

1.1 MONITORING PLAN

Construction period

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge																																																																																										
Air quality	H ₂ S - CO ₂	Borinquen Hotel and 4 sites (north, south, east and west) on the well base boundary	During testing period (weeks-one month): every three month (quarterly) and permanent monitoring station	Field measurement	ICE																																																																																										
Air Quality Monitoring - CAMPO GEOTERMICO BORINQUEN																																																																																															
<table border="1"> <thead> <tr> <th>Site</th> <th>CO2 Min</th> <th>CO2 Avg</th> <th>CO2 Max</th> <th>CO2 Std</th> <th>H2S Min</th> <th>H2S Avg</th> <th>H2S Max</th> <th>H2S Std</th> </tr> </thead> <tbody> <tr> <td>CAÑAS DULCES</td> <td>362</td> <td>385</td> <td>431</td> <td>5,000</td> <td>0.000</td> <td>0.001</td> <td>0.004</td> <td>0.010</td> </tr> <tr> <td>CASA MAQUINAS BORINQUEN</td> <td>342</td> <td>369</td> <td>404</td> <td>5,000</td> <td>0.000</td> <td>0.000</td> <td>0.002</td> <td>0.010</td> </tr> <tr> <td>HOTEL BORINQUEN</td> <td>349</td> <td>380</td> <td>432</td> <td>5,000</td> <td>0.000</td> <td>0.001</td> <td>0.002</td> <td>0.010</td> </tr> <tr> <td>HOTEL BUENA VISTA</td> <td>354</td> <td>374</td> <td>391</td> <td>5,000</td> <td>0.000</td> <td>0.000</td> <td>0.002</td> <td>0.010</td> </tr> <tr> <td>PLB-02</td> <td>344</td> <td>375</td> <td>420</td> <td>5,000</td> <td>0.000</td> <td>0.000</td> <td>0.001</td> <td>0.010</td> </tr> <tr> <td>PLB-03</td> <td>350</td> <td>368</td> <td>418</td> <td>5,000</td> <td>0.000</td> <td>0.001</td> <td>0.001</td> <td>0.010</td> </tr> <tr> <td>PLB-05</td> <td>350</td> <td>373</td> <td>414</td> <td>5,000</td> <td>0.000</td> <td>0.003</td> <td>0.022</td> <td>0.010</td> </tr> <tr> <td>PLB-09</td> <td>341</td> <td>365</td> <td>415</td> <td>5,000</td> <td>0.000</td> <td>0.000</td> <td>0.001</td> <td>0.010</td> </tr> <tr> <td>POBLADO BUENA VISTA</td> <td>358</td> <td>380</td> <td>434</td> <td>5,000</td> <td>0.000</td> <td>0.000</td> <td>0.002</td> <td>0.010</td> </tr> </tbody> </table>						Site	CO2 Min	CO2 Avg	CO2 Max	CO2 Std	H2S Min	H2S Avg	H2S Max	H2S Std	CAÑAS DULCES	362	385	431	5,000	0.000	0.001	0.004	0.010	CASA MAQUINAS BORINQUEN	342	369	404	5,000	0.000	0.000	0.002	0.010	HOTEL BORINQUEN	349	380	432	5,000	0.000	0.001	0.002	0.010	HOTEL BUENA VISTA	354	374	391	5,000	0.000	0.000	0.002	0.010	PLB-02	344	375	420	5,000	0.000	0.000	0.001	0.010	PLB-03	350	368	418	5,000	0.000	0.001	0.001	0.010	PLB-05	350	373	414	5,000	0.000	0.003	0.022	0.010	PLB-09	341	365	415	5,000	0.000	0.000	0.001	0.010	POBLADO BUENA VISTA	358	380	434	5,000	0.000	0.000	0.002	0.010
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Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge																																																																																										
Noise	Noise level	Borinquen Hotel, one site on the well base boundary (in the hotel direction), and 4 sites (north, south, east and west) in the vicinity of the power plant site.	During testing period (weeks-one month): once/week During power plant construction: monthly (with peak time for each construction job taken into account)	Field measurement	ICE																																																																																										

Noise - CAMPO GEOTERMICO BORINQUEN

Site	Noise Min	Noise Avg	Noise Max	Noise Std
CAÑAS DULCES	40	43	52	65
CASA MAQUINAS BORINQUEN	32	47	74	65
HOTEL BORINQUEN	33	38	58	65
HOTEL BUENA VISTA	34	39	63	65
PLB-02	41	56	74	65
PLB-03	36	44	62	65
PLB-05	34	57	75	65
PLB-09	33	47	66	65
POBLADO BUENA VISTA	32	36	41	65

