Environment Management Authority
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxide
O_2	Oxygen
PIT	Point Intercept Transect
SCUBA	Self-Contained Underwater Breathing Apparatus
SEM	South-East Monsoon
SGR	Standard Gauge Railway
SLM	Sound Level Meter
SO_2	Sulfur Dioxide
SPM	Suspended Particulate Matter
TSS	Total Suspended Solids
UVC	Underwater Visual Census

1 Background information

Kenya Ports Authority (KPA) contracted China Communications Construction Company (CCCC) Limited to implement the construction of Container Berth 19B and associated infrastructure at Mombasa Port. The project involves construction of Berth 19B with a Chart Datum Level (C.D.L) –13.5m design depth capable of handling 45,000 Deadweight Tonnage (DWT) containerized ships as well as associated infrastructure including electrical power supply, drainage and utility systems, navigational aids, security, Information and Communication Technology (ICT), Local Area Network (LAN) alarm detection system and dedicated data communication, portable water supply, fire pumping station, welfare building and alternative maritime power if required.

The project activities includes dredging works at the berth pockets and turning basin, land reclamation and ground improvement, construction of quay structures and associated furniture (e.g., fender systems and bollards), revetments under the quay deck and return edges as well as stacking yards and ports.

As part of environmental performance of the project and in compliance with its Environmental and Social Management Plan (ESMP), Environmental Monitoring Plan as well as Environmental Impact Assessment (EIA) licence conditions, China Communications Construction Company (CCCC) Limited prepared and submitted an Environmental Management and Monitoring Plan (EMMP) to Kenya Ports Authority (KPA) and National Environment Management Authority (NEMA) in May 2025. The EMMP requires CCCC to prepare and submit a Baseline Environmental Monitoring Report to KPA and NEMA prior to commencement of the works. This report is therefore prepared in fulfillment of this condition.

The report focuses on four (4) environmental media which are water quality, biological, air quality and noise and vibration measurements. Water quality monitoring included physical parameters and chemical parameters; the physical parameters were turbidity and Total Suspended Solids (TSS) while the chemical ones were pH, Chemical Oxygen Demand (COD), Dissolved Oxygen (DO) and Perspective Degree. Biological monitoring includes critical habitats i.e. coral reefs and benthic communities, seagrass beds, and fauna including fish and invertebrates. The two other environmental media are air quality and noise measurements at the project site, CCCC office and Blue House Residence.

2 Water quality

2.1 Scope

Potential sources of water quality degradation includes dredging, offshore dumping and sand harvesting activities, oil spills as well as solid and liquid wastes. Dredging activities will upset sediments at the bottom of the water at the project site while dumping of dredged materials offshore will generate sediment plumes that might be transported to onshore depending on the prevailing currents and wave action. The sediment plumes will potentially alter the water quality by increasing turbidity which in turn will affect productivity of marine ecosystems mainly due to reduced light, temperature changes and availability of dissolved oxygen. Higher suspended sediment concentration as a result of dredging activities can cause coral polyps to contract and feeding to cease. The suspended sediments can reduce light, clog filtering and feeding apparatus, and settle onto benthic organisms, including ecologically important, habitat forming groups such as corals and therefore pose an environmental hazard. Fish population decline as a result of turbidity arising from dredging and dumping activities has been reported by monitoring surveys from previous projects at the port and studies. At the dumping area suspended plumes may also be transported and deposited on marine habitats such as coral reefs, seagrass and mangroves causing smothering, beaches and recreational areas thus impacting negatively on tourism activities.

High levels of total suspended solids can cause increased water temperatures and decreased dissolved oxygen. Suspended particles absorb more heat from solar radiation than water molecules and lead to oxygen sags and potential asphyxiation as heated water cannot hold as much dissolved oxygen as colder water.

Ship operations will generate wastes which include plastics, metal, glass, paper, organic wastes from kitchen areas, effluent and potential used oil and lubricants. Poor disposal of the wastes and possible oil spills from the dredger and construction equipment will cause pollution and degradation of water quality and are a threat to marine life forms.

Due to these potential impacts of the project on water quality, baseline data and information are important to ensure that monitoring activities during dredging, dumping, sand harvesting and actual construction of the Berth 19B are able to discern and record changes and inform adaptive mitigation measures.

2.2 Monitoring locations

Water quality monitoring was carried out at eight (8) stations (3No. Inshore and 5No. Offshore) (Table 1 and Figure 1).

Table 1: Inshore and Offshore water quality monitoring stations

Monitoring Station	Location description	Coordinates
Inshore		
MS 1	West of Berth 19B	4°02'51.24"S, 39°37'12.37"E
MS 2	South of Berth 19B	4°02'57.70"S, 39°37'18.16"E
MS 3	South-East of Berth 19B	4°02'54.29"S, 39°37'27.53"E
Offshore		
MS 4	Shelly Beach	4° 7'39.17"S, 39°40'26.47"E
MS 5	Tiwi Beach	4° 9'24.59"S, 39°39'55.67"
MS 6	South of the dredged material dumping site	4° 8'33.99"S, 39°42'9.86"E
MS 7	North of the dredged material dumping site	4° 7'14.17"S, 39°43'17.63"E
MS 8	Mombasa Marine Park and Reserve	4° 3'7.23"S, 39°44'30.12"E

Figure 1: The 3 No. Inshore (MS1-3) and 5 No. Offshore (MS4-8) Water Quality Monitoring Stations (Source: Google Earth, 2025)

2.3 Parameters

The baseline water quality monitoring involved sampling and analysis of physical and chemical parameters. The physical parameters were turbidity and Total Suspended Solids (TSS) while the chemical ones were pH, Chemical Oxygen Demand (COD), Dissolved Oxygen (DO) and Perspective Degree.

2.4 Methodology

Water quality monitoring (Figure 2) was carried out at 8 No. monitoring stations (3No. inshore and 5No. offshore) from 13th to 19th July 2025 as per the Environmental Management and Monitoring Plan (EMMP). In each of these stations, three water samples were obtained at depths of -0.5 m, -3 m and -8 m for in-situ parameters (pH, Dissolved Oxygen (DO), turbidity, temperature, salinity, Perspective Degree) and ex-situ parameters (Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS) for analysis in a NEMA approved laboratory. Visual observations were also undertaken as a means of gauging the Perspective Degree of turbidity levels at any given time.

Figure 2: Water quality monitoring inshore (left) and offshore (right) (Source: Fieldwork, July 2025)

2.5 Results and discussion

Baseline water quality results established the physical and chemical parameters status within the inshore and offshore monitoring stations. The results were within the EMMP targets (Table 2). These baseline values will serve as the benchmark for both impact and compliance monitoring. The baseline values will thus be points of reference in relation to the EMMP targets during the dredging and dumping and will inform mitigation measures to be implemented by CCCC.

Further, the results indicated that offshore monitoring stations had better water quality levels compared to the inshore ones (Tables 2 & 3). The average turbidity and TSS readings were 6.02 NTU and 16.03 mg/l, and 0 and 9.06 mg/l for inshore and offshore monitoring stations respectively. The high turbidity and TSS levels in inshore water quality are attributed to the ongoing port development activities, raw effluent discharging into the Port at Berth 14 and the storm water drain effluent (currently discharging raw sewage and industrial effluent from

Mombasa West Mainland) as well as sediment load from upstream sources. The average Perspective Degree value for offshore monitoring stations was more than 20 times higher than inshore waters further indicating relatively low turbidity levels. Apart from the turbidity, TSS and Perspective Degree, the rest of the parameters (pH, DO and COD) were comparable.

Table 2: Baseline water quality results for inshore and offshore monitoring stations (Source: Lahvens (K) Limited, July 2025)

Parameters	Inshore Average value	Offshore Average value	EMMP target	Comments
pH	7.95	8.10	6.6-8.8	Baseline results are within the EMMP targets
Dissolved Oxygen	5.32	6.77	>4 mg/l	
Turbidity	6.02	0	+60 NTU	
Total Suspended Solids	16.13	9.06	+60 mg/l	
Chemical Oxygen Demand	10.46	8.28	50 mg/l	
Perspective Degree	0.33	8.00	-	

Table 3: Detailed baseline water quality monitoring results for inshore and offshore monitoring stations across the water column (Source: Lahvens (K) Limited, July 2025)

