Cielos de Tarapacá

# Chapter 1

# Project Description

## EIA Cielos de Tarapaca

November 2014

# Chapter 1

# Project Description

# EIA CIELOS DE TARAPACA

## Content

## Index of Tables

## Index of Figures

# 1 Introduction

The project submitted to the Environmental Impact Assessment System (SEIA) consists of the construction and operation of a photovoltaic park of 600 MWac Whose name is "**Cielos de Tarapacá**", located To 80 km southeast of the city of Iquique, Pozo Almonte commune, El Tamarugal province, Tarapacá region.

This project corresponds to one of the stages of the project of hydroelectric plant of pumping with seawater *"Mirror of Tarapacá"*, submitted to the environmental impact assessment system on August 18, 2014 through an environmental impact study (EIA) presented to the Environmental assessment Service of the Tarapacá region.

The project *"Mirror of Tarapacá"* Declared in his EIA preseeing, Within its execution, A possible stage of energy generation through a photovoltaic park conditioned to the economic characteristics of the electricity market indicate its viability. It was explained that to materialize this stage, the form of income would be through an environmental impact study, which would contain a plan of environmental measures appropriate to take charge of the possible significant impacts that would be generated at that stage.

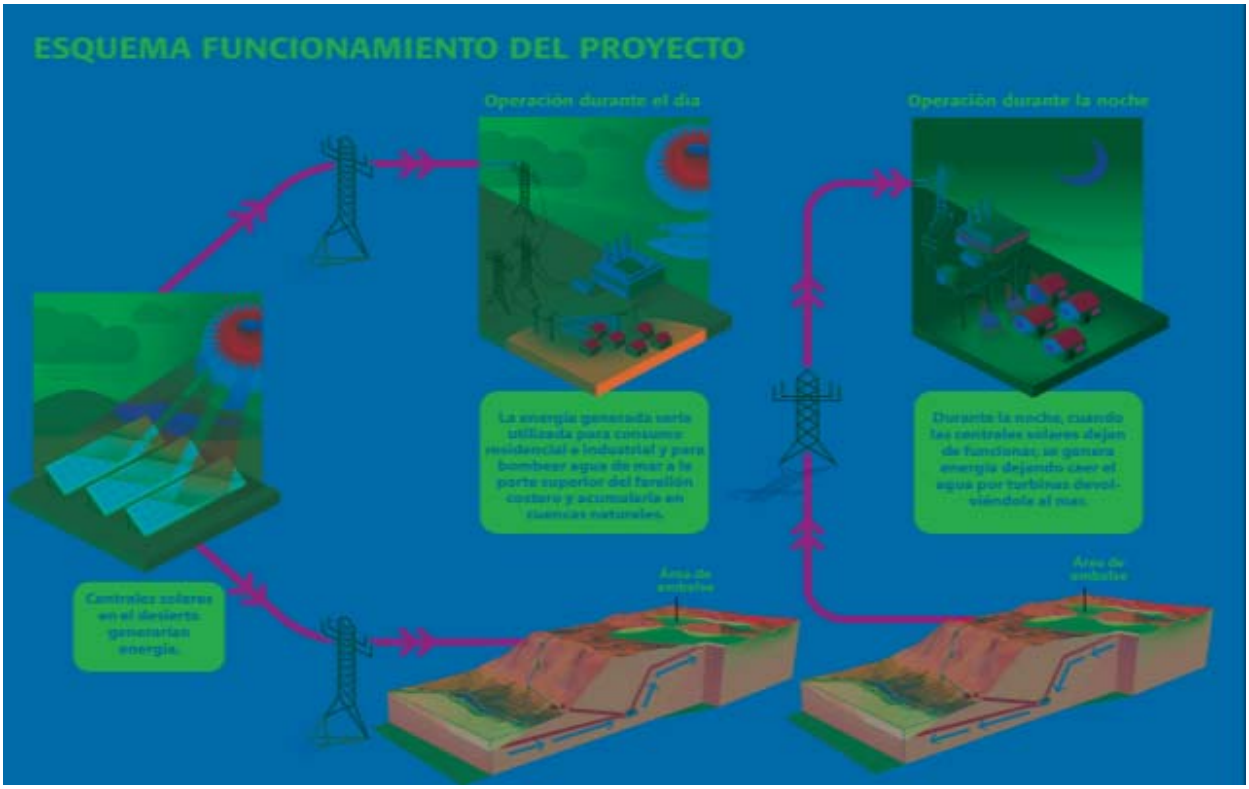
As a reference, it is worth mentioning that the project *"Mirror of Tarapacá"* It consists of generating energy through a reversible hydraulic pump/generation plant with seawater, of 300 MW of power. This project, is located in the coastal sector near Caleta San Marcos, about 100 km south of the city of Iquique and includes the line of electrical transmission of high voltage to the S/E Lagunas where it will connect to the interconnected system of the North large Sing. This project will capture seawater during the day through a work of underwater capture ESTA water will be pumped By The Three units Operating in the modality Pump To a reservoir located on the plateau on the coastal cliff. Later, during the night, The sea water accumulated in the reservoir will be returned to the sea by gravity, using the same works and equipment that were used in the capture and daytime pumping. At this stage of discharge is will generate energy by passing the water through the Units under the modality Turbine,

