CHAPTER 0

REVIEW OF THE ENVIRONMENTAL IMPACT ASSESSMENT

EIA OF THE CIELOS DE TARAPACÁ PHOTOVOLTAIC PARK

DECEMBER 2014

CHAPTER 0

EXECUTIVE SUMMARY OF PROJECT EIA

EIA OF THE CIELOS DE TARAPACÁ PHOTOVOLTAIC PARK

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1. DESCRIPTION OF THE PROJECT

The Project submitted to the Environmental Impact Assessment System (SEIA) is comprised of the construction and operation of a 600 MWac Photovoltaic Park named "**Cielos de Tarapacá**", located 75 km southeast of the city of Iquique, Pozo Almonte district, province of El Tamarugal, Tarapacá Region.

The Project will be built in 3 stages, which in turn will be carried out based on market conditions. The lifespan of the Project is indefinite as long as the necessary maintenance is carried out and depending on technological improvements that can be made.

This Project corresponds to one phase of the "Espejo de Tarapacá" seawater pumped storage hydroelectric plant project, submitted to the Environmental Impact Assessment System on August 18, 2014 with an Environmental Impact Study or Assessment (EIA) submitted to the Environmental Assessment Service of the Tarapacá Region.

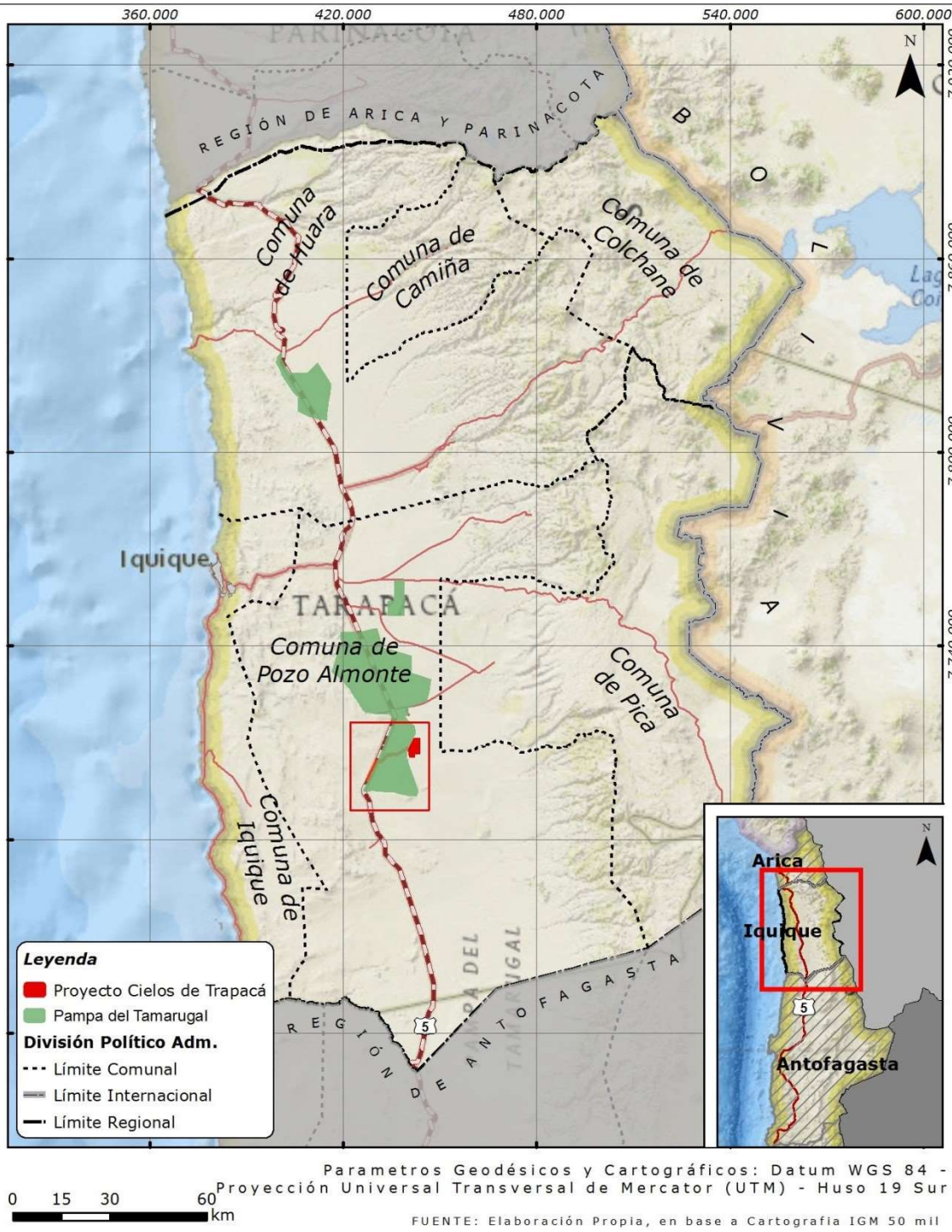
The Espejo de Tarapacá Project declared in its EIA that it projected, as part of its execution, a possible stage of energy generation with a photovoltaic park in accordance with the economic characteristics of the electricity market indicating its feasibility. It was explained that if this phase materialized, the environmental reporting format would be with an Environmental Impact Assessment, which would include a plan with the appropriate environmental measures to mitigate possible significant impacts that could be generated in this phase.