Monitoring station	Sampling Depth (m)	Acidity/ Basicity (pH)	Chemical Oxygen Demand	Dissolved Oxygen	Perspective Degree	Total Suspended Solids	Turbidity
Inshore monitoring stations							
MS1	0.5	7.95	10.28	5.38	0.27	18.54	6.46
	3	7.96	9.97	5.32		15.45	5.73
	8	7.96	10.63	5.29		15.34	5.87
MS2	0.5	7.95	10.19	5.26	0.20	20.12	7.39
	3	7.94	10.01	5.24		17.52	7.37
	8	7.96	10.27	5.22		15.59	6.64
MS3	0.5	7.96	10.54	5.36	0.53	14.68	5.53
	3	7.95	10.91	5.40		13.26	4.77
	8	7.95	11.35	5.37		14.64	4.46
Offshore monitoring stations							
MS4	0.5	8.04	8.87	6.42	8.00	11.47	0.00
	3	8.05	8.67	6.43		10.46	0.00
	8	8.05	8.17	6.42		11.04	0.00
MS5	0.5	8.11	8.49	6.91	8.00	10.15	0.00
	3	8.10	8.61	6.90		8.90	0.00
	8	8.11	8.56	6.87		8.51	0.00
MS6	0.5	8.11	7.91	7.02	8.00	10.09	0.00
	3m	8.11	7.77	6.90		8.26	0.00
	8m	8.10	7.95	6.79		8.76	0.00
MS7	0.5	8.12	8.54	6.88	8.00	8.44	0.00
	3	8.12	8.13	6.80		8.10	0.00
	8	8.11	8.04	6.74		7.55	0.00
MS8	0.5	8.12	9.09	6.82	8.00	8.28	0.00
	3	8.12	8.04	6.87		7.48	0.00
	8	8.11	7.40	6.83		8.44	0.00

2.5.1 Turbidity

Turbidity is the cloudy or opaque appearance of water caused by suspended solid particles and is often used as a general water quality indicator. There is therefore a potential correlation between the turbidity and the suspended solids in water although the latter is a measure of relative clarity of water. During the baseline water quality monitoring, turbidity was measured in situ at all the eight (8) monitoring stations and samples taken to analyze the TSS and the correlation between the two parameters. The results of the analysis indicated average values of 6.02 NTU and 0 for inshore and offshore monitoring stations respectively.

2.5.2 Total Suspended Solids

Total Suspended Solids (TSS) is the dry-weight of suspended particles that are not dissolved, in a sample of water that can be trapped by a filter that is analyzed using a filtration equipment and typically greater than 2 microns. The suspended particles include anything drifting or floating in the water, from sediment, silt and sand to plankton and algae and chemical precipitates that ultimately affect water clarity. High levels of total suspended solids will increase water temperatures and decrease DO levels. This is because suspended particles absorb more heat from solar radiation than water molecules will. This heat is then transferred to the surrounding water by conduction. Warmer water cannot hold as much dissolved oxygen as colder water, so DO levels will drop. In addition, the increased surface temperature can cause stratification, or layering, of a body of water. When water stratifies, the upper and lower layers do not mix. As decomposition and respiration often occur in the lower layers, they can become too hypoxic (low dissolved oxygen levels) for marine organisms to survive. Reduced light penetration will potentially affect benthic communities and critical habitats such as coral reefs and seagrass beds.

For the baseline water monitoring, the TSS parameter was used to assess the quality of the samples of water collected from all the monitoring stations for the seven (7) day period. The analysis of from these samples indicated mean daily TSS levels of 16.13 mg/l and 9.06 mg/l for inshore and offshore monitoring stations respectively.

2.5.3 Dissolved Oxygen

Dissolved Oxygen (DO) refers to the level of free oxygen in the water which is absorbed from the atmosphere directly into the water or as a byproduct of photosynthesis. Dissolved Oxygen (DO) concentrations are influenced by many factors including water temperature, the rate of photosynthesis, the degree of light penetration (turbidity and water depth), the degree of water turbulence or wave action, and the amount of oxygen used by respiration and decay of organic matter. Levels that are too high or too low can harm aquatic life and affect water quality. Dredging and dumping activities will generate suspended solids which will directly impact on the DO levels and consequently affect marine ecosystems within and around the project site and the dumping area. Therefore the baseline water quality monitoring undertook in situ measurements of the DO levels at all the eight (8) monitoring stations. The average daily values were 5.32 mg/l and 6.77 mg/l for inshore and offshore monitoring stations respectively.

2.5.4 pH

pH is a logarithmic scale for how acidic or basic a water sample is. At lower levels of the scale, the sample is considered acidic while upper limits indicate that they are basic. The pH of seawater is typically limited to a range between 7.5 and 8.4. It plays an important role in the ocean's carbon cycle, and there is evidence of ongoing ocean acidification caused by carbon dioxide emissions. Changes in pH levels beyond the ocean limits could potentially impact on marine ecosystems by influencing the distribution and occurrence of both habitats and species. It could also influence the availability of toxic contaminants through the marine food chain. It

is therefore important that the baseline pH values are determined and documented to inform impact monitoring during the Berth 19B project. The baseline monitoring of pH was undertaken at all the eight (8) monitoring stations where the mean daily values averaged 7.95 and 8.10 for inshore and offshore areas respectively.

2.5.5 Chemical Oxygen Demand

Chemical Oxygen Demand (COD) is an indicative measure of the amount of oxygen that can be consumed by reactions in a measured solution. It is commonly expressed in mass of oxygen consumed over volume of solution which in SI units is milligrams per litre (mg/L). A COD test can be used to easily quantify the amount of organics in water. For the baseline monitoring, COD was used in quantifying the amount of oxidizable pollutants found in sampled sea water. Chemical Oxygen Demand (COD) is also useful in terms of water quality by providing a metric to determine the effect an effluent will have on the receiving body. Water samples were obtained from the eight (8) monitoring stations and sent to a NEMA designated laboratory for analysis. From the results, the average daily values were 10.46 mg/l and 8.28 mg/l for inshore and offshore monitoring stations respectively.

2.5.6 Perspective Degree

Perspective Degree is a subjective measurement based on water clarity and depth. Water clarity is relative to sunlight penetration which is a function of TSS and dissolved solids. For the eight (8) monitoring stations, the average daily perspective degrees 0.33 and 8.00 for inshore and offshore areas respectively.

3 Biological monitoring

3.1 Scope

Biological assessment was undertaken concurrently with the water quality monitoring and focused on obtaining baseline data and information on the marine ecosystem including critical habitats (coral reefs and seagrass), fish population and invertebrates. According to the EMMP baseline biological monitoring data would also assist in determining the effectiveness of the water quality management strategies and recovery of habitats and faunal assemblages.

Marine organisms are sensitive to physical changes in surface water quality as a result of dredging and dumping activities. Sedimentation and turbidity changes will contribute to changes in physic-chemical characteristics of watercourses with secondary impact on aquatic flora and fauna. Such an impact would also be expected on fish population and marine habitats such as corals, and seagrass beds especially within Shelly Beach and Mombasa Marine Park and Reserve.

3.2 Monitoring locations

Biological monitoring will be carried out at Shelly Beach and Mombasa Marine Park and Reserve (Table 4 and Figure 3).

Table 4: Biological monitoring stations at Shelly Beach and Mombasa Marine Park and Reserve

Monitoring Station	Location description	Coordinates
MS 4	Shelly Beach	4° 7'39.17"S, 39°40'26.47"E
MS 8	Mombasa Marine Park and Reserve	4° 3'7.23"S, 39°44'30.12"E

Figure 3: Biological monitoring stations at Shelly Beach and Mombasa Marine Park and Reserve (Source: Google Earth, 2025)

3.3 Parameters

Biological monitoring focused on fish, benthic (coral reefs and seagrass ecosystems), and invertebrates.

3.4 Methodology

Biological monitoring was carried out on 19th and 20th July 2025 at Shelly Beach (MS4) and Mombasa Marine Park and Reserve (MS8) as per the Environmental Management and Monitoring Plan (EMMP). Monitoring involved Underwater Visual Census (UVC) survey using Self-Contained Underwater Breathing Apparatus (SCUBA) gear (Figure 4) at a depth range of 6 – 12 m and 10 – 18 m in Shelly Beach and Mombasa Marine Park and Reserve respectively. Visibility at Shelly Beach and Mombasa Marine Park and Reserve was 10 m and 9 m respectively. Benthic substrate was carried out using a Point Intercept Transect (PIT) along a 25 m transect where the type of substrate was noted at every 0.5 m giving a total of 50 points. This was standardized to 100 points to give the percentage cover. Benthic substrates were grouped into nine major categories. Fish and invertebrates diversity and abundance was carried out along a 50 x 5 m transect. Fish species were identified to species level and density was standardized to individuals per meter square while invertebrates identified to the lowest taxa possible.

