

## Annex 4: 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 SO<sub>2</sub> analyzer (Thermo Scientific SO<sub>2</sub> Analyzer model 43i-USA) with a detection limit of ≤ 1 ppb and a precision of ≤ 0.5%. Nitrogen oxides were measured using a NO<sub>x</sub> analyzer (Thermo Scientific NO<sub>x</sub> 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, PM<sub>10</sub>, 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/ m<sup>3</sup> and the precision is ≤ 0.4 µg/ m<sup>3</sup> for 24 hour cycle time at a 2.3 m<sup>3</sup>/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 <sub>x</sub>	ISO 7996 equivalent to(U.S.A EPA Reference method – RFNA-1289-74)
SO <sub>2</sub>	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 <sub>10</sub> 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/m<sup>3</sup>)**

Time	NO (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )	T.S.P (µg/m <sup>3</sup> )
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		
<b>Limits</b>	150	200	150	350	30 (mg/m <sup>3</sup> )	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	<b>59.15</b>	58.26	56.82	53.14	50.03	94.42	<b>70</b>	<b>70</b>
11:00	<b>56.5</b>	56.54	55.21	50.52	46.68	95.49		
12:00	<b>69.61</b>	65.26	62.34	57.95	56.29	117.67		
13:00	<b>67.77</b>	64.3	60.96	55.9	53.84	102.71		
14:00	<b>60.71</b>	56.41	54.52	50.22	47.42	107.36		
15:00	<b>74.35</b>	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	Natio nal	Internati onal
16:00	<b>64.43</b>	62.62	60.08	55.38	54.03	96.92		
17:00	<b>60.76</b>	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 L <sub>Aeq</sub> (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	<b>Industrial; commercial</b>	<b>70</b>	<b>70</b>
	Urban residential areas with commercial activities	60	50			
	Residential adjacent to roads less than 12m wide	65	55			
	<b>Residential adjacent to roads 12m wide or more, or light industrial areas.</b>	<b>70</b>	<b>60</b>			
	Industrial areas (heavy industries)	70	70			