By way of reference, it is worth mentioning that the Espejo de Tarapacá Project consists of the generation of energy by means of a 300 MW reversible hydraulic pumping/generating power plant which utilizes seawater and also includes a High Voltage Transmission Line to the Lagunas substation where it will be connected to the Greater Northern interconnected System (Norte Grande Interconnected System or SING). This project, located approximately 100 km south of the city of Iquique, will capture seawater during the day by means of an underwater intake. This water will be pumped by means of three pump/generator units to a reservoir located on the plateau above the coastal cliff. Later, during the night, the seawater accumulated in the reservoir will be returned to the sea by gravity, using the same works and equipment that were used for capture of water and daytime pumping. In the discharge mode, energy will be generated by the water flowing through Francis turbines of 100 MW each.

This Project has a dual purpose in terms of energy generation as it will depend on the electric market conditions at a given time. On the one hand, it corresponds to a phase of the Espejo de Tarapacá Project, which was submitted to the Environmental Impact Evaluation System on August 18, 2014 with an Environmental Impact Study (EIA) submitted to the Environmental Evaluation Service of the Tarapacá Region. On the other hand, this Project is also designed to deliver all or part of the energy generated, to third parties or to the SING. In this sense, the aforementioned purposes are dynamic, since they will change according to the variations experienced in the electricity market over time.

The following figure shows a representation of the Project on the site where it would be located.

Figure 1. Location of the Cielos de Tarapacá Photovoltaic Park



1.1. Description of parts and physical works of the Project

The photovoltaic solar park consists of a series of modules connected to each other, which transform the energy of the sun into electrical energy. The electrical current provided by the photovoltaic modules is transformed into alternating current by an inverter, then from a transformer the voltage is raised to be coupled to the conventional grid.

The permanent parts and physical works of the Project, which make up a photovoltaic Park and its associated facilities, correspond to the following:

a) **Photovoltaic Modules (or solar panels)**: The photovoltaic module is made up of photovoltaic cells arranged side by side, connected in series/parallel, by means of electrical circuits connected to the positive and negative poles of the cells. The Project considers the use of photovoltaic modules, which will be of thin film photovoltaic technology, without prejudice to the fact that Crystalline Silicon modules could be used whose efficiency will not be less than that of their thin layer simile.

b) **Photovoltaic module table**: The photovoltaic modules are mounted on folding metal support structures. Approximately 20 photovoltaic modules can be mounted on each of these support structures. This structure together with the modules is called a "table".

c) **Follow-up system**: The tables, in turn, are mechanically fixed on a horizontal axis which is supported by four vertical metal posts. This structure is called "tracker".

d) **Inverters**: Equipment designed to transform the energy produced by the photovoltaic panel from direct current to alternate current. The inverter has a capacitor bank that corrects the power factor through a remote monitoring system that allows analyzing the different variables from a single controller.

e) **Transmission system (wiring)**: Direct current wiring. The wiring shall be buried. Alternate current wiring. The wiring inside the park will be buried in underground trenches.

f) **Booster Substation**: The Booster Substation allows boosting and controlling the voltage of the current that will be conducted through a 220 kV line to the Isolating Substation.

g) **Overhead Transmission Line**: From the Project's booster substation to the isolating substation, the energy will be conducted through an overhead line, through the 18 km distance that separate one from the other.

h) **Control facilities**: A monitoring and data-processing system will be installed to allow remote reading of update stored operating data.

1.2. Description of the construction phase

1.2.1 Main activities

During the construction phase, all the works for the implementation of the Project will be carried out, considering the temporary and permanent facilities.

The construction phase will last approximately 4.5 years during which the photovoltaic park will be built in 3 phases of 200 MW each (600 MW in total).

The construction of the first 200 MW implies a greater amount of works and/or actions, since it includes the installation of camps, jobsites (including storage warehouses for materials, wastes, lunch room, administrative offices, etc.), assembly of structures, installation of panels, underground wiring, construction of substations and high voltage overhead lines. The next two phases, of 200 MW each, include a smaller number of works and/or activities, since basically the assembly of structures, the installation of panels and underground wiring will be carried out. At the end of the construction of the third phase of the Photovoltaic Park, the jobsite and camp disassembly activities will be carried out, so as to leave the site in that sector in conditions similar to the situation without a project.

The construction phase will be developed in 3 phases, the works and/or activities per phase are detailed below:

Phase 1 (200 MW)

- Site preparation and access roads
- Installation of jobsite and camp
- Implementation of the network of connecting roads
- Installation of the perimeter fence of the Photovoltaic Park
- Implementation of areas for material unloading and storage
- Structural and electrical installation (panels and assembly of structures)
- Transmission line construction
- Substations construction
- Construction of control room and operations
- Connection tests

Phase 2 (+200 MW)

- Preparation of the site and access roads
- Implementation of the network of connecting roads
- Structural and electrical installation
- Connection and Start-up

Phase 3 (+200 MW)

- Preparation of the site and access roads
- Implementation of the network of connecting roads
- Structural and electrical installation

- Connection and Start-up
- Closure of the construction phase

1.2.2 Main supplies

Water: The water to be used for human consumption will be determined according to that indicated in the S.D. Nº 594/1999 of the Ministry of Health. Supply of 100 l/inhab/day will be considered for consumption in hygienic services and drinking water. The water for human consumption will be provided through drinking water tanks or purified water dispensers, which will be provided by a local company duly certified, complying with all physicochemical, radioactive and bacteriological requirements established in the regulations in force, which are defined in the Standard of NCh 409/1 Of.05 on drinking water requirements.

Based on the workers required for construction (considering 100 l/inhab/day), the requirement for drinking water for consumption, showers, washbasins and toilets on site will be 60,000 l/day during the peak period, for each of the phases of the construction phase (phases 1, 2 and 3), which implies that a storage capacity of 60 m^3 is required.