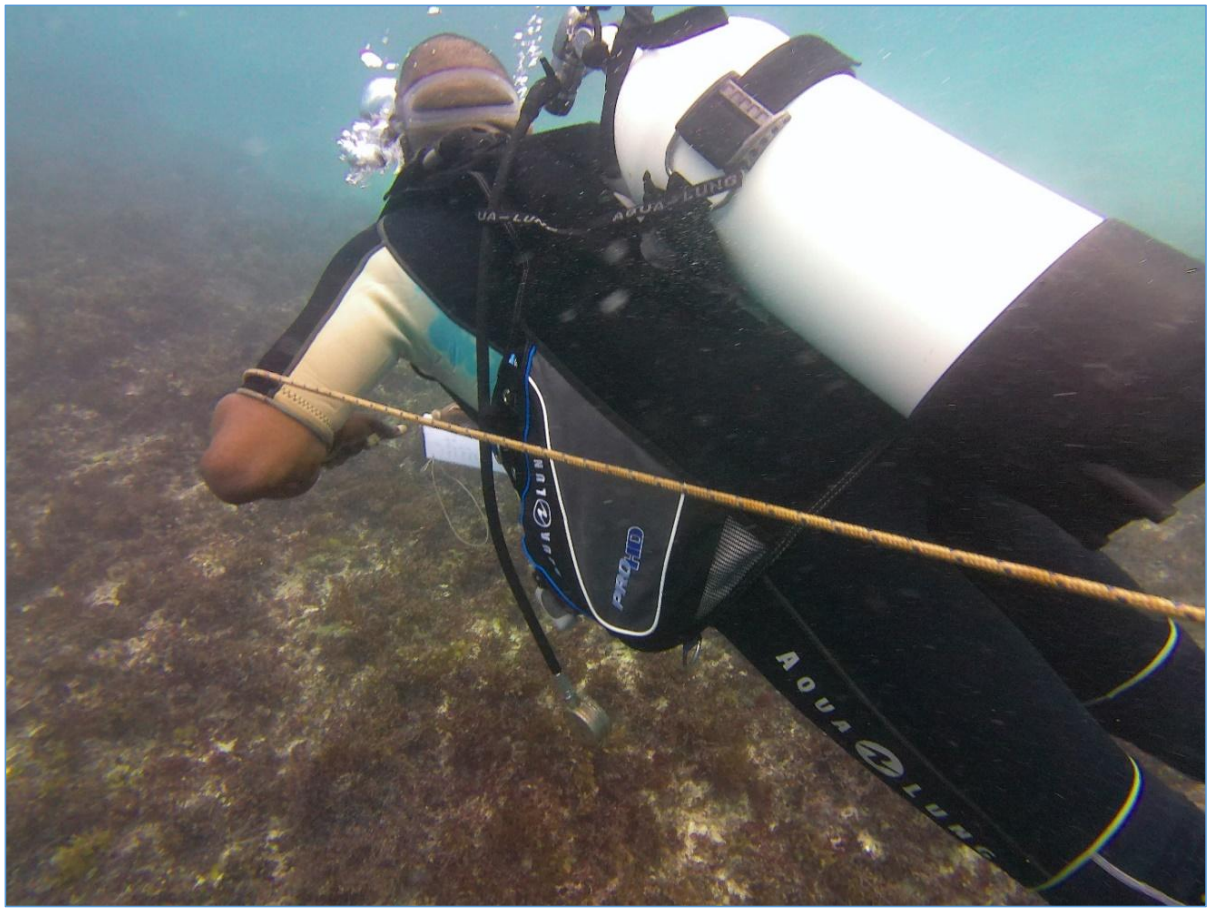


Figure 4: Biological monitoring at Shelly Beach (Source: Fieldwork, July 2025)

3.5 Results and discussion

3.5.1 Benthic substrate

Shelly Beach and Mombasa Marine Park and Reserve were dominated by Macro Algae (62.5 ± 2.5%) and Hard Corals (30.0 ± 5.0%) respectively (Figure 5). This was followed by sand (22.5 ± 2.5%) and Soft Corals (20.0 ± 15.0%) at Shelly Beach and Mombasa Marine Park

and Reserve respectively. Soft and Hard corals (Figure 6) contributed to 15% cover at Shelly Beach. Eight (8) coral genera were recorded at both sites. No Coral bleaching was observed at either site attributed to the low sea surface temperature (24.1°C) experienced during the South-East Monsoon (SEM) season. Further, sedimentation was relatively high in Shelly Beach compared to Mombasa Marine Park and Reserve as a result of sand flat patches and turbulence.

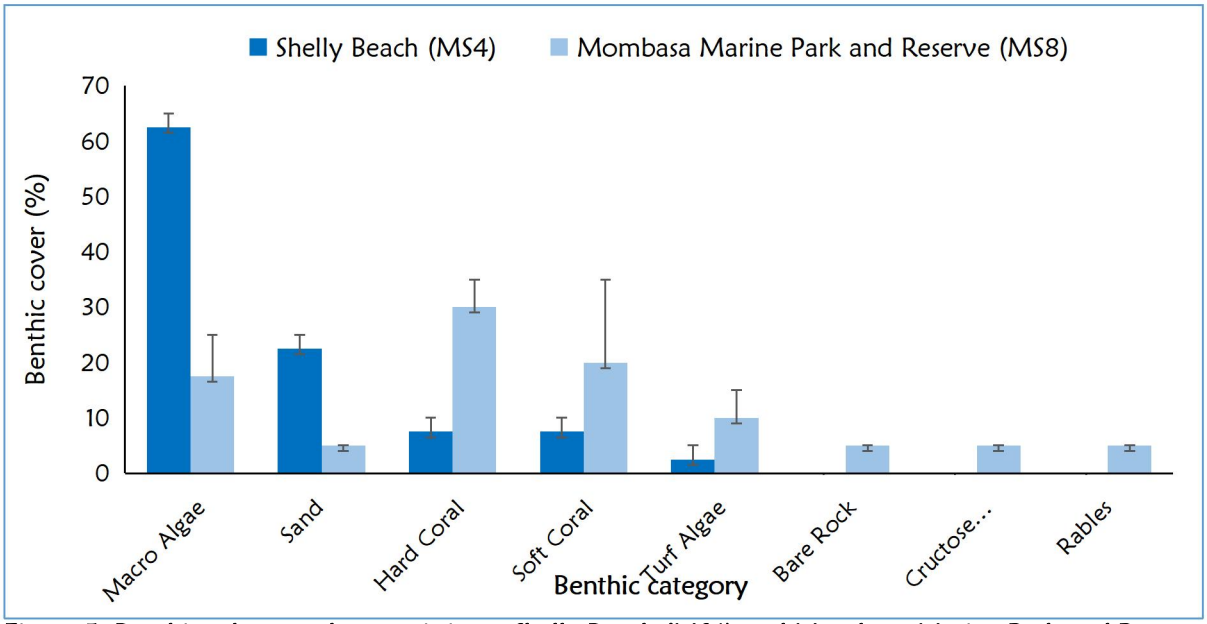


Figure 5: Benthic substrate characteristics at Shelly Beach (MS4) and Mombasa Marine Park and Reserve (MS8) (Source: Envasses, July 2025)

Figure 6: Hard corals at Shelly Beach (left) and Mombasa Marine Park and Reserve (right) (Source: Envasses, July 2025)

3.5.2 Fish

The baseline monitoring exercise recorded two of the 7 main species of fish which include parrot fish (Scaridae) in both monitoring stations and rabbit fish (Siganidae) in Shelly Beach, but at relatively low density. A total of ten (10) fish families were recorded at both sites with Shelly Beach and Mombasa Marine Park and Reserve recording eight (8) and seven (7) families respectively (Figure 7). Fish family density was generally low in both monitoring stations, (less than 10.0 ± 9.5 individuals/250 m^2). Acanthuridae (9.0 ± 4.0 individuals/ 250 m^2) was the most abundant fish family at Shelly Beach whereas Mombasa Marine Reserve was dominated by Pomacentridae (45 ± 5.0 individuals /250 m^2). Common reef health fish families indicator such as Chaetodontidae and Scaridae were present at both sites but at

relatively low density. Coral reef fish species abundance level in both monitoring stations was generally low (22), with a record of 11 and 22 coral reef fish species in Shelly Beach and Mombasa Marine Park and Reserve respectively.

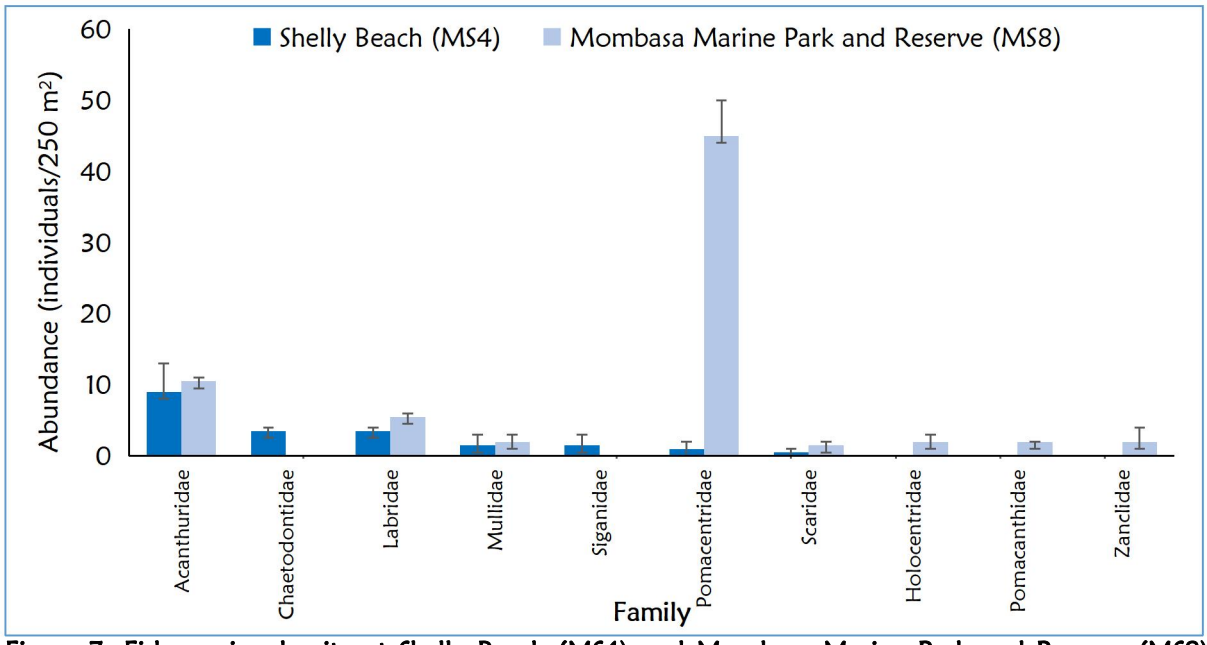


Figure 7: Fish species density at Shelly Beach (MS4) and Mombasa Marine Park and Reserve (MS8) (Source: Envasses, July 2025)

