

Environmental and Social Monitoring GHA

Environmental Issues	Monitoring Items	Parameter /Indicator	Frequency	Responsible	Oct 2022	Mar 2023	Sept 2023	Feb 2024	Aug 2024	Sept 2024	Oct 2024
Air Pollution	Dust	<ul style="list-style-type: none"> Visual observation at Construction Site and Interview of pedestrians Instrumental analysis 	<ul style="list-style-type: none"> Visual observation: Daily Interview: Monthly or as needed Instrumental analysis: Pre-Construction phase: 1-time Construction phase: 5-times [Total: 6-times] 	Contractor	Pre-Construction phase: <u>TSP:</u> Loc. 1 =74µg/m3 Loc.2 = 82 µg/m3 EPA guideline ≤150µg/m3	<u>TSP:</u> Loc.1 =68µg/m3 Loc.2 =71µg/m3. Guideline ≤150µg/m3	TSP: Loc.1 =73 µg/m3 Loc.2 =66µg/m3. Guideline ≤150µg/m3	TSP: Loc.1=108µg/m3 Loc.2=115µg/m3 Guideline ≤150µg/m3	Scheduled to be measured next month September	TSP: Loc.1 = 98µg/m3 Loc.2=101µg/m3 Guideline ≤150µg/m3	
	PM10, PM2.5, NO2, SO2				<u>PM10:</u> Loc. 1 = 63 µg/m3 Loc. 2 =57 µg/m3 guideline ≤ 70 µg/m3 <u>PM2.5:</u> Loc 1 =32µg/m3 Loc 2 =29 µg/m3 lower than ≤35 µg/m3 <u>NO2:</u> Loc. 1 =33µg/m3 Loc. 2 =30 µg/m3 Guideline ≤150µg/m3 <u>SO2:</u> Loc. 1 = 39 µg/m3 Loc. 2 =40µg/m3 Guideline ≤ 150µg/m3	<u>PM10</u> Loc 1=50µg/m3 Loc 2=54µg/m3 guideline ≤ 70 µg/m3 <u>PM2.5</u> Loc 1=21µg/m3 Loc 2=26µg/m3 Guideline ≤35 µg/m3 <u>NO2</u> Loc 1=25µg/m3 Loc 2=30µg/m3 Guideline ≤150µg/m3 <u>SO2</u> Loc1=34µg/m3 Loc 2=36µg/m3 Guideline ≤ 150µg/m3	PM10 Loc 1=52µg/m3 Loc 2=51µg/m3 guideline ≤ 70 µg/m3 PM2.5 Loc 1=27µg/m3 Loc 2=23µg/m3 Guideline ≤35 µg/m3 NO2 Loc 1=23µg/m3 Loc 2=26µg/m3 Guideline ≤150µg/m3 SO2 Loc1=30µg/m3 Loc 2=33µg/m3 Guideline ≤ 150µg/m3	PM 10 Loc 1=52µg/m3 Loc 2=51µg/m3 guideline ≤ 70 µg/m3 PM 2.5 Loc 1=27µg/m3 Loc 2=23µg/m3 Guideline ≤35 µg/m3 NO2 Loc 1=23µg/m3 Loc 2=26µg/m3 Guideline ≤150µg/m3 SO2 Loc1=30µg/m3 Loc 2=33µg/m3 Guideline ≤ 150µg/m3	Scheduled to be measured next month September	PM10 Loc 1=60 µg/m3 Loc 2=62 µg/m3 guideline ≤ 70 µg/m3 PM2.5 Loc 1=26µg/m3 Loc 2=29µg/m3 Guideline ≤35 µg/m3 NO2 Loc 1=33µg/m3 Loc 2=39µg/m3 Guideline ≤150µg/m3 SO2 Loc1=36µg/m3 Loc 2=35µg/m3 Guideline ≤ 150µg/m3	
	PM10, PM2.5, NO2, SO2				Instrumental analysis around Tema intersection	[Operation Phase] 1-time in dry season and 1-time in rainy season per year for 2 years after completion [Total 4-times]	GHA	N/A	N/A	N/A	N/A
Water Pollution	Turbid water and drainage conditions	Visual observation at Construction Site	During rainfall	Contractor	No turbid water and drainage issue	Rainfall this month resulting to water ponding in certain areas (North and South Locations)	Rainfall this month caused water ponding on site	No heavy rainfall in this month	No Water pollution	No Water pollution	