Electrical energy: For the construction phase the generator sets to be used are the following:

- One generator of 100 KW for camp.
- Two generators of 20 KW for jobsites installation.
- Ten generators of 5 KW for the work fronts.

Fuels: It should be noted that there will be a fuel storage warehouse on the jobsite where seven stationary, surface, horizontal and ASTM A- 36 steel tanks will be stored, certified by the Superintendency of Electricity and Fuels (SEC). Six (6) tanks shall have a capacity of 3 m^3 and one (1) tank shall have a capacity of 20 m^3.

1.2.3 Main emissions, effluents and wastes

The main emissions generated during this phase correspond to those of particulate matter, and are related to the earthworks associated with the construction and improvement of access to the Project area. Additionally, there will be gas emissions, product of the fuel combustion process for the machinery and generators to be used during this phase. They will be of a temporary nature, i.e., they will be generated only during the period of the works.

During this phase the Project will comply with current noise regulations (Supreme Decree No. 38/2011) in nearby receivers.

Waste waters will be generated as a result of the use of toilets, showers, and sinks for a maximum of 600 people, which, considering a provision of 100 l/person/day, will generate an effluent of 60,000 liters/day, which will be taken to a water treatment plant. The treated water will be used for wetting and for the preparation of the Bischofite mixture used to stabilize the roads during this phase.

It is estimated that a maximum of 18 tons/month of domestic solid waste will be generated in each phase of the construction phase. This calculation comes from an approximate maximum value of domestic waste generation of 1 kg/worker/day, considering a maximum of 600 workers/day. These wastes will be stored in plastic containers with lids that will remain closed to avoid the proliferation of sanitary vectors and/or odors.

Wastes will also be generated from the process of construction, assembly and unpacking of equipment, mainly waste wood, cardboard, plastics and metals. Containers will be provided on the different work fronts for the primary classification of wastes, which will then be classified according to their nature and disposed of temporarily in an industrial waste stockpiling yard in the jobsite installation sector.

The hazardous waste generated will originate from the various supplies used in the construction and maintenance of machinery in the Project area. They will be kept temporarily in properly labeled containers with lids. S.D. No. 148/03 will be complied with at all times in terms of transitory disposal, transport and final disposal.

1.3. Description of the operation phase

1.3.1 Main activities

A maximum of 20 people will work during the operation phase of the Project. The entire operation of the park will be commanded from the control room, from which the operation of the panels, trackers and substations will be controlled and monitored.
Photovoltaic modules do not require major mechanical maintenance. Periodic cleaning of the modules is required to rid them of dust, which reduces their efficiency; cleaning will be performed using water without any additive or detergent.

Substations, their equipment, and other facilities will receive regular inspections and periodic maintenance, as well as roads and fences.

1.3.2 Main supplies

Water: The operational phase of the Project will require the supply of drinking water for the consumption of operators and for the operation of sanitary facilities. Estimated average demand of water is estimated to be 100 liters per person per day, which must comply with the parameters of NCh N° 409 Of 2005.

Drinking water intended for consumption will be provided by dispensing machines equipped with bottles of 20 liters, a service that will be provided by a company that has the relevant permits.

For the process of washing the panels (cleaning of the modules), it has been considered that this process will be carried out four times a year, requiring 7,920 m^3 of demineralized water for annual maintenance, in the event that it is not feasible to implement dry cleaning.

The water will be purchased from suppliers with valid authorization to carry out this activity.

Electrical energy: The required electrical energy will be self-supplied during the day. At night, it will be supplied from the substation. A generator (10 MVA) to be installed in the elevator substation will be used to energize transformers and the high voltage line prior to start-up. It is estimated that it will be used for 1 month.

Fuels: The Project does not consider fuel requirements in the park during the operation phase.

1.3.3 Main emissions, effluents and wastes

It is expected that during the operation of the Project the emissions resulting from the combustion of vehicles and suspended particles will not be significant, since no constant emissions will be generated, only in the case of transport of maintenance personnel. It should be noted that the Project area is not located in a zone saturated by any type of contaminant.

The operation of the Project will include permanent sanitary facilities for the use of personnel; these facilities will consist of a toilet, washbasin and shower and they will be located in the operation and maintenance building. A modular aerobic digestion treatment plant will be used to treat the waste waters.

The only liquid waste that may be generated during the operation phase can come from the cleaning of the modules, which will be carried out two to four times a year with demineralized water without detergents. If soil and dust conditions allow, dry cleaning will be performed to reduce the need for water during module cleaning.

Solid wastes that can be assimilated to domestic wastes will be generated by the presence of people dedicated to the operation and maintenance activities required by the Photovoltaic Park and by some Project activities. A maximum generation of up to 1 kg/day/person is estimated.

The solid industrial waste generated during this phase of the Project will be originated by the replacement of parts and cables, among others, in very low quantities. These wastes will be disposed of temporarily at a specially designated site and then disposed of in authorized landfills or recycled, depending on the nature of the waste.

The same system established for the construction phase will be used for the stockpiling and management of solid wastes.

It is estimated that as a result of the maintenance and cleaning activities of the Project facilities, approximately 10 tons/year of hazardous wastes will be generated. The same system established for the construction phase will be used for the stockpiling, identification, and management of hazardous solid wastes.

1.4. Description of the closure phase

1.4.1 Main activities

The main activities would be:

a) De-energization of the Photovoltaic Park
b) Disassembly of the Photovoltaic Park
c) Disassembly of additional facilities
d) Cleaning of the site

The process of de-energizing the facilities is carried out by disabling the passage of energy to the entire circuit between modules and the interconnection substation. This disabling is carried out by switching off all the circuit breakers in the facilities. In addition to the above, it is required to disconnect the modules of the interface closest to each of them. The disconnection will be carried out according to the SING process and standard.