3.5.3 Invertebrates

Higher invertebrates' density was recorded at Mombasa Marine Park and Reserve with a mean of 13.0 ± 1.0 individuals/50 m^2 compared to 10.5 ± 1.5 individuals/50 m^2 at Shelly Beach (Table 5 and Figure 8). In addition, diversity was higher at Mombasa Marine Park and Reserve with seven (7) taxa recorded compared to three (3) at Shelly Beach. This may indicate poor substrate conditions at Shelly Beach with only a few invertebrates' taxa able to tolerate. The low diversity can also be correlated with the high macro algae growth and the high fine sediment observed settling on the substrate. *Echinothrix diadema* (Figure 9) and *Echinostrephus molaris* species dominated the invertebrate density in Shelly Beach (MS4) and Mombasa Marine Park and Reserve (MS8) respectively.

Table 5: Invertebrates mean density (± SE) at Shelly Beach and Mombasa Marine Park and Reserve (Source: Envasses, July 2025)

Species	Mean density (± SE)	
	Shelly Beach	Mombasa Marine Park and Reserve
Echinothrix diadema	6.5±0.5	1.5±0.5
Echinostrephus molaris	3.5±0.5	7.5±0.5
Actinopyga mauritiana	0.5±0.5	0
Holothuria scabra	0	1.5±0.5
Hermodice carunculata	0	1.0±1.0
Holothuria atra	0	0.5±0.5
Odontodactylus sp	0	0.5±0.5
Ophiura ophiur	0	0.5±0.5

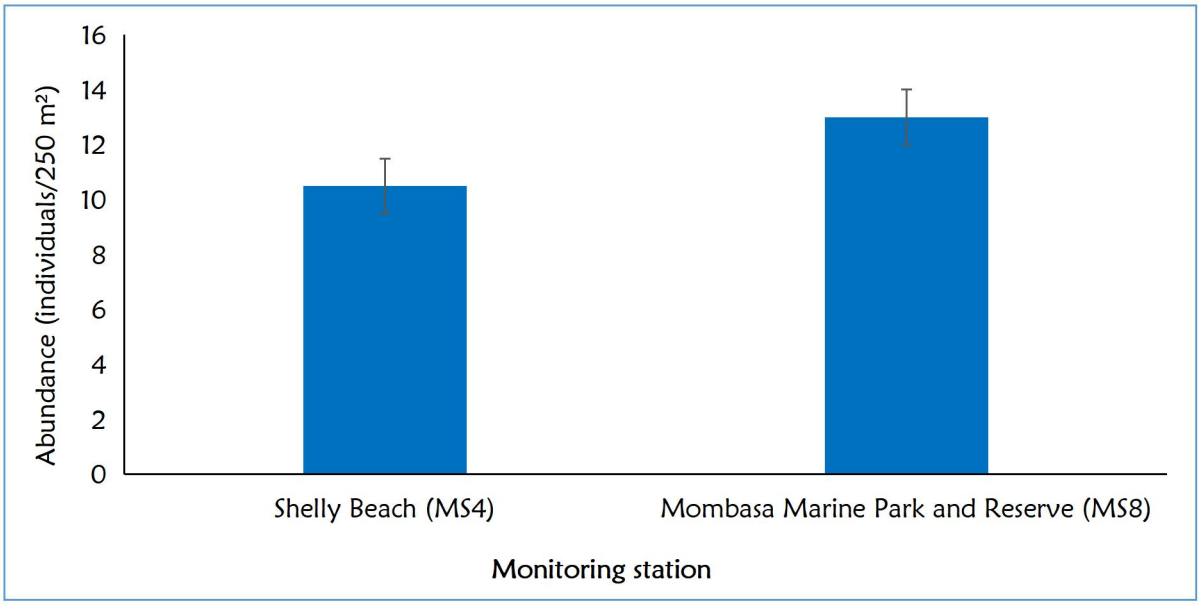


Figure 8: Invertebrates density at Shelly Beach (MS4) and Mombasa Marine Park and Reserve (MS8) (Source: Envasses, July 2025)

Figure 9: *Echinothrix diadema* (left) and *Holothuria atra* (right) at Shelly Beach (MS4) (Source: Envasses, July 2025)

4 Air quality

4.1 Scope

Potential sources of air pollution during project implementation will include land reclamation activities, soil improvement and consolidation using fill material, machinery/equipment (e.g. dredger, barge) operations as well as vehicular movement in and out of the site. Air pollution poses health risks through respiratory diseases to both workers at the site, visitors and KPA employees in areas neighboring the construction site. It is therefore important to provide air quality baseline levels for impact and compliance monitoring during project implementation and to inform air quality management and mitigation measures.

The purpose of the air quality monitoring plan as per the EMMP is to measure the concentrations of gaseous and particulate matter emissions emanating from the project activities and the results compared to the Environmental Management and Coordination (Air Quality) Regulations, 2024 to ensure compliance. In addition, the results will be used to evaluate if the adopted air pollution controls and management are effective.

4.2 Monitoring locations

Air quality monitoring was conducted at the project site, CCCC Office and Blue Room Residence (Figure 10)

Figure 10: Air quality monitoring stations (Source: Google Earth, 2025)

4.3 Parameters

The monitoring parameters were;

- Carbon Monoxide (CO)
- Nitrogen Dioxide (NO_2)
- Nitrogen Oxide (NO_X)
- Sulfur Dioxide (SO_2)
- Hydrogen Sulfide (H_2S)
- Particulate Matter ($PM_{2.5}$ and PM_{10})

4.4 Methodology

A Fixed-Point monitoring strategy was used to obtain baseline ambient air quality measurements which was carried on 13th July 2025. Air monitoring was conducted at the project site, CCCC Office and Blue Room Residence over a 1-hour duration weighted average

period and a calculated 24-hour time weighted average period for the measurements of Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Nitrogen Oxide (NO_X), Sulfur Dioxide (SO_2), Hydrogen Sulfide (H_2S) and Particulate Matter ($PM_{2.5}$ and PM_{10}). Sampling of gases was done using Air Quality Monitoring (AQM) 910 series (Figure 11) which use a mix of sensor technologies. The results interpretation and analysis as well as sampling duration information was used to calculate the gases concentrations.

Figure 11: Diurnal (left) and nocturnal (right) air quality monitoring at Blue Room Residence (Source: Fieldwork, July 2025)

4.5 Results and discussion

Baseline air quality monitoring conducted at the project site, CCCC Office and Blue Room Residence detected measurable levels of Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Nitrogen Oxide (NO_X), Sulfur Dioxide (SO_2), Hydrogen Sulfide (H_2S) and However, all recorded concentrations were within the permissible limits specified in the First Schedule of the Environmental Management and Coordination (Air Quality) Regulations, 2024 (Table 6).

Table 6: Baseline air quality measurements results for project area, CCCC Office and Blue Room Residence compared with the Air Quality Regulations, 2024 (Source: Lahvens (K) Limited, July 2025)

Monitoring location	Parameters						
	CO µg/m³	NO_2 µg/m³	NO_x µg/m³	SO_2 µg/m³	H_2S µg/m³	$PM_{2.5}$ µg/m³	PM_{10} µg/m³
Project site	0.022	0.077	0.0955	72.50	13.00	12.20	46.00
CCCC Office	0.035	0.085	0.1020	85.60	12.20	9.90	32.70
Blue Room Residence	0.0098	0.043	0.0514	68.90	10.50	15.70	50.70
Air Quality Regulations limits, 2024	**-**	**100**	**150**	**125**	**150**	**75**	**150**

5 Noise and vibration measurements

5.1 Scope

Potential sources of noise and vibrations pollution during project implementation are land reclamation activities, machinery/equipment (e.g. dredger, barge, concrete mixer) operations as well as vehicular movement in and out of the site. The noise levels produced may be above the stipulated EMCA limits and are a health hazard. It is therefore important to provide noise and vibration measurement baseline levels for impact and compliance monitoring during project implementation and to inform mitigation measures.