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Waste	Disposal methods of construction and general waste	Visual observation at Construction Site/Disposal Site and meeting with consultant	<ul style="list-style-type: none"> Visual observation: Daily Meeting: Monthly or as needed 	Contractor	Waste Disposal site identified at Apollonia	Waste generated on site is disposed of by Zoom lion	Waste generated on site is disposed of by Zoom lion	Soil waste Material disposed at comm 6 Tema while other solid waste such as food, bottles cans, papers and miscellaneous items disposed of by zoom lion	Soil waste Material disposed at comm 6 and other miscellaneous items disposed of by Zoomlion.	Soil waste Material disposed at comm 6 and other miscellaneous items disposed of by Zoomlion.	
Noise and Vibration	<ul style="list-style-type: none"> Noise level Vibration level 	<ul style="list-style-type: none"> Interview to local residents and pedestrians at Construction Site Instrumental measurement 	<ul style="list-style-type: none"> Interview: Monthly or as needed Instrumental measurement: Pre-Construction phase: 1-time Construction phase: 5-times [Total 6-times] 	Contractor	<u>Noise level</u> Loc 1: 69.4 dBA Loc 2: 70 dBA. EPA guideline ≤ 70 dBA. <u>Vibration</u> Loc1 :10mm/s Loc 2:6mm/s	<u>Day Noise</u> Loc 1=59.9dBA Loc2=67.8(dBA) <u>Night Noise</u> Loc 1=50.3dBA Loc 2=51.8dBA Day and Night Guidelines ≤70dBA vibration levels 1.6(mm/s) and 1.2(mm/s).	Day Noise Loc 1=61.2dBA Loc =65.4(dBA) Night Noise Loc 1=50.0dBA Loc 2=50.9dBA Day and Night Guidelines ≤70dBA vibration levels 1.2(mm/s) and 1.0(mm/s).	Day Noise Loc 1= 63.6 dBA Loc 2= 60 (dBA) Night Noise Loc 1=52 dBA Loc 2=54 dBA Day and Night Guidelines ≤70dBA vibration levels 1.1(mm/s) and 1.1(mm/s).	N/A	Day Noise Loc 1=62 dBA Loc 2=64(dBA) Night Noise Loc 1=50.3dBA Loc 2=51.8dBA Day and Night Guidelines ≤70dBA vibration levels 1.6(mm/s) and 1.8(mm/s).	
	<ul style="list-style-type: none"> Noise level Vibration level 	Instrumental measurement in and around Tema intersection	[Operation Phase] 1-time per year for 2 years after completion [Total 2-times]	GHA	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Resettlement/ Land Acquisition	Progress of resettlement action plan	Site survey around Tema intersection and relocation sites, and meeting with PAPs	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	
Poor People	Activity conditions of street vendors	Visual observation at Construction Site	Daily	Contractor	All activities of poor people not affected	No activity of Street vendors is affected by the construction activity	Street vendors, hawkers etc. are going on their normal activities without any interruption from construction activities.	Street vendors, hawkers etc. Are going on their normal activities without any interruption from construction activities.	No activity of Street vendors is affected by the construction activity	Street vendors, hawkers etc. are going on their normal activities without any interruptions	
Local economies, such as employment, livelihood, etc.	Progress of resettlement action plan	Site survey around Tema intersection and relocation sites, and meeting with PAPs	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	