The final disposal and subsequent recycling of the solar modules will be carried out. This activity will be carried out by the company that manufactures the modules so they will be returned to the supplier.

When operations cease, all equipment and facilities used in the operation of the Project, such as containers, drinking water system, etc., will be disassembled and removed from the site for transfer, if appropriate, or final disposal at a site authorized for that purpose. Subsequently, an analysis of the occupied zone will be carried out to establish whether, due to the activities carried out, there are areas that require special cleaning.

2. BASELINE

2.1. Terrestrial Physical Environment

2.1.1 Climate and Meteorology

The study area is located in the climatic subtype Normal Desert Climate, with temperatures ranging from 11°C to 18°C, with a considerable daily thermal variance and precipitation levels not exceeding 0.0 mm in several months of the year, with an annual average of 1.3 mm. This, added to the scarce influence of water masses coming from the coast together with the inexistence of orographic precipitations, establish the condition of aridity in the zone. Additionally, relative humidity undergoes important variations during the day and the night fluctuating between 10% and 30% being able to reach 90% during early morning. Regarding wind, similar to relative humidity, these undergo strong changes between summer and winter months, with 4.2 m/s in summer and descending noticeably to 3 m/s in winter period.

Accordingly, the climatic statistics for the area indicate that both the local climate and the meteorological conditions provide a favorable situation for the development of the Project, by combining site characteristics of favorable temperatures, humidity and precipitation.

2.1.2 Air Quality

According to the records of the air quality monitoring stations Nueva Victoria, Victoria and Pozo Almonte, the daily average mean from the monitoring campaigns between 2003 and 2012 would be approximately 28.3 µg/m3N, which would not exceed the value limit established as a primary air quality standard of 150 µg/m3N for compound MP10.

In relation to MP2.5 particulate matter, although no monitoring data are recorded close to the Project, MP10 particulate matter can be distinguished in a coarse fraction and a fine fraction, where the latter considers particles of size less than or equal to 2.5 microns called MP2.5 (N°59/1998), so this compound would be represented by the records of the monitoring campaigns for MP10.

Given that the area close to the Project site does not record the implementation of major projects between 2013 and 2014 that could cause significant alterations to the baseline presented, it is possible to infer that the baseline would not present significant changes, so the representativeness of the data obtained in the monitoring campaigns from 2003 to 2012 could explain the present condition in air quality in the area directly involved with the Project.

2.1.3 Geology

The geological units present in the Project area consist of Miocene-Quaternary (MQs), Upper Miocene-Pliocene (MP1c) and Pleistocene-Holocene (Qa), which correspond to successive sequences of a sedimentary and depository nature caused by the accumulation of materials in the sector, mainly generating strata and sand fills that make up extensive plains. The origin of the detected materials corresponds, in a general way, to deposits produced by the dragging of matter either by fluvial or lacustrine cause.

According to the analyzed antecedents it is possible to conclude that the geological conditions of the study area present adequate conditions for the implementation of the Project.

2.1.4 Geomorphology

The Project area is located on a regional scale in the Pampa del Tamarugal area, while on a local scale the geoforms on which it is based correspond to sedimentation glacis and the Bellavista salt flats.

In general terms, it should be noted that the terrain is homogeneous from a structural point of view since most of the Project area is made up of low gradient slopes with low erosion patterns.

Following the above, it should be noted that according to the information gathered, the study area presents morphological characteristics favorable for the installation of the photovoltaic park, as well as for the high voltage line and electrical substations, being the structural conditions adequate for such purposes.

2.1.5 Hydrography

In the area under analysis, the dominant basins are of the Andean and pre-Andean type, with an endorheic character. In turn, the characteristic of these watercourses is that their

regimes are sporadic and intermittent, caused by rainfall in summer months due to the influence of the altiplanic winter generating the recharge of rivers and enabling the formation of surface runoffs.

The main basin corresponds to the Pampa del Tamarugal, whose sub-basin and sub-sub-basin have the same name. The closest ravines are the Tarapacá Ravine, more than 2 km south of the Project area, and Los Tambos Ravine, more than 5 km north of it.

In general terms, the presence of permanent watercourses is not evident, and based on this it is possible to infer that the hydrographic characteristics of the area associated with the Project present adequate conditions for its implementation.

2.1.6 Edaphology

The soil resource existing in the Project area is characterized, in general, as a soil that has limited changes in parental material due to low climatic intensity and remaining dry for long periods of years with very low vegetation cover.

In addition, the surface is covered by alluvial-colluvial deposits, product of processes of deflation and wind corrosion, forming a stony pavement, constituted mainly by angular lithic fragments.

On the other hand, it has fairly homogeneous soil characteristics, with a very narrow range of variation in its physical and morphological properties. The evolution or edaphological development is incipient and even non-existent, being qualified as a succession of sediment layers, classified as a class VIII soil of use capacity, which indicates that the soil has no agricultural, cattle or forest value, and its use is limited only to wild life, recreation or protection of hydrographic basins.

2.1.7 Natural Risks

Local analysis indicates that there is no risk of mass movement due to the existence of moderate to low slopes, coupled with mainly flat morphological conditions and almost no rainfall, indicating the low probability of occurrence of such phenomena.

With respect to the volcanic activity, both the location distance of the Project and the inactivity recorded in the sector are considered a low probability of volcanic risk, while for seismic activity, whose cause is due to plate tectonics, the probability of occurrence is greater, however the distance in relation to the coastline may reduce the associated risk.

