

Annex 6: Site Air Quality & Noise

Air Quality

Site selection

The selection of the site for the active air measurements is based on the prevailing wind direction, the future layout of the proposed project components.

Collection of air measurements

Instrumentation for measurements of ambient air pollutants

Ambient air concentrations of sulfur dioxide were measured using an SO₂ analyzer (Thermo Scientific SO₂ Analyzer model 43i-USA) with a detection limit of ≤ 1 ppb and a precision of ≤ 0.5%. Nitrogen oxides were measured using a NO_x analyzer (Thermo Scientific NO_x Analyzer - Model 42i- USA) with a detection limit of ≤ 0.4 ppb and a precision of ≤ 0.5%. Carbon monoxide concentrations were measured using a CO Analyzer (Thermo Scientific Carbon Monoxide CO Analyzer model 48i-USA) with a detection limit of ≤ 0.04 ppm and a precision of ≤ 0.5%. Particulate matter, PM₁₀, and total suspended particles, T.S.P, were measured using a Sequential Particulate sampler equipped with a Beta Ray Source. The detection limit is ≤ 1.5 µg/ m³ and the precision is ≤ 0.4 µg/ m³ for 24 hour cycle time at a 2.3 m³/h operating flow rate.

Protocols for measurements of ambient air pollutants

Concentrations of ambient pollutants were measured according to the standard reference methods presented in the table below.

Table Error! No text of specified style in document.-1: Standard reference methods followed for the collection of ambient air pollutants

Pollutant	Standard reference procedure
NO _x	ISO 7996 equivalent to(U.S.A EPA Reference method – RFNA-1289-74)
SO ₂	ISO 10498 equivalent to(U.S.A EPA Reference method – EQSA-0486-60)
CO	ISO 4224 equivalent to U.S.A EPA Reference method – RFCA-0981-54)
PM ₁₀ T.S.P	EPA method, Appendix J-Reference method FR

Results of ambient air quality measurements

The following tables present the results for ambient air quality measurements conducted at the monitoring location. Daily average results are shown in the following table for all the measured parameters.

Table Error! No text of specified style in document.-2: Eight (8) hours average ambient air pollutants' concentrations (µg/m³)

Time	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)	CO (mg/m ³)	PM ₁₀ (µg/m ³)	T.S.P (µg/m ³)
10:AM	40.9	45.2	86.1	10.7	2.4	107.2	121.3
11:00	36.8	47.3	78.3	12.3	2.4		

12:00	35.7	46.1	76.8	12.3	2.5		
13:00	36.2	48.2	84.4	12.2	2.4		
14:00	27.8	42.1	69.9	13.6	2.4		
15:00	27.5	44.2	71.7	14.5	2.3		
16:00	40.9	45.2	86.1	10.7	2.4		
17:00	36.8	47.3	78.3	12.3	2.4		
Limits	150	200	150	350	30 (mg/m³)	150	230

Noise

Methodology

Ambient noise levels were measured using two B & K 2238 Mediator, Integrating Sound Level Meters, Type I (precision grade), compliant with IEC 1672 Class 1 standard and a B & K 4198 Outdoor Weatherproof Microphone Kit;

Results

The tables below present the results of ambient noise measurements and their corresponding national and World Bank permissible limits.

Table **Error! No text of specified style in document.-3**: Ambient noise level measurements

Time	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA)	
	LAeq	LA10	LA50	LA90	LA95	LCpeak	Natio nal	Internati onal
10:00	59.15	58.26	56.82	53.14	50.03	94.42	70	70
11:00	56.5	56.54	55.21	50.52	46.68	95.49		
12:00	69.61	65.26	62.34	57.95	56.29	117.67		
13:00	67.77	64.3	60.96	55.9	53.84	102.71		
14:00	60.71	56.41	54.52	50.22	47.42	107.36		
15:00	74.35	65.91	63.15	57.53	55.03	121.12		

Time	Sound Level Equivalent & Percentile Recordings in dBA for 8 Hours						Permissible Limits LAeq (dBA)	
	LAeq	LA10	LA50	LA90	LA95	LCpeak	National	International
16:00	64.43	62.62	60.08	55.38	54.03	96.92		
17:00	60.76	56.48	55.68	53.78	52.78	108.15		

Table Error! No text of specified style in document.-4: National and World Bank limits for ambient noise levels

Noise	Egyptian Law 4 Requirements			WB Requirements		
	TYPE OF AREA	Permissible noise intensity decibel		Receptor	One hour LAeq (dBA)	
		DAY 7 a.m. to 10 p.m.	NIGHT 10 p.m. to 7 a.m.		Day 07:00– 22:00	Night 22:00 - 07:00
	Sensitive Areas (Schools-hospitals- rural areas)	50	40	Residential; Institutional; educational	55	45
	Residential with limited traffic	55	45	Industrial; commercial	70	70
	Urban residential areas with commercial activities	60	50			
	Residential adjacent to roads less than 12m wide	65	55			
	Residential adjacent to roads 12m wide or more, or light industrial areas.	70	60			
	Industrial areas (heavy industries)	70	70			