with a power of 100 MW each.

Regarding the project subject to this environmental impact study, the photovoltaic Park "**Cielos de Tarapacá**", Your Function Main is Give the necessary energy to make the project *"Mirror of Tarapacá"* Can pump seawater during the day and accumulate it in the reservoir, and also, Deliver energy Al SING To supply residential and industrial consumptions.

In The following figure Is Presents A scheme that Sample The concept of The relationship between The newly mentioned projects.

***Figure** エラー! 指定したスタイルは使われていません。**-1. Representative scheme projects Mirror of Tarapacá-Cielos de Tarapacá***




Source: Cielos de TARAPACÁ Spa

This project corresponds to the installation and operation of a photovoltaic park with an approximate power of 600 MW, installation and operation of a forklift substation at 220 Kv installation and operation of a substation SEccionadora and the construction and operation of a high voltage line of Double circuit in 220 Kv About 18 km long.

This project is positively related to The law for the promotion of non-conventional renewable energies (NCRE) (Ley 20.257/08 and 20.698/13), which requires that from the year 2010 the generating companies of our country, with an installed capacity exceeding 200 MW, must prove that a quantity of energy Equivalent to 20% of its withdrawals each year has been injected by means of non-conventional renewable generation, being able to be these own means or contracteds. This obligation would apply in the form

Gradual, being 5% for the Years 2010 to 2014 and gradually increasing to Reach 20% in the year 2025. This, in order to use sources of clean, sustainable generation, diversify the energy matrix and reduce dependence on imported fossil fuels. From the enactment of this Law, In the country it has experienced an explosive increase in ncre projects that enter the environmental impact Assessment System (SEIA), among which the most developed have been undoubtedly wind farms in the southern part of the country, and photovoltaic parks in the North Zone.

In this context, **Cielos de Tarapacá Spa**, comes to present to the environmental impact Assessment System (SEIA) its Environmental impact Study (EIA) for the photovoltaic park "**Cielos de Tarapacá**", whose design has considered environmental restrictions raised in field studies carried out early, in order to prevent and reduce the impact of the environment in the areas chosen for the implementation of the project.

Considering that the works and operations will be located only in the commune of Pozo Almonte, this EIA is presented in the service of Evaluación Environmental (SEA) REgión de Tarapacá, as indicated in article 9 of Law 19,300 and its amendment Ley 20,417.

In accordance with the provisions of Law n º 19,300, Law of general Bases of the Environment (amended by law N ° 20.417) and the DS N º 40/12 of the Ministry of the Environment, To Then it develops Article 18 (c) of the regulation of the Environmental Impact Assessment System (DS 40/2012), corresponding to chapter 1 of the present environmental impact study.

## 1.1 Owner ID

| | |
|---|---|
| **Social Reason** | Cielos de TARAPACÁ Spa |
| **R.U.T.** | 76.365.279-3 |
| **Business Spin** | Generation in other NCP stations |
| **Home** | Av. Presidente Errázuriz 3943, Las condes |
| **City** | Santiago |
| **Region** | Metropolitan |
| **Phono** | + 56 (2) 26538400 |

| | |
|---|---|
| **Legal representative** | Juan Andrés Camus Valdés |
| **R.U.T.** | 15.382.153-4 |
| **Home** | President Errázuriz 3943. Las Condes |
| **City** | Santiago |
| **Region** | Metropolitan |
| **Phono** | + 56 (2) 6538400 |
| **Email** | Jcamus@valhallaenergia.com |

In **Annex 1.1** Is They enclose the legal antecedents that give account of the representation of the company.