Given the above, it can be inferred that the natural risks in the study area may show a low probability of occurrence appearing as an area suitable for the location of works.

2.1.8 Noise

The main sources of noise detected at the time of the measurements correspond to vehicular traffic on Route 5 and noise produced by wind interaction.

Based on the values obtained in the Baseline and the limits established in the D.S. Nº 38/2011 of the MMA for each point of evaluation, maximum permissible levels vary between 55 and 64 [dB(A)] for daytime and between 47 and 50 [dB(A)] for night-time. In the case of points selected for sensitive fauna, the maximum is 85 [dB] in both periods.

2.1.9 Electromagnetic Fields

The electromagnetic fields of the Project will not exceed those generated by the power lines of projects in the sector.

2.2. Terrestrial Biotic Environment

2.2.1 Flora and Vegetation

In the Project area, 2 vegetation units were recognized, which correspond to: Pajonal de Baccharis juncea and No vegetation, the latter being the unit that covers almost the entire area of influence of the Project with 99.998%.

Only one species (Baccharis juncea) of vascular flora native to Chile was identified during the trips made in the area of influence of the Project.

The conservation status of the recorded species was analyzed in accordance with the species listings of the species classification processes in accordance with Supreme Decrees (S.D. No. 151 of 2007; S.D. No. 50 of 2008; S.D. No. 51 of 2008, S.D. No. 23 of 2009, from MINSEGPRES; and S.D. No. 33, S.D. No. 41, S.D. No. 42 of 2011, S.D. No. 19 of 2012, S.D. No. 13 of 2013, and S.D. N°52 of 2014 of the Ministry of the Environment (MMA)) and in accordance with the Red Book of Terrestrial Flora of Chile (Benoit, 1989), without identifying any conservation category for the species in question.

It should be considered that the intervention of the Pajonal de Baccahris juncea is not subject to any of the regulations established by any environmental regulations in force, such as the Native Forest Law (Law 20.283).

2.2.2 Fauna

In the area of influence of the Project, four species of terrestrial vertebrates were recorded, corresponding to two species of birds and two species of mammals.

With respect to abundance, low species abundance was recorded in the Project area. In this sense, the most abundant taxonomic class was birds. Of which, 9 individuals corresponding to two species of birds (Red-necked Dormilona and Red-headed Jote) were recorded in only one sampling station (E30).

Thus, the results from the baseline study are consistent with that described in the literature, since the Project area corresponds to an absolute desert area with little presence of fauna.

As for the origin and endemism of the species, three species are native to Chile, however, none of these species is endemic to Chile. In terms of conservation status, out of the four

species registered in the study area, only one species has a conservation category and is a Fox species (Lycalopex sp.).

2.3. Human Environment

The area of influence of the Project was defined according to the possible affectations on cultural and identity roots that the human groups close to the Project could have. These human groups correspond to the towns of Victoria and Colonia de Pintados.

In this way, both towns were characterized, taking into consideration the five dimensions established in the Regulation of the Environmental Impact Assessment System (SEIA) as minimum contents of an EIA.

Regarding the Geographical Dimension, the town of Colonia de Pintados is composed of four subsectors, which are Tierra de Jehová, Juventud del Desierto, Nuevo Amanecer and Santa Cruz de Pintados. The one with the highest population density is the Tierra de Jehová sub-sector, which is also the service center of the four sub-sectors. It has an elementary school, stores, main church and entertainment, such as a swimming pool and children's playground, among others. In addition, it has a transportation system that passes three times a week and providing transport to Pozo Almonte and Pica. In addition, it has access to water and electricity, but no sewage.

Victoria, on the other hand, is a small town adjacent to Route 5, located on the southern boundary of the district of Pozo Almonte, inhabited by people who belonged to the Victoria saltpeter. This locality is oriented to deliver services of food, lodging, and fuel to the workers of companies that operate in the zone, such as SQM, Quebrada Blanca, and other smaller companies.

For more complex procedures and services, people need to go to Pozo Almonte. The town of Victoria does not have water or sewage, but it does have electricity. In addition, it has no children and its population has been migrating to other towns since 2002. It does not have transport and the only telephone connections are by means of cell phones.

The results of the geographic characterization show that there is no possibility of affectation in Colonia de Pintados or Victoria in relation to its accessibility, connectivity, access to services, or territorial distribution, due to the works or actions of the Project.

Regarding the demographic dimension, the results of the baseline show that no population was found in the areas adjacent to the area of influence. There is also no population using natural resources in the Pampa del Tamarugal area closest to the Project, i.e. Bellavista.

It is not observed that there is an affectation in relation to the demographic dimension of the population due to the works or actions of the Project.

As for the anthropological dimension, in Colonia de Pintados there is an indigenous

population that does not maintain traditional activities linked to its ethnic groups in a collective manner. There is no use of natural resources, traditional uses, festivities, rituals or sites of cultural significance within the Project area, or that may be affected by its works or actions.

In spite of the fact that for the definition of the area of influence the elements contained in letter d) of article 7 of the Regulation of the Current Environmental System, D.S. N°40 of the year 2013 were considered, and considering that there could exist a potential effect on the cultural roots due to the existence of cattle driver track, the interviews did not reflect a clear interest, as well as there were no claiming actions on them nor were rites, cults, protection actions or others identified.

Regarding the socioeconomic dimension, it can be observed that the productive vocation of Colonia de Pintados, including its four subsectors, is oriented towards the production of fruit and vegetables for sale to the main localities of the North, and livestock for self-consumption. They also sell water in a community way, and there is an orientation towards the mining boom in the young population due to the fact that it provides better salary and employability perspectives. The employed population is 40%, and 20% are looking for work. This is because there is a degree of informality in the work in the area.

