

1.1 MONITORING PLAN

Construction period

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Air quality	H <sub>2</sub> S - CO <sub>2</sub>	Borinquen Hotel and 4 sites (north, south, east and west) at the well base boundary	During testing period (weeks-one month): every three month (quarterly) and permanent monitoring station	Field measurement	ICE

<a href="#">Volver al informe</a>   CALIDAD DEL AIRE - CAMPO GEOTERMICO BORINQUEN								
Descripcion_Sitio	CO2_Min	CO2_Prom	CO2_Max	CO2_MaxStd	H2S_Min	H2S_Prom	H2S_Max	H2S_MaxStd
CAÑAS DULCES	319	399	470	5000	0,000	0,001	0,001	0,010
CASA MAQUINAS BORINQUEN	303	371	421	5000	0,000	0,000	0,003	0,010
HOTEL BORINQUEN	319	375	426	5000	0,000	0,000	0,002	0,010
HOTEL BUENA VISTA	324	377	425	5000	0,000	0,000	0,001	0,010
PLB-02	322	373	423	5000	0,000	0,001	0,003	0,010
PLB-03	320	364	422	5000	0,000	0,000	0,003	0,010
PLB-05	310	364	415	5000	0,000	0,012	0,145	0,010
PLB-09	301	362	415	5000	0,000	0,000	0,001	0,010
POBLADO BUENA VISTA	326	380	429	5000	0,000	0,000	0,001	0,010

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
Noise	Noise level	Borinquen Hotel, one site at the well base boundary (towards 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

Attachment 2

<a href="#">← Volver al informe</a>   <b>RUIDO - CAMPO GEOTERMICO BORINQUEN</b>					
Descripcion_Sitio	Ruido_Min	Ruido_Prom	Ruido_Max	Ruido_MaxStd	RuidoLog
CAÑAS DULCES	37	41	44	65	49
CASA MAQUINAS BORINQUEN	32	44	69	65	52
HOTEL BORINQUEN	32	35	43	65	42
HOTEL BUENA VISTA	32	35	45	65	42
PLB-02	27	40	76	65	47
PLB-03	32	38	76	65	45
PLB-05	33	54	83	65	64
PLB-09	31	40	62	65	48
POBLADO BUENA VISTA	32	34	39	65	41

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) along the creek.	1) During testing period: twice/testing period (weeks-one month)	Laboratory analysis of collected samples	ICE and External laboratory to hire by ICE

## Attachment 2

Geothermal Field	CG-BRQ
Monitored variable	pH Lab.

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS	7,86	5,99	6,9
CG-BRQ --- NACIENTE NAVARIT	7,83	5,71	6,8
CG-BRQ --- QUEBRADA GATA	8,12	5,36	7,3
CG-BRQ --- QUEBRADA TENCHA (PBR11)	7,93	5,76	6,9
CG-BRQ --- RIO SALITRAL	8,34	6,04	7,5
CG-BRQ --- RIO TIZATE	8,39	6,72	7,8
CG-BRQ --- TERMAL LOS PEDERNALES	7,28	5,95	6,6
CG-BRQ --- TOMA AGUA LAS LILAS	7,01	5,9	6,7
CG-BRQ --- TOMA DE AGUA PLB-02	7,97	4,66	7,3
CG-BRQ --- TOMA DE AGUA PLB-05	8,21	5,8	7,1
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	7,84	3,02	7,2

Geothermal Field	CG-BRQ
Monitored variable	Cond. ( $\mu$ S/cm)

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS	210,9	97	154,7
CG-BRQ --- NACIENTE NAVARIT	245,4	148,9	183,5
CG-BRQ --- QUEBRADA GATA	348	115,4	214,3
CG-BRQ --- QUEBRADA TENCHA (PBR11)	263	74,5	139,1
CG-BRQ --- RIO SALITRAL	328	80,8	170,4
CG-BRQ --- RIO TIZATE	306,5	125,2	218,6
CG-BRQ --- TERMAL LOS PEDERNALES	189,2	138,7	163,4
CG-BRQ --- TOMA AGUA LAS LILAS	189	141,5	178,1
CG-BRQ --- TOMA DE AGUA PLB-02	432,3	70,6	121,0
CG-BRQ --- TOMA DE AGUA PLB-05	971	78,8	153,5
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	885	92	308,5

Attachment 2

Geothermal Field	CG-BRQ
Monitored variable	Cl- (ppm)

