

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																																																																																																			
Calidad del Aire - CAMPO GEOTERMICO BORINQUEN																																																																																																								
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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																																																																																																			

Ruido - CAMPO GEOTERMICO BORINQUEN

Sitio	Ruido Min	Ruido Prm	Ruido Max	Ruido Std
CAÑAS DULCES	36	39	43	65
CASA MAQUINAS BORINQUEN	33	44	68	65
HOTEL BORINQUEN	33	36	48	65
HOTEL BUENA VISTA	33	35	38	65
PGB-42	48	65	77	65
PLB-02	41	57	80	65
PLB-03	34	40	64	65
PLB-05	47	63	85	65
PLB-09	33	39	57	65
POBLADO BUENA VISTA	33	33	34	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

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	7.2
CG-BRQ --- QUEBRADA TENCHA (PBR11)	7.81	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	6.7
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	7.55	5.8	7.1
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	7.64	7.64	7.64
Total general	8.39	4.66	7.3

Geothermal Field	CG-BRQ
Monitored variable	Cond. (μ S/cm)

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS	210.9	97	157.1
CG-BRQ --- NACIENTE NAVARIT	245.4	148.9	184.6
CG-BRQ --- QUEBRADA GATA	348	115.4	218.6
CG-BRQ --- QUEBRADA TENCHA (PBR11)	263	74.5	144.7
CG-BRQ --- RIO SALITRAL	328	80.8	170.4
CG-BRQ --- RIO TIZATE	306.5	127.4	223.5
CG-BRQ --- TERMAL LOS PEDERNALES	185.9	138.7	161.6
CG-BRQ --- TOMA AGUA LAS LILAS	189	141.5	178.1
CG-BRQ --- TOMA DE AGUA PLB-02	432.3	70.6	134.4
CG-BRQ --- TOMA DE AGUA PLB-05	241.1	78.8	136.2
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	558	558	558
Total general	558	70.6	174.3

Attachment 2

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

Site	Max.	Min.	Avg.
CG-BRQ --- NACIENTE DOS QUEBRADAS	8	2.5	4.3
CG-BRQ --- NACIENTE NAVARIT	7.8	2	4.2
CG-BRQ --- QUEBRADA GATA	12.2	1.31	6.0
CG-BRQ --- QUEBRADA TENCHA (PBR11)	11.3	1.8	4.9
CG-BRQ --- RIO SALITRAL	27.94	2.41	6.6
CG-BRQ --- RIO TIZATE	16.1	5.2	9.1
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	3.04	4.7
CG-BRQ --- TOMA DE AGUA PLB-05	13.1	2.38	4.6
CG-BRQ --- LAGUNA DE ALMACENAMIENTO	7.69	7.69	7.69
Total general	27.94	1.31	6.0

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

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

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)	
	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 2022.					

Attachment 2

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, February and March 2021.

Group	State of conservation		
	CITES	IUCN	MINAE N° 40548- Regulations
Amphibian			
<i>Agalychnis callidryas</i>	II		RP
<i>Craugastor fitzingeri</i>			
<i>Dendropsophus microcephalus</i>			
<i>Engystomops pustulosus</i>			RP
<i>Leptodactylus savagei</i>			
<i>Lithobates forreri</i>			
<i>Lithobates warszewitschii</i>			
<i>Pristimantis ridens</i>			
<i>Rhinella horribilis</i>			
<i>Smilisca sordida</i>			
Birds			
<i>Amazilia rutila</i>	II		RP
<i>Amazilia saucerrottei</i>	II		RP
<i>Amazilia tzacatl</i>	II		RP
<i>Amazona albifrons</i>	II		RP
<i>Arremonops conirostris</i>			
<i>Arremonops rufivirgatus</i>			
<i>Basileuterus culicivorus</i>			
<i>Basileuterus rufifrons</i>			
<i>Brotogeris jugularis</i>	II		RP
<i>Burhinus bistriatus</i>	III		
<i>Buteo plagiatus</i>	II		RP
<i>Calocitta formosa</i>			
<i>Campephilus guatemalensis</i>			
<i>Campylopterus hemileucurus</i>	II		RP
<i>Cantorchilus modestus</i>			
<i>Cathartes aura</i>			
<i>Catharus ustulatus</i>			
<i>Chiroxiphia linearis</i>			
<i>Ciccaba virgata</i>	II		RP

