10.0 CUMULATIVE EFFECTS ASSESSMENT (CEA)

The cumulative effects assessment process involves selection of VECs from the ECC list, identifying other projects in the area, identifying information on an area basis for the VECs, and finally conducting the assessment. Cumulative Effects can be defined as changes to the environment that are caused by action in combination with other past, present and future human actions.

The central question is what contribution the proposed Project would make to the overall stresses on selected VECs that are caused by all stressors due to human activities. CEAs are conducted when a project will have a likely, measurable, effect on a VEC.

All ECCs identified in the scoping exercise were considered for the proposed power station as candidates for the CEA. Only those ECCs that were identified with a pathway of concern (Table 6-1) and determined to act cumulatively were selected for CEA (Table 10-1).

Table 10-1 VECs Selected for Cumulative Effects Assessment

VECs Assessed	Inclusion Rationale
Air Quality	Additional emissions can act cumulatively with existing air quality conditions
Noise	Additional emissions can act cumulatively with existing noise levels
Traffic	Additional traffic pressures can act cumulatively on traffic loadings.

10.1 Assessed Projects

Projects were selected because they could potentially act cumulatively with the proposed Project in the following manner: direct emissions sources, traffic loadings, and other noise sources. The Projects that were examined as part of this assessment are listed below:

- Arawak Cement Plant;
- Road Construction and other Construction Projects; and,
- Other Construction Projects.

The significance of a potential effect was determined using duration, frequency, geographical extent, magnitude and reversibility of the effect.

10.1.1 Air Quality

Monitoring data obtained from ambient air monitoring programs includes the effects of existing activities on air quality in the area, such as industry, agriculture, traffic and human other activity. This data was assumed to be representative of the average ambient air quality in the Project

area for the year. An assessment of cumulative effects on air quality was performed by adding the predicted concentrations from the dispersion modelling to these ambient conditions.

Table 10-2 Cumulative Effects of Low Speed Diesels on Air Quality

Contaminant	World Bank Guidelines (WBG)		Stage 3 (240 MW)		Air Quality		
	Averaging Period	GLC [1] ($\mu g/m^3$)	GLC ($\mu g/m^3$)	% WBG	Current [2] Background ($\mu g/m^3$)	Cumulative ($\mu g/m^3$)	% WBG
NO_x as NO_2	24 hr annual	150 100	94.22 43.15	62.8 43.2	2.45	96.67 45.6	64.45 45.6
SO_2	24 hr annual	150 80	370.87 16.18	**247.2** 20.2	1.31	**372.18** [3] 17.49	**248.12** [3] 21.86
PM	24 hr annual	230 80	9.11 0.40	6.1 0.5	53	62.11 53.4	27 66.5
PM-10	24 hr annual	150 50	6.56 0.29	4.4 0.6	14.1	20.66 14.39	13.77 28.78

Notes:

(1) GLC = Maximum Ground Level Concentration
(2) Background air quality based on maximum levels measured (see Table 5-2)
(3) SO_2 levels are predicted to exceed the WBG for approximately 6.5% of the time (24 days/year).

Table 10-2 shows the cumulative effects for the full 240 MW development using Low Speed Diesels without the recommended mitigation. The cumulative effects indicate that without mitigation only the SO_2 levels are elevated above World Bank Guidelines. With the proposed mitigation methods (switching to a lower sulphur content fuel) the local air quality will be within acceptable levels.

Similarly Table 10-3 shows the cumulative effects for the full 240 MW development with Combined Cycle generation operating on distillate fuel which is the worst case for emissions. The cumulative effects indicate that the World Bank Guidelines for air quality can be met under all operating conditions.

Table 10-3 Cumulative Effects of Combined Cycle Plant on Air Quality

Contaminant	World Bank Guidelines (WBG)		Distillate Fuel (240 MW)		Air Quality		
	Averaging Period	GLC [1] ($\mu g/m^3$)	GLC ($\mu g/m^3$)	% WBG	Current [2] Background ($\mu g/m^3$)	Cumulative ($\mu g/m^3$)	% WBG
NO_x as NO_2	24 hr annual	150 100	51.50 41.16	34.3 41.2	2.45	53.95 43.61	35.97 43.61
SO_2	24 hr annual	150 80	102.36 3.20	68.2 4.0	1.31	103.67 4.51	69.11 5.63
PM	24 hr annual	230 80	2.09 0.07	0.9 0.09	53	55.09 53.07	23.95 66.34
PM-10	24 hr annual	150 50	1.05 0.03	0.7 0.06	14.1	15.15 14.13	10.10 28.26

Notes:
(1) GLC = Maximum Ground Level Concentration
(2) Background air quality based on maximum levels measured (see Table 5-2)

10.1.2 Noise

The analysis for noise included existing background levels from current sources in the area of the site. The analysis (Section 8.2) recommends the appropriate design levels to meet World Bank Guidelines in the context of the existing sources. The cumulative effects indicate that the World Bank Guidelines for noise can be met with the recommended levels of sound attenuation.

10.1.3 Traffic

Traffic in Barbados has become increasingly congested in the last few years by the proliferation of privately owned automobiles. This is further impacted by the large number of development and construction projects on the Island, as well as ongoing maintenance of roads and municipal services.

While the proposed Project will result in some short term traffic impacts during the construction phase, during operations the predicted effects of the additional traffic loads will be modest.