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Water quality	1) pH, Electric conductivity (EC), Chlorides (Cl-)	Upper and lower streams of the Salitral rivers, upper and lower streams within the project area (AP) of the creek running.	1) During testing period: twice/testing period (weeks-one month)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS			
Cl- (ppm)	2.5	4.29	8
Cond. (µS/cm)	97	157.02	210.9
pH Lab.	5.99	6.84	7.72
CG-BRQ --- NACIENTE NAVARIT			
Cl- (ppm)	2	4.23	7.8
Cond. (µS/cm)	148.9	184.48	245.4
pH Lab.	5.71	6.77	7.83
CG-BRQ --- QUEBRADA GATA			
Cl- (ppm)	1.31	5.84	12.2
Cond. (µS/cm)	115.4	214.99	348
pH Lab.	5.36	7.23	8.12
CG-BRQ --- QUEBRADA TENCHA (PBR11)			
Cl- (ppm)	1.8	4.90	11.3
Cond. (µS/cm)	74.5	144.77	263
pH Lab.	5.76	6.96	7.81
CG-BRQ --- RIO SALITRAL			
Cl- (ppm)	2.41	6.50	19
Cond. (µS/cm)	100.3	169.99	328
pH Lab.	6.04	7.54	8.34
CG-BRQ --- RIO TIZATE			
Cl- (ppm)	5.2	8.99	16.1
Cond. (µS/cm)	127.4	222.28	306.5
pH Lab.	6.72	7.75	8.39
CG-BRQ --- TERMAL LOS PEDERNALES			
Cl- (ppm)	2.64	3.15	4.72
Cond. (µS/cm)	138.7	161.07	185.9
pH Lab.	5.95	6.64	7.28
CG-BRQ --- TOMA AGUA LAS LILAS			
Cl- (ppm)	3.79	5.58	11.5
Cond. (µS/cm)	141.5	177.79	189
pH Lab.	5.9	6.66	7.01
CG-BRQ --- TOMA DE AGUA PLB-02			
Cl- (ppm)	3.04	4.58	7.49
Cond. (µS/cm)	80	131.61	432.3
pH Lab.	4.66	7.23	7.97
CG-BRQ --- TOMA DE AGUA PLB-05			
Cl- (ppm)	2.38	4.54	13.1
Cond. (µS/cm)	78.8	134.49	241.1
pH Lab.	5.8	7.09	7.55

Attachment 2

Water quality	2) Oils and grease,	Outlet of the settling basin (construction work effluents). Only in the presence of machinery in the project area (AP)	2) Oils and grease, every six months (semester) After 2 years, the continuation of monitoring will be reconsidered based on opinions of professional experts.)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE
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Site	Oils and grease (mg/L)	
Standard 50 mg/L	Min	Max
Q. Gata Abajo	<1	8
Q. Gata Arriba	<1	<1
Río Salitral Abajo	<1	4
Río Salitral Arriba	<1	<1
Río Tizate Abajo	<1	<1
Río Tizate Arriba	<1	<1
Tencha Abajo	<1	<1
Tencha Arriba	<1	<1
Toma PLB-02	<1	<1
Toma PLB-05	<1	<1

Water quality	3) Hexavalent chrome (Cr+6), and Mercury (Hg) and COD	NOT APPLICABLE (NA)	NOT APPLICABLE (NA)	-----	
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Water quality	4) Arsenic (As)	Only in drinking water intakes	every six months (semester) After 2 years, the continuation of monitoring will be reconsidered based on opinions of professional experts.)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE
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Site	Arsenic (mg/L)	
Standard 0,01 mg/L	Min	Max
Plantel Curubandé	<1	<2

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Soil	Complete analysis - Cadmium (Cd), Lead (Pb), As, Cr ⁺⁶ , Hg, etc.	Four points in the vicinity of a representative geothermal field	One year before construction starts, and once five years after operation starts	Laboratory analysis of collected samples	ICE
		Four points in the vicinity of the power plant site	One year before construction starts, and once five years after operation starts		
Not applicable for this period. Monitoring in 2020.					
Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Fauna and flora	Plants and animals (birds, amphibians, reptiles, and mammals)	Area in the vicinity of wells and power plant site, the project site side of the national park, and gallery forest along the Salitral river	Monthly (with rainy and dry seasons, breeding seasons, etc. taken into account)	Visual observation records and photographs	ICE

Results of monitoring and state of conservation of species, january – march 2020.

Group	State of conservation		
Amphibian	CITES	IUCN	MINAE N° 40548- Regulations
<i>Craugastor fitzingeri</i>			
Birds			
<i>Amazona albifrons</i>	II		A
<i>Basileuterus culicivorus</i>			
<i>Basileuterus rufifrons</i>			
<i>Brotogeris jugularis</i>	II		A
<i>Calocitta formosa</i>			A
<i>Cantorchilus modestus</i>			
<i>Chiroxiphia linearis</i>			
<i>Coragyps atratus</i>			
<i>Crax rubra</i>	III	VU	RD
<i>Crotophaga sulcirostris</i>			
<i>Eumomota superciliosa</i>			
<i>Euphonia luteicapilla</i>			
<i>Geothlypis poliocephala</i>			
<i>Habia fuscicauda</i>			
<i>Hylocharis eliciae</i>	II		EN
<i>Hylophilus decurtatus</i>			
<i>Leiothlypis peregrina</i>			
<i>Melanerpes hoffmannii</i>			
<i>Microcerculus philomela</i>			
<i>Mniotilta varia</i>			
<i>Morococcyx erythropygus</i>			
<i>Myiarchus tuberculifer</i>			
<i>Myiarchus tyrannulus</i>			
<i>Myiodynastes luteiventris</i>			
<i>Penelope purpurascens</i>	III		RP
<i>Peucaea ruficauda</i>			
<i>Ramphastos ambiguus</i>			
<i>Ramphastos sulfuratus</i>	II		RP
<i>Sturnella magna</i>			