In the case of Victoria, its employment composition has not changed since 2002, as it continues to be oriented towards services to nearby mining and construction companies. In this sense, all people have their own businesses, and the people who have been employed are almost all from abroad, and work in a restaurant in the area. It has been observed that there is a possible opportunity related to the development of tourism that can be taken advantage of by this locality.

It has been observed that there is no possibility of affecting the socioeconomic activities of Colonia de Pintados and Victoria due to the works or actions of the Project.

Finally, the analysis of the social welfare dimension showed that both the Colonia de Pintados and Victoria sectors do not have access to health within their locality, for which they must attend, in accordance with municipal dependence, the locality of Pozo Almonte. However, the people of Colonia de Pintados also attend the Pica medical center in case of emergency, due to the fact that it is a shorter distance and therefore a shorter travel time to receive the service.

With regard to education, Tierra de Jehová's sub-sector has a school that has up to eighth grade. Neither Colonia de Pintados nor Victoria have other educational centers. In the case of Colonia de Pintados, the children travel to Pica or Pozo Almonte to continue their studies, while in the case of Victoria, there were no children who might need educational services.
Colonia de Pintados in its four subsectors has well water, electricity, mobile phone, but no sewage. Victoria must buy water in Colonia de Pintados.

Connectivity and access to all of these assets is through Route 5 or within the locality, such that the works or actions of the Project will not affect them.

2.4. Cultural Heritage

The area where the Cielos de Tarapacá Photovoltaic Project will be located corresponds to a semi-flat terrain, associated with limited depressions and small natural mounds, interspersed with faint layers of salt with the abundant chusca (moon dust) of the place. The results of the archaeological prospecting allowed the identification of 85 heritage elements, between pre-Hispanic (n=11) and historical (n=74) evidence, detected in the two macro-sectors of the Project, represented operationally by the photovoltaic plant and LAT, which are commented below.

- Photovoltaic plant sector

The sector corresponding to the PV plant is located to the east of the Pan-American Highway, and is distinguished as a semi-flat space, with sporadic presence of salt and abundant chusca (See Figures 2.3 and 3.1 above). The results of the archeological prospection in the sector allowed identifying patrimonial elements of pre-Hispanic and historical chronology. The pre-Hispanic contexts correspond mainly to lithic dispersions that constitute isolated sites and findings, among which the following stand out (plates and flakes), andesite and exceptionally silica. These evidences account for initial phases of lithic roughing, reflecting local procurement tasks.

The historical evidence corresponds to eight isolated findings and 54 linear features. The isolated findings are represented by remains of historical rubbish, represented essentially by metal containers adapted for cooking, bottle fragments, and carcasses of domestic animals. These contexts are associated with linear features, where traces of the passage of wagons, paths related to pedestrian traffic, and cattle driver tracks, linked to the transfer of livestock.

- Transmission line sector and electrical substation

The area corresponds to a linear strip that starts from the polygon of the PV plant towards the west, joins the Pan-American Highway and extends parallel to the latter towards the south, to the Lagunas substation. The terrain is semi-flat and irregular, with salt predominating over the chusca.

Pre-Hispanic and historical evidence was recorded in the area. The former correspond to lithic dispersions, with a predominance of andesite debris, represented by flakes, a projectile tip fragment and a possible scraper. In four of these elements, historical evidence is also recorded, thus marking a bi-component condition.

The historical evidence corresponds to five sites, two isolated findings and five linear

features. The first corresponds to historical remains coming from productive and domestic activities, probably associated to saltpeter offices. Within the linear features there are traces of wagons, railway lines and telegraphs, which would also be associated with saltpeter activity.

2.5 Landscape and Scenic Resources

The local landscape, where the study area is inserted, is found in a desert landscape matrix, characterized by large areas without obvious use of the territory, this is combined with areas of the territory where human settlements are configured (for example, the oasis of Pica-Matilla), economic activities of mining exploitation (exploitation of caliche), road and electrical infrastructure and sectors of heritage and natural value (old saltpeter offices, natural reserves and archaeological sites).

The results of the landscape evaluation, and especially those related to the quality, fragility, visual absorption capacity and intervisibility of the landscape, are strongly moderated by:

Route 5: Visibility from Route 5 is close and direct to the transmission line, which tends to disappear as it moves away from the route and into the Pampa del Tamarugal. It is worth mentioning that currently there are power lines in the high-voltage line sector of the photovoltaic park that is close to Route 5.

Road to Quebrada Blanca: Visibility from this road is direct and close to the photovoltaic plant and its north access road. As in the previous route, visibility disappears as observers move away from the Project area.

Notwithstanding the foregoing, the landscape presents a low visual quality. This result is mainly explained by the conditions presented by the following elements of the landscape considered in the evaluation:

- The presence of low slopes;
- A moderate chromatic contrast; and
- Absence of singularities.

On the other hand, the factors that mainly affect the high value of visual fragility are fundamentally related to:

- Uneven slopes that facilitate visibility;
- Shape and size of visual basins; and
- Low landscape uniqueness.

2.6 Protected Areas and Priority Sites

The Project area is spatially related to protected areas, since the photovoltaic plant would be located immediately adjacent to the eastern limit of the Pampa del Tamarugal National Reserve. At the same time, the high voltage line crosses the Reserve in a sector where the soil corresponds to salt flats.

Meanwhile, the nearest priority site is located 52 km away and corresponds to "Punta Patache".