Attachment 2

<i>Coragyps atratus</i>			
<i>Crax rubra</i>	III	VU	RP
<i>Crotophaga sulcirostris</i>			
<i>Crotophaga sulcirostris</i>			
<i>Crypturellus cinnamomeus</i>			
<i>Dendrocincla homochroa</i>			
<i>Empidonax flaviventris</i>			
<i>Empidonax virescens</i>			
<i>Eucometis penicillata</i>			
<i>Eumomota superciliosa</i>			
<i>Euphonia affinis</i>			
<i>Euphonia hirundinacea</i>			
<i>Euphonia luteicapilla</i>			
<i>Eupsittula canicularis</i>	II		RP
<i>Eurypyga helias</i>			RP
<i>Falco ruficularis</i>	II		RP
<i>Geothlypis formosa</i>			
<i>Geothlypis poliocephala</i>			
<i>Habia fuscicauda</i>			
<i>Henicorhina leucophrys</i>			
<i>Henicorhina leucosticta</i>			
<i>Herpetotheres cachinnans</i>	II		RP
<i>Hylocharis eliciae</i>	II		RP
<i>Hylocichla mustelina</i>			NT
<i>Icterus galbula</i>			
<i>Leiothlypis peregrina</i>			
<i>Lepidocolaptes souleyetii</i>			
<i>Leptotila verreauxi</i>			
<i>Megarynchus pitangua</i>			
<i>Melanerpes hoffmannii</i>			
<i>Mniotilta varia</i>			
<i>Momotus lessonii</i>			
<i>Morococcyx erythropygus</i>			
<i>Myiarchus nuttingi</i>			
<i>Myiarchus tuberculifer</i>			
<i>Myiarchus tyrannulus</i>			
<i>Myiodynastes luteiventris</i>			
<i>Myiozetetes similis</i>			

Attachment 2

<i>Nyctibius griseus</i>			
<i>Nyctidromus albicollis</i>			
<i>Onychorhynchus coronatus</i>			
<i>Pachysylvia decurtatus</i>			
<i>Parkesia noveboracensis</i>			
<i>Passerina caerulea</i>			
<i>Passerina ciris</i>			
<i>Passerina cyanea</i>			
<i>Patagioenas flavirostris</i>			
<i>Penelope purpurascens</i>	III		RP
<i>Peucaea ruficauda</i>			
<i>Phaethornis striigularis</i>	III		RP
<i>Pheucticus ludovicianus</i>			
<i>Piaya cayana</i>			
<i>Piranga rubra</i>			
<i>Pitangus sulphuratus</i>			
<i>Polioptila albiloris</i>			
<i>Psarocolius montezuma</i>			
<i>Pseudastur albicollis</i>	II		RP
<i>Psilorhinus morio</i>			
<i>Ramphastos sulfuratus</i>	II		RP
<i>Ramphocaenus melanurus</i>			
<i>Rupornis magnirostris</i>	II		RP
<i>Seiurus aurocapilla</i>			
<i>Setophaga petechia</i>			
<i>Sittasomus griseicapillus</i>			
<i>Streptoprocne zonaris</i>			
<i>Thamnophilus atrinucha</i>			
<i>Thryophilus pleurostictus</i>			
<i>Thryophilus rufalbus</i>			
<i>Tiaris olivaceus</i>			
<i>Tityra inquisitor</i>			
<i>Tityra semifasciata</i>			
<i>Trogon aurantiiventris</i>			RP
<i>Trogon melanocephalus</i>			
<i>Turdus grayi</i>			
<i>Tyrannus forficatus</i>			
<i>Tyrannus melancholicus</i>			

Attachment 2

<i>Vireo flavifrons</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>Ateles geoffroyi</i>	I	EN	EN
<i>Canis latrans</i>			
<i>Caluromys derbianus</i>			
<i>Cebus imitator</i>	II		RP
<i>Conepatus semistriatus</i>			
<i>Cuniculus paca</i>	III		
<i>Dasypus novemcinctus</i>			
<i>Puma concolor</i>	I		EN
<i>Sciurus variegatoides</i>			
<i>Tamandua mexicana</i>	III		
<i>Tapirus bairdii</i>	I	EN	EN
<i>Tayassu pecari</i>	II	VU	EN
<i>Dasyprocta punctata</i>	III		
<i>Didelphis marsupialis</i>			
<i>Didelphis virginiana</i>			
<i>Leopardus pardalis</i>	I		EN
<i>Leopardus wiedii</i>	I		EN
<i>Nasua narica</i>	III		
<i>Odocoileus virginianus</i>	III		
<i>Ototylomys phyllotis</i>			
<i>Potos flavus</i>	III		
<i>Proechimys semispinosus</i>			
<i>Puma concolor</i>	I		EN
<i>Puma yagouaroundi</i>	I		EN
<i>Tylomys watsoni</i>			
<i>Nyctomys sumichrasti</i>			
<i>Sylvilagus floridanus</i>			
<i>Pecari tajacu</i>	II		RP
Reptiles			
<i>Boa imperator</i>	II		RP
<i>Bothrops asper</i>			