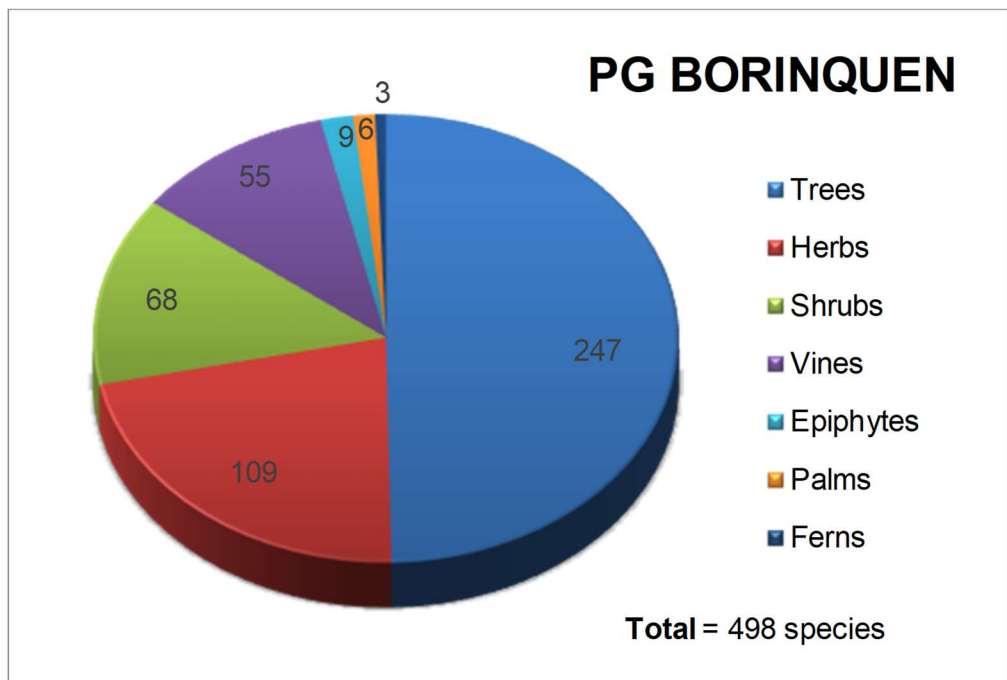
<i>Tityra semifasciata</i>			
<i>Turdus assimilis</i>			
<i>Vireo philadelphicus</i>			
<i>Volatinia jacarina</i>			
<i>Zenaida asiatica</i>			
Mammals (Visual, Sherman, Mist nets and Camera trap)			
<i>Alouatta palliata</i>	I		EN
<i>Caluromys derbianus</i>			
<i>Conepatus semistriatus</i>			
<i>Dasyprocta punctata</i>	III		
<i>Dasypus novemcinctus</i>			
<i>Didelphis marsupialis</i>			
<i>Eira barbara</i>			
<i>Nasua narica</i>	III		
<i>Odocoileus virginianus</i>			
<i>Panthera onca</i>	I	NT	PE
<i>Puma concolor</i>	I		EN
<i>Sciurus deppei</i>	III		RP
<i>Sylvilagus floridanus</i>			
<i>Tapirus bairdii</i>	I	EN	EN
<i>Tayassu pecari</i>	II	VU	EN
<i>Carollia sowelli</i>			
<i>Micronycteris microtis</i>			
<i>Desmodus rotundus</i>			
<i>Artibeus toltecus</i>			
<i>Glossophaga soricina</i>			
<i>Carollia perspicillata</i>			
<i>Myotis elegans</i>			
Reptiles			
<i>Bothrops asper</i>			
<i>Holcosus undulatus</i>			
<i>Norops biporcatus</i>			
<i>Norops cupreus</i>			

I=Appendix I CITES, II=Appendix II CITES, III=Appendix III CITES, IUCN= The International Union for Conservation of Nature, CITES=The Convention on International Trade in Endangered Species of Wild Fauna and Flora, NT= Near Threatened, EN= endangered species, RP= species with reduced or threatened populations, VU= Vulnerable.

Wild animals monitoring. January – march 2020.
Birds monitoring.



Distribution of flora species by habits registered in the Borinquen Geothermal Field. March 2014 – March 2020.



Attachment 2

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Waste*	Generated amount	Power plant construction site	Monthly	Total of generated amount (weight or volume)	Construction contractor
	Not applicable for this period. In 2021 starts the construction of plant.				

*Appropriate waste management including disposal of sludge will be implemented in accordance with Law for the Integrated Management of Residues (Law 8839), and in reference to Resolution No. 1948-2008-SETENA17 (page26).