The purpose of noise monitoring plan as per the EMMP is to ascertain the extent of the impact due to the project activities in compliance with the Environmental Management and Coordination (Noise and Excessive Vibrations Pollution) (Control) Regulations, 2009 (Table 7) as well as safeguard the health of construction workers, neighbors and KPA staff.

Table 7: Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009: Noise levels zoning

Zone		Sound Level Limits dB (A) Leq, 14 h		Noise Rating Level (NR) Leq, 14 h	
		DAY	NIGHT	DAY	NIGHT
A	Silent Zone	40	35	30	25
B	Place of worship	40	35	30	25
C	Residential: Indoor Outdoor	45 50	35 35	35 40	25 25
D	Mixed Residential (with some commercial and places of entertainment)	55	35	50	25
E	Commercial (CCCC zone)	60	35	55	25

5.2 Monitoring locations

Noise and vibration measurements locations coincided with those of air quality monitoring.

5.3 Parameters

The monitoring parameters were;

- Noise levels (Leq, Lmax and Lmin)
- Vibration emissions (acceleration, displacement & velocity)

5.4 Methodology

Noise and vibrations was evaluated using a Sound Level Meter (SLM) Model UT – 351, C150107874 (Figure 12) at the project site, CCCC Office and Blue Room Residence on 13th July 2025. The SLM was mounted on at 2.0m above ground level and at least 3.5m away from any sound reflecting surfaces at a boundary position and measurements taken at timed intervals of 30 minutes every one-hour period over 24-hour duration and stored in SLM's memory. Noise level measurement was achieved via initial examination of existing noise sources of significance. The sound level meter was placed on the microphone to reduce any wind interference during measurements. Further, noise levels (Leq, Lmax and Lmin) as well as vibration emissions level monitoring and equipment deployment of acceleration, displacement and velocity were recorded. Factors to consider such as time, duration and predictability, amplitude and frequency of the noise emission, nature of the source, location of noise sensitive receptors, ambient and background noise level, nature and character of the locality, presence of special acoustic characteristics and the incongruity or familiarity of the noise during the monitoring were considered.

Figure 12: Diurnal (left) and nocturnal (right) noise and vibration measurements at the project site and Blue Room Residence respectively (Source: Fieldwork, July 2025)

5.5 Results and discussion

Baseline noise level measurements conducted at the project site, CCCC Office and Blue Room Residence indicated non-compliance with the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 limit of 60 and 35 dB(A) for diurnal and nocturnal schedule respectively (Tables 8 and 9). This was mainly attributed to vehicular movement, Standard Gauge Railway (SGR) and container handling operations within the port, ships hooting, low flying aircrafts as well as wind breeze. Further, the calculated acceleration at the project site, CCCC Office and Blue Room Residence was 74.03 dB, 66.93 dB and 73.17 dB respectively (Table 10).

Table 8: Diurnal baseline noise measurements results for project site, CCCC Office and Blue Room Residence compared with the Noise Regulations, 2009 (Source: Lahvens (K) Limited, July 2025)

Monitoring location	Parameters		
	Leq dBA	Lmax dBA	Lmin dBA
Project site	66.75	80.60	56.91
CCCC Office	57.84	72.65	48.63
Blue Room Residence	54.66	75.64	45.73

Table 9: Nocturnal baseline noise measurements results for project site, CCCC Office and Blue Room Residence compared with the Noise Regulations, 2009 (Source: Lahvens (K) Limited, July 2025)

Monitoring location	Parameters		
	Leq dBA	Lmax dBA	Lmin dBA
Project site	58.19	74.52	49.68
CCCC Office	55.47	69.04	45.99
Blue Room Residence	51.32	74.83	42.97

Table 10: Baseline vibration measurements results for project area, CCCC Office and Blue Room Residence compared with the Noise Regulations, 2009 (Source: Lahvens (K) Limited, July 2025)

Monitoring location	Acceleration mm/s^2	Velocity mm/s	Displacement mm	Calculated Acceleration dB
Project site	0.091	0.70	0.1284	74.03
CCCC Office	0.039	0.30	0.0398	66.93
Blue House Residence	0.079	0.41	0.0648	73.17

6 Conclusion

The baseline environmental monitoring established the existing environmental conditions against which future impacts will be measured. The results demonstrated that offshore monitoring stations had better water quality levels compared to the inshore ones. This was mainly attributed by ongoing port activities, effluent discharges and surface run-off in inshore monitoring stations. Biological monitoring indicated lower coral coverage, fish density and invertebrate diversity at Shelly Beach than Mombasa Marine Park and Reserve, highlighting localized ecological stressors. Baseline air quality across all sites was within the limits prescribed by the Environmental Management and Coordination (Air Quality) Regulations, 2024. However, noise and vibration levels exceeded the limits set under the Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009 due to ongoing port operations and related activities.

In line with these findings, strict implementation of the EMMP is required throughout the construction phase to minimize potential adverse environmental effects and ensure compliance with safeguards policies and statutory environmental and social performance standards.

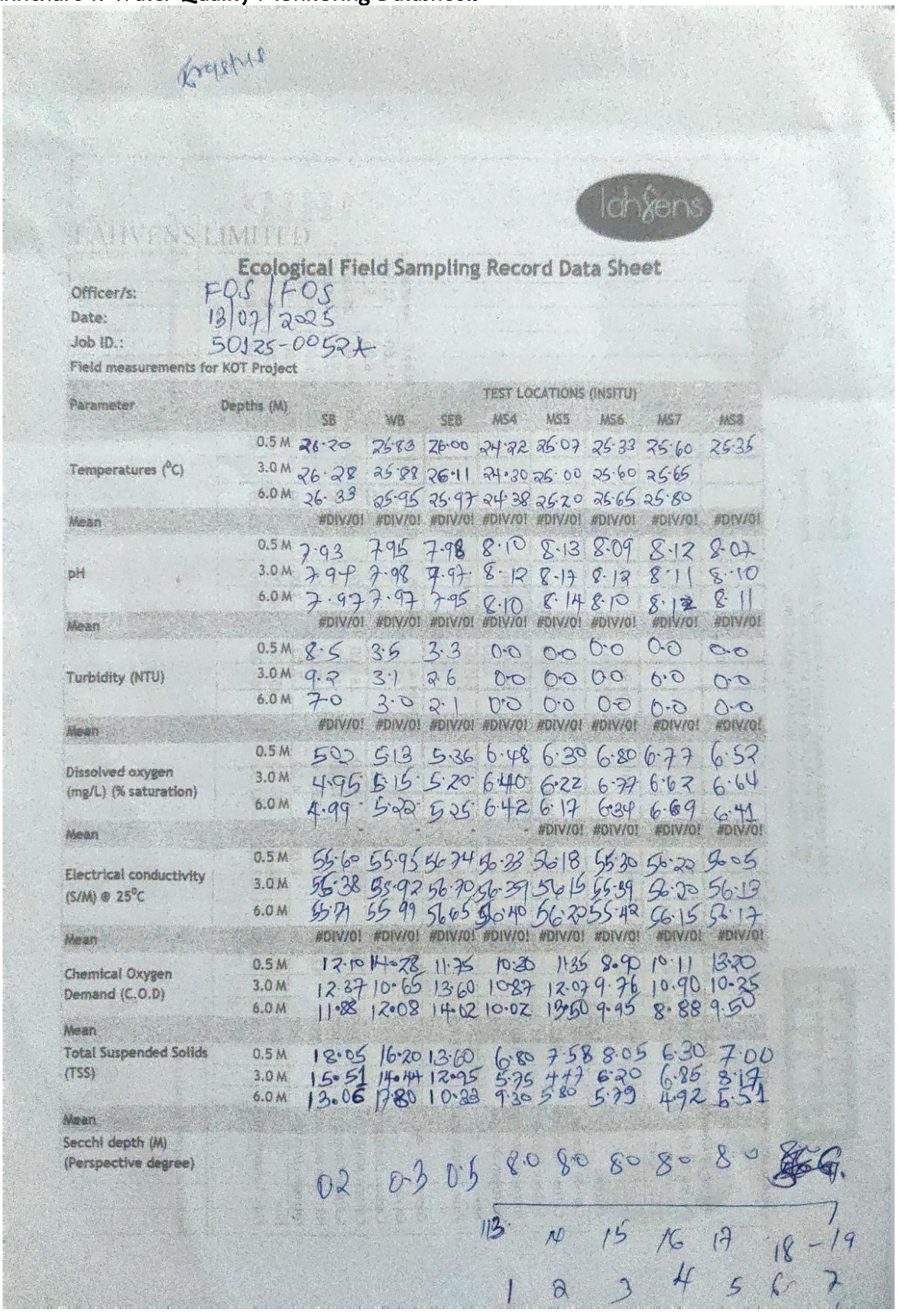
7 References

1. China Communications Construction Company (CCCC) Limited & Envasses Environmental Consultants Limited, 2025. Environmental Management and Monitoring Plan for Civil and Construction Works at Mombasa Port Berth 19B and Associated Infrastructure. A report submitted to KPA
2. Kenya Ports Authority (KPA) and Heztech Engineering Services, 2024. Environmental and Social Impact Assessment Study Report for the Proposed Construction of Berth 19B and Associated Infrastructure at the Port of Mombasa. A report submitted to NEMA

