Environmental Monitoring Form for Construction Stage

Attachment EN3

Item	Location	Parameter/Means of Monitoring	Result (Average/Max /Total, etc)	Standard (Legal/International Standard)	Frequency	Remarks
Air quality	construction site	visual inspection of mechanical condition and exhaust gas	colorless gas, no eyes irritation was left		every day before working	The results of analyzes presented in this table show that the landfills of the base camp of the control mission and of the industrial base camp of lot 2 (Ntam - Mbalam) do not emit odors that could harm the environment, the health of people who are in these places all day long. Nitrogen dioxide (NO2): NO2 values are zero in all stations • Ozone (O3): the O3 concentrations are zero in some stations. In the villages of Belle ville; Mboutoukol II, Nkolmeyos I (Chiefdom); Nkolmeyos II (Chiefdom); Lele (Crushing plant) Lele (Quarry); Alati (Alati center); Mékom (Public School); Mékom (Public School), the concentration values are respectively 0.007 ppm; 0.006 ppm; 0.005 ppm; 0.005 ppm; 0.004 ppm; 0.005 ppm; and 0.007 ppm. All these values are lower than the Cameroonian standard (0.06 ppm). • Sulfur dioxide (SO2): SO2 values are zero at all measuring stations. This could be explained by the absence of emission sources in the study area during the measurements. SO2 is a gaseous, colorless and flammable pollutant that comes primarily from the combustion of sulfur-containing fossil materials such as coal, fuel oil, and diesel. Some of this pollutant is emitted during industrial processes such as waste incineration, sulfuric acid manufacturing and paper production. The irritant gas of SO2 can cause certain health problems, especially in sensitive people such as asthmatics, the elderly and children. Short exposures to high values can cause bronchial spasms, coughing attacks, and eye irritation. • Carbon monoxide (CO): sampling this gas reveals a zero concentration level on all measuring stations Carbon monoxide (CO) is a colorless, odorless and toxic gas which results from incomplete combustion, and this whatever the fuel used: wood, butane, coal, gasoline, fuel oil, natural gas, petroleum, propane and diffuses very quickly in the environment. These results could then be justified by the absence of works or of movement of machinery during these measurement periods with regard to the construction of the road. • PM10 dust: PM10 values are associated with dust flying along the project road that can be significantly caused by the works. The average values of PM10 obtained in all the stations are below the Cameroonian standard (260 µg / m3). The maximum value of all the measurement stations was recorded in the village Mboutoukol I (44.08 µg / m3). This could be explained by the fact that the measurements were taken during the rainy season and in the absence of work in certain places on the site. • PM 2.5 dust: the concentrations of fine particles (PM 2.5) contained in the dust are all below the standard set by the WHO (25 µg / m3) the maximum value recorded at Village Mboutoukol II (16.573 µg / m3). These particles have impacts on the health of populations, in particular the onset of pulmonary infections.
	construction site	visual observation of dust	No observation of dust in the air. The study was conducted in the rainy season		every day before working	
	storage facilities for dust generating					
	boundary of ROW nearest to construction site	SPM10	0 - 999,9	50 µg/m3 (WHO, average 24h)	2 times in dry season and 2times in rainy season	
		SPM2.5	0 - 999,9	25 µg/m3 (WHO, average 24h)		
		SO2	0 - 10	0.30 mg/m3 (MOE, average 24h)		
		NO2	0 - 1	0.10 mg/m3 (MOE, average 24h)		