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS	8	2,46	4,3
CG-BRQ --- NACIENTE NAVARIT	7,8	2	4,2
CG-BRQ --- QUEBRADA GATA	12,2	1,31	5,6
CG-BRQ --- QUEBRADA TENCHA (PBR11)	11,3	1,33	4,3
CG-BRQ --- RIO SALITRAL	27,94	1,35	6,5
CG-BRQ --- RIO TIZATE	16,1	2,2	8,8
CG-BRQ --- TERMAL LOS PEDERNALES	4,72	2,64	3,2
CG-BRQ --- TOMA AGUA LAS LILAS	11,5	3,79	5,6
CG-BRQ --- TOMA DE AGUA PLB-02	7,49	2,75	4,4
CG-BRQ --- TOMA DE AGUA PLB-05	13,1	1,42	4,4
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	8,18	0,97	4,0

<b>Water quality</b>	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

Site	Oils and grease (mg/L)		
	Standard 50 mg/L	Min	Max
Q. Gata Abajo	<0,2		8
Q. Gata Arriba	<0,2		<1
Río Salitral Abajo	<0,2		4
Río Salitral Arriba	<0,2		<1
Río Tizate Abajo	<0,2		<1
Río Tizate Arriba	<0,2		<1
Tencha Abajo	<0,2		<1
Tencha Arriba	<0,2		<1
Toma PLB-02	<0,2		<1
Toma PLB-05	<0,2		<1

Attachment 2

<b>Water quality</b>	3) Hexavalent chrome (Cr+6), and Mercury (Hg) and COD	NOT APPLICABLE (NA)	NOT APPLICABLE (NA)	-----	
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<b>Water quality</b>	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
<b>Soil</b>	Complete analysis - Cadmium (Cd), Lead (Pb), As, Cr <sup>+6</sup> , 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 2022.					

Attachment 2

Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
<b>Fauna and flora</b>	Plants and animals (birds, amphibians, reptiles, and mammals)	Area in the vicinity of wells and power plant site, the project boundary next to 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. july, august and september 2022.**

<b>Group</b>	<b>State of conservation</b>		
<b>Amphibian</b>	<b>CITES</b>	<b>IUCN</b>	<b>MINAE N° 40548-Regulations</b>
Agalychnis callidryas		II	A
Craugastor fitzingeri			
Dendropsophus microcephalus			
Diasporus diastema			
Engystomops pustulosus			
Incilius coccifer			
Incilius melanochlorus			
Leptodactylus savagei			
Lithobates warszewitschii			
Pristimantis ridens			
Rhinella horribilis			
Smilisca sordida			
Trachycephalus typhonius			
<b>Birds</b>			
Amazilia rutila		II	A
Amazilia saucerrottei		II	A
Amazona albifrons		II	A
Aramides albiventris			
Arremon aurantirostris			
Arremonops rufivirgatus			
Attila spadiceus			
Basileuterus rufifrons			
Brotogeris jugularis		II	A
Buteo plagiatus		II	A
Calocitta formosa			A
Campephilus guatemalensis			
Campylorhynchus rufinucha			
Cantorchilus modestus			
Cathartes aura			
Chiroxiphia linearis			

## Attachment 2

Chlorostilbon canivetii		II	A
Ciccaba virgata		II	A
Coragyps atratus			
Crax rubra	VU	III	A
Crotophaga sulcirostris			
Crypturellus cinnamomeus			
Dendrocincla homochroa			
Dendrocolaptes sanctithomae			
Elanoides forficatus		II	A
Empidonax minimus			
Eucometis penicillata			
Eumomota superciliosa			
Euphonia hirundinacea			
Euphonia luteicapilla			
Falco ruficularis		II	A
Galbula ruficauda			
Geothlypis poliocephala			
Henicorhina leucosticta			
Herpetotheres cachinnans		II	A
Hylomanes momotula			
Lepidocolaptes souleyetii			
Leptotila verreauxi			
Megarynchus pitangua			
Melanerpes hoffmannii			
Mniotilta varia			
Momotus lessonii			
Morococcyx erythropygus			
Myiarchus tuberculifer			
Myiarchus tyrannulus			
Myiothlypis fulvicauda			
Notharchus hyperrhynchus			
Nyctidromus albicollis			
Pachysylvia decurtatus			
Passerina caerulea			
Patagioenas flavirostris			
Penelope purpurascens		III	
Peucaea ruficauda			



Attachment 2

Phaethornis striigularis		II	A
Piaya cayana			
Pitangus sulphuratus			
Polioptila albiloris			
Psarocolius montezuma			
Psilorhinus morio			
Pteroglossus torquatus			
Pulsatrix perspicillata		II	A
Ramphastos sulfuratus		II	A
Ramphocaenus melanurus			
Rupornis magnirostris		II	A
Sporophila funerea			
Thryophilus pleurostictus			
Thryophilus rufalbus			
Tolmomyias sulphurescens			
Trogon caligatus			
Turdus grayi			
Vireo olivaceus			
Volatinia jacarina			
Xiphorhynchus susurrans			
Zenaida asiatica			
<b>Mammals (Visual, Sherman, Mist nets and Camera trap)</b>			
Alouatta palliata		I	P.E
Artibeus jamaicensis			
Artibeus tolteca			
Ateles geoffroyi	P	II	P.E
Cabassous centralis			A
Canis latrans			
Carollia perspicillata			
Carollia sowelli			
Carollia subrufa			
Conepatus semistriatus			
Cuniculus paca		III	A
Dasyprocta punctata		III	
Dasypus novemcinctus			
Didelphis marsupialis			
Didelphis virginiana			