Attachment 2

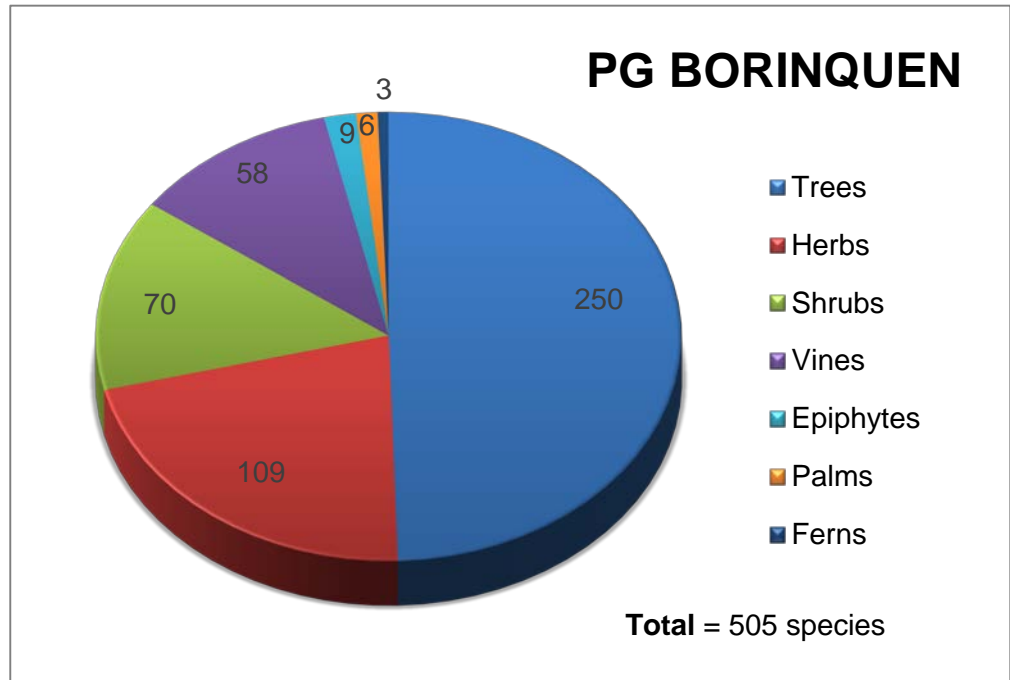
<i>Coleonyx mitratus</i>			RP
<i>Ctenosaura similis</i>			
<i>Holcosus festivus</i>			
<i>Holcosus undulatus</i>			
<i>Imantodes gemmistratus</i>			
<i>Leptodeira rhombifera</i>			
<i>Masticophis mentovarius</i>			
<i>Ninia sebae</i>			
<i>Norops biporcatus</i>			
<i>Norops cupreus</i>			
<i>Oxybelis aeneus</i>			
<i>Oxybelis fulgidus</i>			
<i>Senticolis triaspis</i>			
<i>Sphenomorphus cherriei</i>			
<i>Trimorphodon quadruplex</i>			
<i>Lepidophyma flavimaculatum</i>			
<i>Iguana iguana</i>	II		RP
<i>Basiliscus basiliscus</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. March 2021.
Bird monitoring

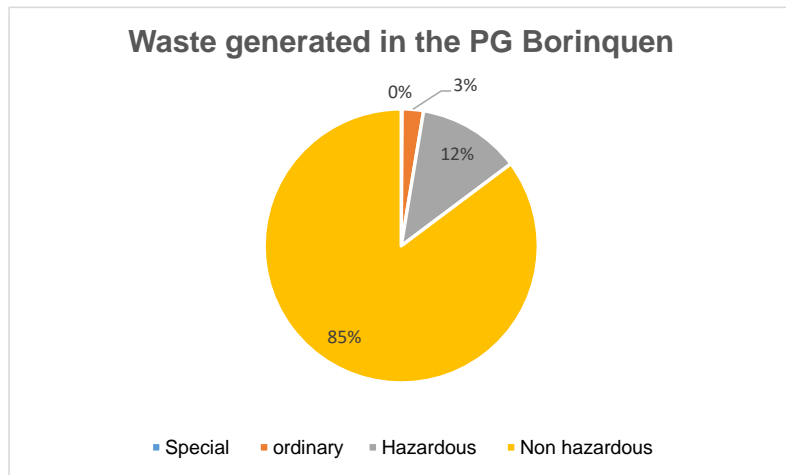


Distribution of flora species by habits registered in the Borinquen Geothermal Field. March 2014 – April 2021.



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

Period report January 2021 – March 2021



Waste	kg
Special	41.5
Ordinary	955.4
Hazardous	4617.1
Non hazardous	32399.7

*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).