2.7 Tourist Attractions

The Project area is located within the Priority Tourist Area (ATP) "Salitreras y Oasis de Tarapacá", which does not include an official protection area, but it does correspond to an area of homogeneous characteristics, inasmuch as it is considered as a zone within the Pampa del Tamarugal that housed human settlements dedicated to mining, specifically nitrate extraction, generating an urban industrial complex that provided this zone of the country with singularity and history.

The district territory of Pozo Almonte presents tourist attractions related mainly to the natural and scenic resources (Salt Flats), historical (Painted Geoglyphs) and patrimonial (Saltpeter Offices).

There are currently 16 tourist attractions, two of which are close to the Project area; the Oasis Colonia Agrícola Pintados and the Bellavista Salt Flats located more than 2.2 km north of the Project.

In relation to the Project area, none of the regional tourist circuits (SERNATUR 2013) crosses the study area, the closest being Los Salares circuit, more than 25 km north of the Photovoltaic Park.

In relation to the Zones of Touristic Interest or ZOITs, the closest to the Project area is "Pica Salar de Huasco", which is located approximately 18 km northeast of the Project.

3. REQUIREMENT FOR THE PROJECT TO ENTER THE SEIA

The requirement for submitting the Project to the Environmental Impact Evaluation System (SEIA), is based on application of the following classification established in Article 10 of Law 19.300 and Law 20.417; and Article 3 of the Regulation of the Environmental Impact Evaluation System (DS 95/01 of the Ministry Secretariat General of the Presidency):

c) Power plants greater than 3 MW

Secondarily, according to letter b) of Article 10 of Law 19.300 and Article 3 of S.D. 40/2013 MMA, the Project following classification also applies:

b) High-voltage transmission lines and substations

Finally, considering that the development of the Project will require the construction and improvement of access roads and the construction of a high voltage transmission line (LAT), which will introduce artificial elements of anthropic origin, i.e., roads and structures (towers) and conductors from the LAT in a sector of the Pampa del Tamarugal National Reserve, the following classification applies:

p) Execution of works, programs or activities in national parks, national reserves, natural monuments, wilderness reserves, nature sanctuaries, marine parks, marine reserves, or in any other areas placed under official protection, where permitted by law.

4. ENVIRONMENTAL IMPACT ASSESSMENT

The following table summarizes the significant environmental impacts of the Project, for each of the environmental components evaluated, in the construction and operation phases.

Table 1. Summary of Significant Environmental Impacts of the Project

Environmental component	Code	Environmental Impact
Cultural Heritage		
Archaeological Heritage	PC-PAR-CON-01	Affectation and/or loss of the elements that define each archaeological site

5. MITIGATION, COMPENSATION AND MONITORING PLAN

The following table incorporates a summary of the impacts, as well as the environmental management plan, associated with the Cultural Heritage component:

Table 2. Cultural Heritage Environmental Management Plan

Associated Impact	Phase	Type of Measure	Specific Measure
PC-PHI-CON-01	Construction	Compensation	PM-PHI-01: Comprehensive recording of elements for conservation in historical context.
			PM-PHI-02: Collection of surface sites and historical isolated findings. Generation of historical restriction area.
PC-PAR-CON-01	Construction	Compensation	PC-PAR-01: Collection of surface sites and isolated findings.

Measure PM-PHI-01: Compliance shall correspond to the corroboration that the registration was completed. A report will be delivered to the Superintendency of the Environment and the Council of National Monuments (CMN) that details registration of heritage elements, with annexes presenting the files of each element and associated plans.

Measure PC-PAR-01: Compliance shall correspond to corroboration by submitting to the

Superintendence of the Environment and to the CMN a report stating that the findings and sites were recorded, collected, conserved, packed and shipped to the institution designated by the CMN, as defined in the corresponding plan.

6. ENVIRONMENTAL MONITORING PLAN

Monitoring of the measures associated with completion of the detailed registration of elements for their conservation in the historical context. (PM-PHI-01).

Environmental Monitoring Plan - Cultural Heritage Component – Confirmation of the Preparation of Detailed Registration			
Monitoring Plan		Medio:	Cultural Heritage
		Component:	Historical Heritage
		Project Phase:	Construction
Environmental impact	Impact **PC-PHI-CON-01**: Affectation on the elements that define each site, isolated finding or historical linear feature.		
Measures	*PM-PHI-01*: Detailed recording of the elements for their conservation in the historical context. Generation of historical restriction areas.		
Description of the monitoring measures	Measure PM-PHI-01 consists of: • Detailed recording of the external characteristics of each heritage element, through an ad hoc registration file that documents the location, architectural features and materiality. • Topographical survey of each element. • Photographic record of each element. • Preparation of historical review that contextualizes each element within the framework of saltpeter development in the region.		
Measuring parameters	For PM-PHI-01, the measuring parameters correspond to: • Verifying request for permit under PAS 132. • Corroborating detailed registration through document review. • Corroborating that the document meets all the objectives of the measure. • Approval of the Council on National Monuments.		
Location of control points	Not applicable		
Levels allowed according to standard	Not applicable.		

Committed levels	Not applicable.
Duration of follow-up	Duration of the follow-up to measure *PM-PHI-01:* • From the moment of the implementation of the protection measure until the approval of the report by the Council of National Monuments.
Frequency of follow-up	Frequency not applicable. Two follow-up milestones are considered: • Review of the report which confirms compliance with the measure • Approval by the Council on National Monuments (CMN).
Method (procedure)	Scheduling of the implementation of measure *PM-PHI-01*: • Submission of permit PAS 132. • Approval (CMN) for application of detailed registration measure. • Scheduling of site activities, definition of work team. • Exhaustive registration campaign; application of specialized registration form; topographical surveys and photographic registration. • Systematization of results and preparation of registration report. • Presentation before the CMN. • Approval by the CMN.
Inspection body	SEA – Council on National Monuments (CMN).
Deadline or frequency of submission of reports to the inspection body	Not applicable.