## Attachment 2

Eira barbara		III	
Galictis vittata			A
Glossophaga soricina			
Glyphonycteris sylvestris			P.E
Leopardus pardalis		I	P.E
Lonchophylla robusta			
Lophostoma brasiliense			
Myotis oxyotus			A
Nasua narica		III	
Nyctomys sumichrasti			
Odocoileus virginianus		III	
Pteronotus mesoamericanus			
Panthera onca	C.A	I	P.E
Pecari tajacu		II	A
Proechimys semispinosus			
Puma concolor		II	P.E
Sciurus deppei			A
Sciurus variegatoides			
Sturnira parvidens			
Sylvilagus floridanus			
Tamandua mexicana		III	
Tapirus bairdii	P	I	P.E
Trachops cirrhosus			
Vampyriscus nymphaea			A
<b>Reptiles</b>			
Aspidoscelis deppii			
Boa imperator		II	A
Bothriechis schlegelii			
Bothrops asper			
Coleonyx mitratus			
Corytophanes cristatus			
Erythrolamprus mimus			
Holcosus festivus			
Holcosus undulatus			
Imantodes cenchoa			
Lepidoblepharis xanthostigma			

Attachment 2

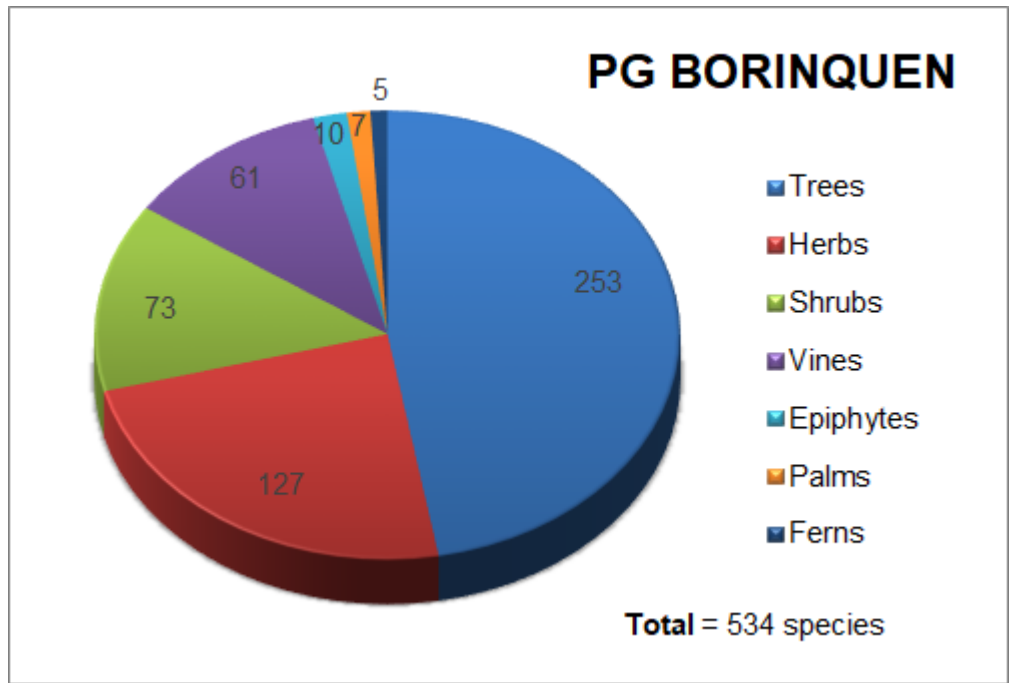
Leptodeira rhombifera			
Marisora unimarginata			
Ninia sebae			
Norops biporcatus			
Norops cupreus			
Norops oxylophus			
Oxybelis aeneus			
Sceloporus variabilis			
Senticolis triaspis			
Sibon nebulatus			
Spilotes pullatus			
Tretanorhinus nigroluteus			

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. September 2022.**



**Distribution of flora species by habitats registered in the Borinquen Geothermal Field. March 2014 – september 2022.**



Environmental item	Item to be monitored	Monitoring site	Frequency	Method	Party in charge
<b>Waste*</b>	Generated amount	Power plant construction site	Monthly	Total of generated amount (weight or volume)	Construction contractor
	Not applicable for this period. In 2023 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).