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	<ul style="list-style-type: none"> Business activity around construction site Employment situation of unskilled labor 	Site survey and interview of local people and unskilled labourers at Construction Site	Monthly or as needed	Contractor	2 Unskilled labourers employed this month to weed around the site	Over 2 Unskilled labourers employed this month	Over 20 Unskilled labourers employed this month many at rebar fabrication Location	Over 25 Unskilled labourers employed this month many at U-drain works and scaffolding	Over 11 unskilled labourers employed this month most of them are for kerb stone and Traffic barrier	Over 5 unskilled labourers employed this month most of them are for kerb stone and Traffic barrier.	
Land use and utilization of local resources	Progress of resettlement action plan	Site survey around Tema intersection and relocation sites, and meeting with PAP	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	
	<ul style="list-style-type: none"> Condition of land use Condition of business activity 	Site survey and interview of local people in and around Tema intersection	[Operation Phase] Monthly or as needed for 2 years after completion	GHA/TDC	N/A	N/A	N/A	N/A	N/A	N/A	
Existing social infrastructures and services	Relocation status of existing infrastructure facilities	Site survey and meeting with facility owners in and around Tema intersection	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	
Existing social infrastructures and services	Condition of traffic congestion around construction site	Visual observation at Construction Site	Daily	Contractor	Parking of huge trucks by the road occasionally but does not totally affect traffic flow	No traffic congestion	Normal traffic flow	Normal traffic flow	Traffic lights were broken but was fixed immediately. Traffic flow normal	Traffic flow normal	
	Crossing conditions of pedestrians	Site survey and interview of local people in and around Tema intersection	[Operation Phase] Monthly or as needed for 2 years after completion	GHA	N/A	N/A	N/A	N/A	N/A	N/A	
Misdistribution of benefits and damages	Progress of resettlement action plan	Site survey around Tema intersection and relocation sites, and meeting with PAPs	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	
	Living situations of Project Affected Persons (PAPs)		[Operation Phase] Monthly or as needed for 2 years after relocation		N/A	N/A	N/A	N/A	N/A	N/A	
Local conflicts of interest	Progress of resettlement action plan	Site survey around Tema intersection and relocation sites, and meeting with	[Pre-Construction Phase] Monthly or as needed	GHA	N/A	N/A	N/A	N/A	N/A	N/A	

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	Living situations of Project Affected Persons (PAPs)	PAPs	[Operation Phase] Monthly or as needed for 2 years after relocation		N/A	N/A	N/A	N/A	N/A	N/A	
Landscape	<ul style="list-style-type: none"> Status of tree felling Status of Planting works 	Visual observation at Construction Site and meeting with consultant	Daily	Contractor	Works not started.	No tree felling in this month	No tree felling in this month	No tree felling in this month	No tree felling in this month	No tree felling in this month	
Working Conditions (including occupational safety)	<ul style="list-style-type: none"> Workplace situations Implementation status of accident prevention measures 	Visual observation at Construction Site and meeting with consultant	Daily	Contractor	Project signboard mounted to send information to people around the site	Slow down signage, No Unauthorized entry installed (North and south side)	Detour signages installed More signages are posted around the construction site such as, Danger vehicle crossing, Danger excavation keep off, No unauthorized entry around abutment location	Scaffold signages are posted around temporary support, other signages such as harness required at height, Site safety notice. Demarcation of pedestrian walkways in the work area	Colour coding for lifting equipment (white) this month. Installation of work No unauthorized signage, site safety signage exits etc. Demarcating Site panel installation area and crane working zones with caution tapes.	Colour coding for lifting equipment (green) this month. Safe access created to concrete casting locations, working zones demarcated with caution tapes. Additional No unauthorized signage, and exit installed.	
Accidents	Implementation status of accident prevention measures	Visual observation at Construction Site and meeting with consultant	Daily	Contractor	Plant and machinery movement path allocated.	Additional signages are installed in the construction site such as deep excavation keep off along And area Other additional bamboos to cover spaces between the concrete barriers.	Traffic lights installed at two locations: South side detour and North side detour Construction site barricaded with concrete barriers, bamboo bollards and orange net mesh	Nets are fixed around scaffolds to prevent fall of objects, additional signages installed along work area and cautioning all danger areas/spots	Continuous installation of MCB's and bamboo bollards, bracing of bamboo bollards to prevent unauthorised persons from entering the site. Fixing of shredded orange net	Repair of defaced/broken detour signages, Continuous installation of MCB's and bamboo bollards, bracing of bamboo bollards. Flagmen allocated at all entry/exit locations around the site	
	Number of traffic accident	Site survey and traffic accident data in and around Tema intersection	[Operation Phase] Monthly or as needed for 2 years after relocation	GHA	N/A	N/A	N/A	N/A	N/A	N/A	