8 Annexures

1. Water Quality Monitoring Datasheets
2. Air Quality Monitoring Report
3. Noise and Vibration Measurements Report
4. Photos
   (a) Water Quality
   (b) Biological Monitoring
   (c) Air Quality and Noise and Vibration Measurements
5. NEMA practicing license for Envasses Environmental Consultants Limited
6. NEMA practicing license for Mr. Simon Kioko Nzuki

Annexure 1: Water Quality Monitoring Datasheets



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LAHMENS LIMITED

Ecological Field Sampling Record Data Sheet

Officer/s: FOS / FOS
Date: 13/07/2025
Job ID.: 50125-00524
Field measurements for KOT Project

Parameter	Depths (M)	TEST LOCATIONS (INSITU)							
		SB	WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	26·20	25·83	26·00	24·72	26·07	25·33	25·60	25·35
	3.0 M	26·28	25·88	26·11	24·30	25·00	25·60	25·65	
	6.0 M	26·33	25·95	25·97	24·38	25·20	26·65	25·80	
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M	7·93	7·95	7·98	8·10	8·13	8·09	8·12	8·07
	3.0 M	7·94	7·98	7·97	8·12	8·17	8·12	8·11	8·10
	6.0 M	7·97	7·97	7·95	8·10	8·14	8·10	8·12	8·11
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	8·5	3·5	3·3	0·0	0·0	0·0	0·0	0·0
	3.0 M	9·2	3·1	2·6	0·0	0·0	0·0	0·0	0·0
	6.0 M	7·0	3·0	2·1	0·0	0·0	0·0	0·0	0·0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	5·02	5·13	5·36	6·48	6·30	6·80	6·77	6·52
	3.0 M	4·95	5·15	5·20	6·40	6·22	6·77	6·67	6·64
	6.0 M	4·99	5·02	5·25	6·42	6·17	6·34	6·69	6·41
Mean						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M	55·60	55·95	56·74	56·33	56·18	55·30	56·22	56·05
	3.0 M	56·38	55·92	56·70	56·35	56·15	55·39	56·20	56·13
	6.0 M	55·71	55·99	56·65	56·40	56·20	55·42	56·15	56·17
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	12·10	14·28	11·75	10·30	11·35	8·90	10·11	13·20
	3.0 M	12·37	10·65	13·60	10·87	12·07	9·76	10·90	10·35
	6.0 M	11·88	12·08	14·62	10·02	13·50	9·95	8·88	9·50
Mean									
Total Suspended Solids (TSS)	0.5 M	18·05	16·20	13·60	6·80	7·58	8·05	6·30	7·00
	3.0 M	15·51	14·44	12·95	5·75	4·17	6·20	6·85	8·17
	6.0 M	13·06	17·80	10·23	9·30	5·80	5·79	4·92	5·51
Mean									
Secchi depth (M) (Perspective degree)		0·2	0·3	0·5	8·0	8·0	8·0	8·0	8·0

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Ecological Field Sampling Record Data Sheet

Officer/s: LRO/FO/FO
Date: 14/07/2025
Job ID.: 30125005RB

Field measurements for KOT Project

Parameter	Depths (M)	SB	WB	SEB	TEST LOCATIONS (INSITU) MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	26.49	26.22	26.30	25.10	25.46	25.47	25.70	25.66
	3.0 M	26.35	26.05	26.19	25.18	25.38	25.53	25.58	25.75
	6.0 M	26.57	25.96	26.23	25.22	25.41	25.55	25.62	25.80
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M	7.95	8.01	7.99	8.08	8.12	8.10	8.13	8.15
	3.0 M	7.97	7.99	8.00	8.10	8.10	8.12	8.14	8.13
	6.0 M	7.99	7.97	8.01	8.11	8.11	8.12	8.11	8.12
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	6.2	5.0	4.4	0.0	0.0	0.0	0.0	0.0
	3.0 M	5.9	6.1	4.8	0.0	0.0	0.0	0.0	0.0
	6.0 M	5.2	4.6	4.3	0.0	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	4.94	5.12	5.27	6.18	6.59	6.80	6.73	6.40
	3.0 M	4.99	5.03	5.19	6.34	6.55	6.69	6.75	6.60
	6.0 M	5.03	5.29	5.30	6.50	6.61	6.62	6.61	6.63
Mean						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M	55.46	56.00	56.20	55.37	55.20	55.18	55.60	56.30
	3.0 M	55.57	55.94	56.25	55.35	55.25	55.10	55.68	55.38
	6.0 M	55.52	55.90	56.17	55.40	55.29	55.23	55.56	55.35
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	9.50	8.78	9.80	7.7	7.38	8.80	9.50	9.0
	3.0 M	10.20	10.35	11.20	8.1	7.90	8.30	7.60	7.8
	6.0 M	9.00	10.70	12.50	9.0	8.50	8.50	7.10	7.4
Mean									
Total Suspended Solids (TSS)	0.5 M	16.60	19.20	15.25	13.60	12.20	8.10	7.35	7.85
	3.0 M	15.15	17.80	13.35	12.50	10.50	7.20	7.02	7.77
	6.0 M	14.30	15.00	14.88	10.70	10.80	7.65	6.95	8.05
Mean									
Secchi depth (M) (Perspective degree)		0.2	0.3	0.5	~~8.0~~	~~8.0~~	~~8.0~~	~~8.0~~	~~8.0~~

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Ecological Field Sampling Record Data Sheet

Officer/s: LRS | FOS | FOS
Date: 15/07/2025
Job ID.: 50|25-0052 C

Field measurements for KOT Project

Parameter	Depths (M)	TEST LOCATIONS (INSITU)							
		SB	WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	26.20	26.00	26.10	25.60	25.35	25.30	25.32	25.50
	3.0 M	26.15	25.90	25.80	25.65	25.30	25.40	25.34	25.44
	6.0 M	26.07	25.96	25.70	25.48	25.29	25.44	25.39	25.42
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M		7.95	7.97	7.96	8.10	8.12	8.13	8.10
	3.0 M		7.97	7.99	7.98	8.09	8.11	8.14	8.13
	6.0 M		7.98	8.00	7.99	8.06	8.08	8.11	8.10
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	9.5	7.2	4.6	0.0	0.0	0.0	0.0	0.0
	3.0 M	6.0	5.8	4.1	0.0	0.0	0.0	0.0	0.0
	6.0 M	5.2	6.0	3.0	0.0	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M		5.05	5.28	5.11	6.70	6.88	6.77	6.50
	3.0 M		5.22	5.35	5.20	6.85	6.89	6.60	6.58
	6.0 M		5.17	5.40	5.18	6.90	6.50	6.64	6.73
Mean						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M		56.18	50.56	55.90	56.10	56.27	56.20	56.00
	3.0 M		56.14	61.40	56.05	56.30	56.44	56.13	55.95
	6.0 M		56.27	56.19	55.80	56.48	56.25	56.07	56.11
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	11.30	12.30	11.10	10.2	8.8	11.00	9.7	10.70
	3.0 M	11.80	10.80	11.60	9.5	10.3	8.40	9.8	9.80
	6.0 M	11.50	10.90	10.50	9.1	9.7	8.10	11.1	9.00
Mean									
Total Suspended Solids (TSS)	0.5 M	28.30	20.80	18.80	13.30	10.30	12.10	8.30	6.90
	3.0 M	20.70	17.60	14.10	12.80	7.60	7.50	8.60	7.40
	6.0 M	18.90	15.50	15.70	12.10	7.20	10.10	6.20	8.10
Mean									
Secchi depth (M) (Perspective degree)		0.1	0.3	0.6	80	80	80	80	80

(LAHVENS LIMITED)

Ecological Field Sampling Record Data Sheet

Officer/s: FOS | LRS | FOS
Date: 16/04/2025
Job ID.: 501250252D.