water quality	rivers including Sanaga river, streams and other public water bodies where construction works are executed	visual observation		Of the fourteen (14) watercourses inspected, it was observed that scupper construction work was carried out on eleven (12) watercourses, of which the trajectory of only one was modified by this work.		every day	In general, the results of physico-chemical analyzes show that the waters of the rivers that were the subject of this study are unpolluted and have the character of natural waters. Otherwise, The turbid character of some rivers is high (river 13 in particular).
		analysis using potable pH and turbidity		10-2020			
		pH		5,3 - 5,5		when any pollution is suspected	In order not to interfere with the flow of water, deviations were created during the construction of the hydraulic structures and the company was asked to avoid pouring the remains of concrete into the watercourse. In addition, the section of road has been the subject of a regular watering schedule.
		TSS		0 - 0	25-100 (mg/l)		
		TURB		10-27	<5 (NTU)		
		MES		160 - 120,5	50 - 100 (mg/l)		
		COND		15 - 0	<400 (µS.cm-1)		
		BOD		44,92 - 31	1-10 (mg/l)		
		COD		55,7 - 37,2	1-8 (mg/l)		
		PLOMB		0,00 - 0,00	≤0,01 (mg/l)		
		CADMIUM		0,00 - 0,00	≤0,0005 (mg/l)		
		CHROME		0,00 - 0,00	≤0,05 (mg/l)		
		ZINC		0,09 - 0,04	≤3.00 (mg/l)		
		CUIVRE		0,04 - 0,06	≤ 1 (mg/l)		
		CF		2400 - 1640	< 2000 (UFC/100 ml)		
noise	boundary of land plot nearest to the construction site	Noise level		50,2 - 70,5	60dB(06:00-18:00) 60dB(06:00-18:00) 60dB(06:00-18:00) (MOE, residential area)	*when noise/ vibration level exceeding the standards is suspected *when local residents complain	At the level of the various measurement stations, the noise level is below the Cameroonian standard. According to Order No. 039 / MTPS / IMT of November 26, 1984 establishing general health and safety measures at workplaces in the Republic of Cameroon, the sound environment favorable to good working conditions, throughout possible should not exceed 85 decibels (dB). Conclusion: on the basis of the results obtained during the study period, the sound environment at the level of the twenty-three (23) stations studied does not present any risk to the health of workers and the populations of these localities.
vibration		vibration level		average particle speed of 0.13 m / s	65Hz(05:00-17:00) 60dB(17:00-05:00)		
general waste	waste storage at construction site	slurry and other construction waste	discharged amount			every domain	Special waste generally consists of used oil, scrap metal, used bitumen drums, used tires and old fabrics soaked in used oil.
			recycled amount	0			
			the way of recycle	inert waste is stored at the discharge of the life base of the SINIHYDRO company			
			treated amount	0			
			location of final disposal				
		general waste	discharged amount	0			
			recycled amount	0			
			the way of recycle	special waste is removed by the subcontractor NDACK METIAK and Fils with environmental permits N ° 00084 of October 30, 2018			
			treated amount	0			
			location of final disposal				

Hydrology	rivers, streams and reservoirs where construction works are executed	visual inspection on volume and speed of water flow	In general, the waters of the rivers identified in the context of this study are not polluted and have the character of natural waters. These waters are mainly acidic and all turbid with slightly high turbidity values which can be explained by the presence of suspended matter of natural origin, the different uses of local residents (laundry, dishes, bathing, washing motorcycles, etc.) thus affect their quality.		every domain	
Soil	Staying site, borrow pit and quarry site, fuel station and workshop, paring place, garbage place	soil contamination level			when soil contamination is suspected	When the soil is contaminated with used oils, the copo is poured immediately on it, then it is collected and stored away from bad weather while awaiting their recovery by an approved subcontractor.
Ecosystem	lot 1 lot 2	visual observation of animals, reptiles and amphibious	The vegetation in the project area (lot 1, lot 2) is characterized by dense humid forests and swampy raphial forests. These plant formations are rich in marketable species and Non-Wood Forest Products (NTFPs). The flora is very diverse. These plant formations are home to many non-timber forest products. The most important ones include among others: wild mango (Irvingia gabonensis), Djangsang (Ricinodendron heudolettii), Moabi (Baillonella toxisperma), rattan, hazelnuts (Kola edulis), Voakanga (Voacanga africana), Bitter kola (Garcinia cola), fuelwood, bark and roots of some woody species. Almost 95% of these products are intended for own consumption and used by local populations in traditional pharmacopoeia and food. Among these NWFPs, only Djangsang, wild mango, and Voakanga constitute a significant source of income for some households. In general, these products remain undervalued in the project area despite the importance of the existing potential and the opportunity they present for local development. Collecting these products remains primarily a female activity. The wildlife is very diverse. Following interviews with the environment managers of the two lots and the Principal Water and Forestry Technician of Ntam reveal that this fauna is localized both in gallery forests and in peri-forest savannas. Some of the characteristic species are: Mammals, Pan troglodytes, Gorilla gorilla, Tragelaphus spekei, Hylochoerus porcus, Cephalophus dorsalis, Vivera civetta, Nandinia binotata, Geneta servalina, Cephalophus monticola, Thryonomis swinderianus, Cricetomys gabianus, Manis tetradactyla, Funisciunus isabella, Funisciunus pyrrhopus, Atherurus africana Manis tricuspis, Cercopithecus nictitans, Cercopithecus cephus, Reptiles, Bitis gabonensis, Birds, Francolinus spp, Psythacus erythacus, Wild goose, Hawk		every half year (1 time in dry season and 1 time in rainy season)	Awareness continued on a quarterly basis by an NGO recruited by the company

**Remarks; Past trend and current status including remedial measures if necesary