Measure follow-up: Surface collection of sites and historical findings. Generation of historical restriction area (Measure PM-PHI-02)

Environmental Follow-up Plan - Cultural Heritage Component - Confirmation of surface collection of historical sites and findings, and generation of historical restriction area.			
Follow-up Plan		Means:	Cultural Heritage
		Component:	Archaeological Heritage
		Project Phase:	Construction
Environmental impact	PC-PHI-CON-01: Affectation and/or loss of the elements that define each site or historical isolated finding.		
Measures	PM-PHI-02: Surface collection of surface sites and historical isolated findings. Generation of historical restriction area.		
Description of the follow-up measure	• Record the topographic point of each site and isolated findings through a survey with high resolution equipment. • Collect each element according to registration protocols and archaeological conservation. • Perform specialized analyses to complete the historical information associated with the Project area. • Fence in and install protective signs for site SH04/LAT.		
Measuring parameters	• Corroboration of the registration, collection, conservation, packing and shipment to the institution designated by the CMN, of archaeological sites and isolated findings. • Corroboration of fence installation and informative signs in SH04/LAT.		
Location of control points	Site SH04/LAT, around which an archaeological restriction area will be generated.		
Levels allowed according to standard	Not applicable.		
Committed levels	Not applicable.		
Duration of follow-up	From the moment of implementation of the collection measure until the delivery of historical materials to the institution designated by the CMN.		
Frequency of follow-up	The frequency will be directly related to the implementation plan for the measure.		

	Scheduling of the implementation of measure PM-PAR-01: • Inspection of the condition of historical isolated sites and findings prior to the implementation of the measure. • Recording and collection of historical elements. • Conservation and packaging of collected remains. • Installation of fencing and informative signs for protection of SH04/LAT. • Shipment of the collected remains to the institution designated by the CMN. • Preparation of reports with evaluation of the results of each phase.
Method (procedure)	• SEA – Council on National Monuments (CMN).
Inspection body	Not applicable.
Deadline or frequency of submission of reports to the inspection body	

Measure follow-up: Surface collection of archaeological sites and findings (Measure PM-PAR-01)

Environmental Follow-Up Plan - Cultural Heritage Component – Confirmation of surface collection of archaeological sites and findings, and generation of archaeological restriction areas.		
Follow-up Plan	Means:	Cultural Heritage
	Component:	Archaeological Heritage
	Project Phase:	Construction
Environmental impact	**PC-PAR-CON-01**: Affectation and/or loss of the elements that define each site or isolated archaeological finding.	
Measure	*PM-PAR-01*: Surface collection of archaeological sites and findings.	

Description of the monitoring measure	• Recording of the topographic point of each site and isolated finding through a survey with high resolution equipment. • Collection of each element according to registration protocols and archaeological conservation. • Performing specialized analyses to complete the historical information associated with the Project area.
Measuring parameters	Corroboration of the registration, collection, conservation, packing and shipment to the institution designated by the CMN, of archaeological sites and isolated findings.
Location of control points	Not applicable.
Levels allowed according to standard	Not applicable.
Committed levels	Not applicable.
Duration of follow-up	From the moment of the implementation of the collection measure until the shipment of the isolated archaeological findings to the institution designated by the CMN.
Frequency of monitoring	The frequency will be directly related to the implementation plan for the measure.
Method (procedure)	Scheduling of the implementation of measure *PM-PAR-01*: • Inspection of the condition of isolated archaeological sites and findings prior to the implementation of the measure. • Registration and collection of archaeological elements. • Conservation and packaging of the collected remains. • Shipment of the collected remains to the institution designated by the CMN. • Preparation of reports with evaluation of the results of each phase.
Inspection body	SEA – Council on National Monuments (CMN).
Deadline or frequency of submission of reports to the inspection body	Not applicable.

7. RISK PREVENTION AND ACCIDENT CONTROL PLAN

7.1 Preventive measures

The following general measures shall apply to all activities associated with the Project. In the event that the activity in question is carried out by a third party, requirements will be specified in contractual clauses. The necessary signs will be implemented to identify the risks present in the area, which will be in accordance with Chilean Regulations. Additionally, compliance with established safety measures will be informed with graphic signs. The stockpiling of wastes and materials will be carried out in an orderly manner in areas specifically designated for this purpose, which will have the necessary signs and safety measures to guarantee their safety and that of the workers. All the workers, in all phases, will be equipped with the personal protection equipment (PPE) that their activity requires, being mandatory at least the use of helmet, reflective vest and safety shoes in the area of work fronts. It will be mandatory that all outdoor workers apply sunscreen. The workload will be planned based on the capabilities of the personnel, considering the demand of the corresponding activity. The electrical zones will be properly fenced or confined and marked with signs, with exclusive access for authorized and adequately equipped personnel. Electrical works shall be carried out in accordance with sector safety regulations.

The assembly of electrical appliances will be carried out by qualified personnel, with certification if necessary. Thorough quality control will be carried out with regard to electrical structures and materials. Defective materials will be returned to the supplier. Drivers in charge of transporting personnel and materials will have valid licenses. The vehicles will have valid circulation permits and technical revisions and will be maintained periodically. Speed limits will be established for driving inside the premises and the speed limits of public roads used will be observed.

7.2 Accident control measures

The plant will implement an accident control system, which will be updated each time a contingency occurs, in order to analyze the causes and apply corrective measures in order to avoid a new risk situation.