Field measurements for KOT Project

Parameter	Depths (M)	SB	TEST LOCATIONS (INSITU) WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M		26.80	26.51	26.18	25.40	25.30	25.42	25.23
	3.0 M		26.50	26.35	26.05	25.48	25.50	25.22	25.20
	6.0 M		26.43	26.20	26.10	25.29	25.44	25.17	25.15
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M		7.94	7.97	7.95	8.18	8.16	8.18	8.15
	3.0 M		7.96	7.93	7.98	8.16	8.14	8.15	8.14
	6.0 M		7.96	7.94	7.97	8.15	8.13	8.13	8.14
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M		7.90	8.1	5.5	0.0	0.0	0.0	0.0
	3.0 M		5.10	6.0	4.3	0.0	0.0	0.0	0.0
	6.0 M		6.5	5.4	4.2	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	-	5.58	5.35	5.55	7.00	6.90	6.83	7.10
	3.0 M	-	5.41	5.47	5.61	6.93	6.77	6.44	6.95
	6.0 M	-	5.26	5.40	5.49	6.85	6.51	6.62	6.90
Mean		-	-	-	-	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M		54.35	54.80	55.00	56.13	56.40	56.60	56.38
	3.0 M		54.28	54.65	55.05	56.35	56.20	56.68	56.26
	6.0 M		54.20	54.90	54.96	56.27	56.36	56.50	56.30
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	7.90	9.30	11.30	10.00	8.80	7.30	9.90	8.40
	3.0 M	7.10	8.90	12.20	9.70	9.10	9.50	7.70	7.60
	6.0 M	8.50	10.00	12.10	8.10	7.20	9.20	8.00	8.00
Mean									
Total Suspended Solids (TSS)	0.5 M	19.90	18.10	15.20	14.80	12.30	10.50	13.60	12.90
	3.0 M	16.80	14.00	14.90	12.30	10.10	9.80	10.70	11.20
	6.0 M	13.60	15.20	15.50	11.90	9.20	9.00	11.50	11.80
Mean									
Secchi depth (M) (Perspective degree)		0.2	0.4	0.6	>8.0	>8.0	>8.0	>8.0	>8.0

LATIVENS LIMITED

Ecological Field Sampling Record Data Sheet

Officer/s: LOR/FO/FOS
Date: 17/07/2025
Job ID.: 50/25-00526

Field measurements for KOT Project

Parameter	Depths (M)	TEST LOCATIONS (INSITU)							
		SB	WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	27.18	26.80	26.38	25.80	25.70	25.83	25.85	25.28
	3.0 M	27.00	26.85	26.61	26.00	25.77	25.88	25.42	25.10
	6.0 M	26.55	26.61	26.25	25.75	25.62	25.70	25.47	25.35
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M	7.89	7.90	7.95	8.09	8.15	8.13	8.17	8.15
	3.0 M	7.92	7.92	7.94	8.10	8.11	8.12	8.15	8.14
	6.0 M	7.93	7.94	7.92	8.12	8.14	8.10	8.16	8.12
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	6.0	5.4	6.0	0.0	0.0	0.0	0.0	0.0
	3.0 M	7.5	7.0	4.0	0.0	0.0	0.0	0.0	0.0
	6.0 M	8.8	8.2	2.8	0.0	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	5.38	5.60	5.75	7.00	7.15	6.95	6.82	6.90
	3.0 M	5.31	5.42	5.66	7.00	7.14	7.08	6.77	6.96
	6.0 M	5.18	5.31	5.56	7.10	7.06	7.10	6.80	6.84
Mean						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M	55.80	55.55	55.30	56.05	56.00	56.00	56.01	56.15
	3.0 M	55.69	55.59	55.37	56.11	56.05	56.02	56.00	56.02
	6.0 M	55.74	55.49	55.29	56.17	56.18	56.35	56.18	56.30
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	7.90	5.50	7.80	7.30	8.20	7.40	7.00	5.90
	3.0 M	7.40	8.20	6.90	6.90	5.30	7.10	5.80	5.40
	6.0 M	8.30	9.00	8.80	5.60	6.00	5.30	6.10	6.70
Mean									
Total Suspended Solids (TSS)	0.5 M	27.60	21.60	13.60	14.40	10.80	14.00	6.40	8.00
	3.0 M	22.00	15.80	11.80	8.80	10.40	9.80	7.80	6.00
	6.0 M	18.50	17.60	15.20	15.60	7.60	10.20	8.20	10.50
Mean									
Secchi depth (M) (Perspective degree)		0.1	0.2	0.4	7.80	7.80	7.80	7.80	>7.80

Ecological Field Sampling Record Data Sheet

Officer/s: LRoc | FO | FOS.
Date: 18/07/2025
Job ID.: 50125-0052 F

Field measurements for KOT Project

Parameter	Depths (M)	TEST LOCATIONS (INSITU)							
		SB	WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	27.53	26.91	27.10	24.63	25.07	25.20	25.31	25.48
	3.0 M	26.50	26.66	26.75	24.80	25.09	25.15	25.33	25.30
	6.0 M	26.35	26.58	26.50	24.88	25.19	25.23	25.38	25.39
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M	7.97	7.95	7.87	7.99	8.03	8.05	8.00	8.07
	3.0 M	7.90	7.94	7.86	8.00	7.99	8.07	8.03	8.05
	6.0 M	7.95	7.92	7.88	8.02	8.04	8.04	8.05	8.04
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	6.4	8.0	7.3	0.0	0.0	0.0	0.0	0.0
	3.0 M	9.7	7.7	7.0	0.0	0.0	0.0	0.0	0.0
	6.0 M	8.3	6.9	9.3	0.0	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	5.82	5.78	5.36	7.40	7.32	7.44	7.18	7.09
	3.0 M	5.78	5.71	5.71	7.22	7.35	7.36	7.25	7.14
	6.0 M	5.60	5.60	5.56	7.05	7.30	7.30	7.31	7.05
Mean		-	-	-	-	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M	5595	5619	56.63	56.74	5580	55.30	55.61	0.00
	3.0 M	5532	56.07	56.56	55.70	55.65	56.45	55.87	56.89
	6.0 M	55.50	56.13	56.48	56.77	56.61	55.45	55.54	56.81
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	11.90	10.40	9.70	7.60	6.50	5.70	9.90	9.90
	3.0 M	9.90	10.10	10.50	8.40	7.40	6.30	9.10	8.90
	6.0 M	12.30	11.70	10.90	7.10	8.90	6.90	8.80	5.50
Mean									
Total Suspended Solids (TSS)	0.5 M	1452	1580	11.80	8.00	7.60	9.90	9.70	7.7
	3.0 M	1280	13.70	12.60	8.30	10.10	8.80	8.50	6.0
	6.0 M	13.30	11.50	1500	7.90	10.70	9.10	7.60	8.4
Mean									
Secchi depth (M) (Perspective degree)		0.2	0.3	0.6	>8.0	>8.0	>8.0	>8.0	>8.0

lahyens

Ecological Field Sampling Record Data Sheet

Officer/s: LRS / FAS
Date: 19/07/2025
Job ID.: 50/250059G
Field measurements for KOT Project

Parameter	Depths (M)	TEST LOCATIONS (INSITU) SB	WB	SEB	MS4	MS5	MS6	MS7	MS8
Temperatures (°C)	0.5 M	26.00	26.05	26.20	24.63	25.45	26.10	25.38	25.55
	3.0 M	26.30	26.19	26.00	25.40	26.80	26.00	25.80	25.73
	6.0 M	26.15	26.35	25.94	25.70	25.33	25.93	25.70	25.70
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH	0.5 M	7.92	7.94	7.96	8.09	8.05	8.13	8.10	8.13
	3.0 M	7.93	7.96	7.97	8.10	8.08	8.10	8.11	8.15
	6.0 M	7.95	7.93	7.95	8.07	8.11	8.12	8.08	8.12
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Turbidity (NTU)	0.5 M	7.3	8.2	5.0	0.0	0.0	0.0	0.0	0.0
	3.0 M	7.0	6.3	4.9	0.0	0.0	0.0	0.0	0.0
	6.0 M	7.9	5.9	4.3	0.0	0.0	0.0	0.0	0.0
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Dissolved oxygen (mg/L) (% saturation)	0.5 M	4.96	5.40	5.18	7.20	7.28	7.35	7.09	7.25
	3.0 M	5.15	5.38	5.20	7.25	7.26	7.30	7.16	7.20
	6.0 M	5.28	5.25	5.15	7.22	7.21	7.17	7.20	7.30
Mean						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Electrical conductivity (S/M) @ 25°C	0.5 M	54.66	55.05	55.17	55.87	55.86	55.31	55.80	56.00
	3.0 M	54.78	55.20	55.68	55.87	55.89	55.51	55.69	55.92
	6.0 M	55.00	55.27	55.40	55.83	55.87	55.87	55.60	55.84
Mean		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Chemical Oxygen Demand (C.O.D)	0.5 M	10.70	11.50	12.30	9.00	8.50	6.30	4.90	6.50
	3.0 M	11.30	10.90	9.90	7.20	8.00	5.90	6.00	7.10
	6.0 M	10.40	10.00	10.60	8.30	6.80	7.70	7.10	5.70
Mean									
Total Suspended Solids (TSS)	0.5 M	16.80	18.10	14.50	9.40	10.30	8.00	7.90	5.60
	3.0 M	20.20	15.60	13.30	12.80	9.10	8.50	7.20	5.80
	6.0 M	19.50	14.80	15.90	10.00	8.90	9.40	7.50	6.70
Mean									
Secchi depth (M) (Perspective degree)		0.2	0.3	0.5	>8.0	>8.0	>8.0	>8.0	>8.0

Annexure 2: Air Quality Monitoring Report

Monitoring Locations	Date/Hour	Weather Conditions	Temp.	Humidity	CO	NO2	NOx	SO2	H2S	PM2.5	PM10
			°C	%	(µg/ m3)	(µg/ m3)	(µg/ m3)	(µg/ m3)	(µg/ m3)	(µg/ m3)	(µg/ m3)
CCCC Office	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	26.1	69.60	0.035	0.085	0.1020	85.60	12.20	9.90	32.70
Blue House Residence	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	27.2	71.10	0.0098	0.043	0.0514	68.90	10.50	15.70	50.70
Project Site	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	26.8	67.00	0.022	0.077	0.0955	72.50	13.00	12.20	46.00

SITE NOTES:	Ship and vehicular (trucks and heavy duty lorries) emissions characterized the major anthropogenic source of CO emissions at the site. Sources of Sulphur dioxide at the site included trucks, ships, escavators and rail operations around the sites. Observable sources of NO2 generation at the sites included diesel or gasoline fueled engines in commercial trucks, locomotives, and personal vehicles moving into and out of the survey locations. Dust collected included fugitive dust from other port related activities and source dust from client operations including batching operations, mixing of aggregates and soil excavation and filling activities.

Annexure 3: Noise and Vibration Measurements Report

DUIRNAL ACCOUSTIC EMISSIONS MONITORING						SITE NOTES
Monitoring Locations	Date/Hour	Weather Conditions	Leq	Lmax	Lmin	
			dBA	dBA	dBA	
CCCC office	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	57.84	72.65	48.63	Environmental noise (Wind breeze), movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the KPA roads (Gate 1 - Gate 5 to Kapengura - to Fire house to main offices), other construction works currently ongoing at CCCC KOT office areas and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.
Blue House residence	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	54.66	75.64	45.73	Environmental noise (Wind breeze), movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the Mombasa SGR road, agregate mixing operations, workshop & garage work operations and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.
Project site	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	66.75	80.60	56.91	Environmental noise (Wind breeze), container handling operations, quayside cranes, gantry cranes, reach stackers, top-lifters, excavation works, dredging works, movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport of trucks along the Container Terminal road and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.

NOCTURNAL ACCOUSTIC EMISSIONS MONITORING						SITE NOTES
Monitoring Locations	Date/Hour	Weather Conditions	Leq	Lmax	Lmin	
			dBA	dBA	dBA	
CCCC office	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	55.47	69.04	45.99	Environmental noise (Wind breeze), movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the KPA roads (Gate 1 - Gate 5 to Kapengura - to Fire house to main offices), other construction works currently ongoing at CCCC KOT office areas and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.
Blue House residence	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	51.32	74.83	42.97	Environmental noise (Wind breeze), movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the Mombasa SGR road, agregate mixing operations, workshop & garage work operations and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.
Project site	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	58.19	74.52	49.68	Environmental noise (Wind breeze), container handling operations, quayside cranes, gantry cranes, reach stackers, top-lifters, excavation works, dredging works, movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport of trucks along the Container Terminal road and low flying aircrafts were the main sources of noise emissions during the day and night surveys. Hooting of the the ships were also audible at this site.

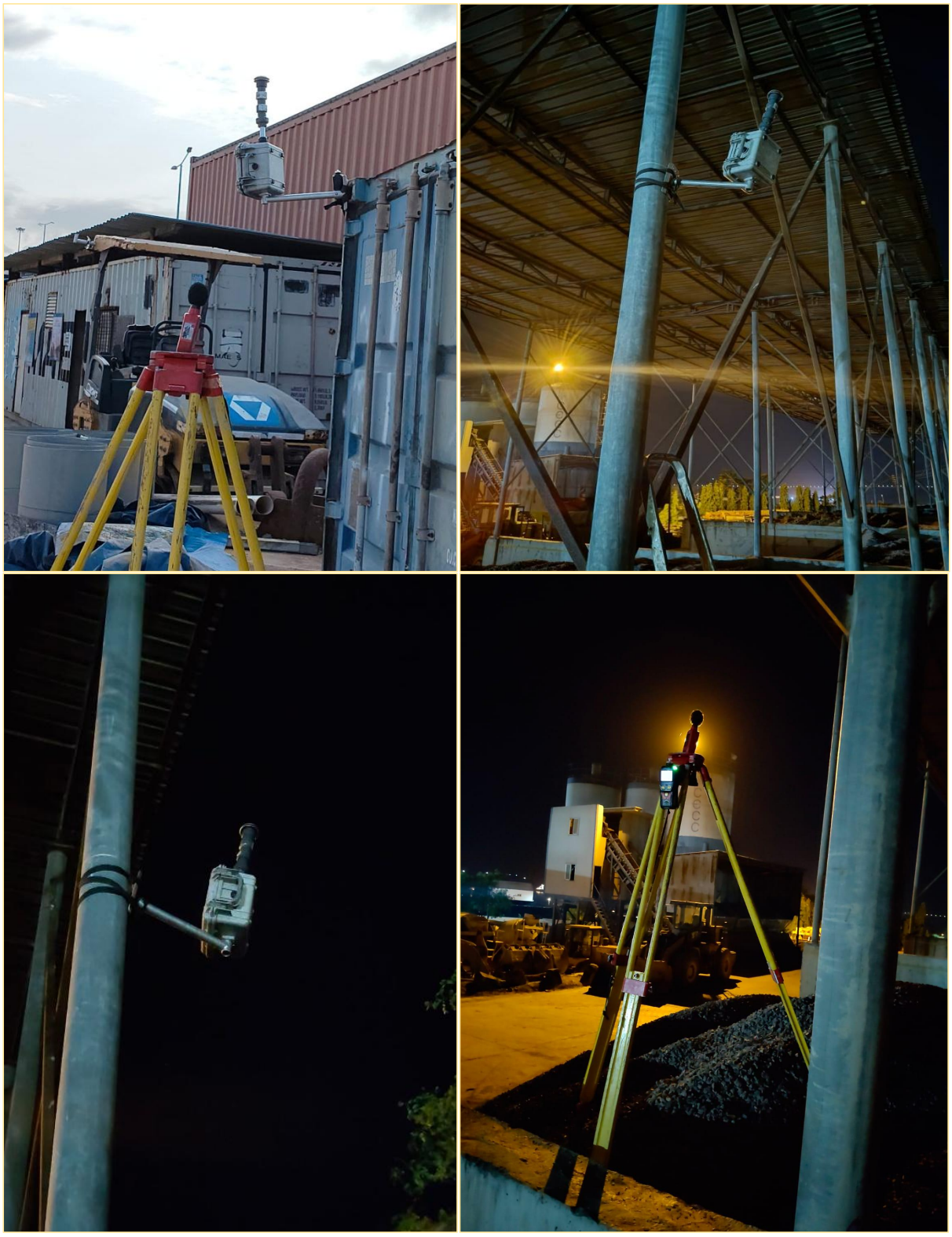
VIBRATION EMISSIONS MONITORING							SITE NOTES
Monitoring Locations	Date/Hour	Weather Conditions	Acceleration	Velocity	Displacement	Cal. Acceleration	
			mm/s2	mm/s	mm	dB	
CCCC Office	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	0.039	0.30	0.0398	66.93	Movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the KPA roads (Gate 1 - Gate 5 to Kapengura - to Fire house to main offices) and other construction works currently ongoing at CCCC KOT office areas were the main sources of vibration emissions.
Blue House Residence	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	0.079	0.41	0.0648	73.17	Movement of heavy trucks, locomotion of personal service vehicles, rail operations, transport along the Mombasa SGR road, aggregate mixing operations, workshop and garage work operations were the main sources of vibration emissions during surveys.
Project site	13th July 2025 (1500-1400 hrs)	Sunny during the day and cloudy & windy during the night.	0.091	0.70	0.1284	74.03	Container handling operations, quayside cranes, gantry cranes, reach stackers, top-lifters, excavation works, dredging works, movement of heavy trucks, locomotion of personal service vehicles, rail operation and transport of trucks along the Container Terminal road were the main sources of vibration emissions during the survey.

Annexure 4: Photos

(a) Water Quality

(b) Biological Monitoring

(c) Air Quality and Noise and Vibration Measurement



Annexure 5: NEMA practicing license for Envasses Environmental Consultants Limited

EAE 23062779

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/22303

Application Reference No: NEMA/EIA/EL/29698

M/S **Envasses Environmental Consultants Ltd**
(individual or firm) of address
P.O. Box 2013 - 80100 Mombasa

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts** registration number **6175**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **1/8/2025** Expiry Date: **12/31/2025**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified

Annexure 6: NEMA practicing license for Mr. Simon Kioko Nzuki

EAE 23062778

FORM 7 (r.15(2))

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/22302

Application Reference No: NEMA/EIA/EL/29699

M/S **Simon Kioko Nzuki**
(individual or firm) of address
Po Box 2013 80100 Nairobi

is licensed to practice in the capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert General**

registration number **1350**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **1/8/2025** Expiry Date: **12/31/2025**

Signature.....

(Seal)
Director General
The National Environment Management Authority

P.T.O.

ISO 9001 : 2015 Certified