## 1.2 General background

### 1.2.1 Project name

Cielos de TARAPACÁ spa Presents the environmental impact assessment service Of the region of Tarapacá EL Project of "***Park Photovoltaic Cielos de Tarapacá ",*** In Adelante the project.

### 1.2.2 Brief description of the project

The project *"Photovoltaic park Cielos de Tarapacá "* Corresponds to a new project that It consists in the construction and operation of a photovoltaic park (PFV) constituted by Approximately 2.200.000 Photovoltaic modules per phase, Mounted on metal structures (photovoltaic tables). Each module grouping will be of a maximum power of 4,500 K:iW provides an approximate installed power of 600 MW, To provide Electric power to the hydro-electric pumping Central project with seawater *"Mirror of Tarapacá"* And the large North interconnected system (SING).

In this regard, the owner reports that the project *"Cielos de Tarapacá Photovoltaic Park"* It corresponds to one of the stages of a major energy project to be developed in the region of Tarapacá, which involves the following projects:

*i.* Project Reversible Hydraulic Power Plant *"Mirror of Tarapacá"* From 300MW. Presented to the SEIA through an environmental impact study, on August 18, 2014, currently under evaluation.

*ii.* Photovoltaic project *"Cielos de Tarapacá"*, from 600 MWac which in turn will run in three phases of 200 MW each and To be Introduces the SEIA through The present Environmental impact Study.

The energy generated in the Project in Evaluation (Photovoltaic Park) Be Received in A forklift substation, which Evacuated The energy At a voltage level of 220 Kv, and then be led to Through a high voltage line (LAT) of about 18 KM-length a The Substation Disconnect That on the one hand Corresponds

to the connection point with the project *"Mirror of Tarapacá"*, thus supplying energy to this project, and on the other hand it is connected to the substation Lagunas and with it to SING so it will also deliver energy to the network.

In summary, the project under evaluation consists of four main parts:

- Photovoltaic Park PFV, of approximately 600 MWAC.
- Substation ELeVar Is At 220 Kv.
- 220 high Voltage electrical transmission line (LAT) Kv and 18 Km approximately length.
- Disconnecting substation (SS Project Connection point *"Mirror of Tarapacá"*.

### 1.2.3 Objective of the project

The objectives of the project are as follows:

a) Main objectives:

A. 1 To build and operate a photovoltaic park with a maximum installed power of 600 MWac What, Combined with the hydro-electric Pump Project *"Mirror of Tarapacá"*, DeliveryRán Renewable energy 24 hours a day to SING.
A. 2 Generate Around 1.800 Gwh/AñOr, approximately, electric energy through the sustainable use of a source of ncre, in this case, solar energy.

A. 3 NocsBuild and operate a substation and LeVar To 220 Kv.

A. 4 Build and operate an electric transmission line of 220 Kv (High voltage line), approximately 18 KM long.

A. 5 NocsBuild and Operate a transmission system required for the evacuation of the energy that consists of a Substation SEccionadora that will allow the delivery of energy generated to SING and project *"Mirror of Tarapacá*. It will also be the point of connection with the project *"Mirror of Tarapacá"*.

b) Secondary objectives:

B. 1 Contribute to meet the growing energy demand, both industrial and residential in the country through the design, installation and operation of a photovoltaic park in the Comuna Pozo Almonte, Región of Tarapacá.

B. 2 Effectively contribute to the reductions in emissions of polluting gases ($CO_2$, $No_X$, $SO_X$), generators of the greenhouse effect, from the combustion of fossil fuels.

### 1.2.4 Typology of the project

The entry into the Environmental impact Assessment System (SEIA) is justified because the project corresponds to a power generation plant greater than 3 MW identified in the literal c) of article 10 of law 19,300, on the basis of the environment and its modification. In the same way and in accordance with article 3 of the DS 40/2013, the type of income falls into:

*Energy-generating power plants greater than 3 MW*

In a secondary way:

According to article 10 of law 19,300 and Art. 3 of the DS 40/2013, the project includes the following typology:

*c) High-voltage electrical transmission lines and their substations.*

*Execution of works, programs or activities in national parks, national reserves, natural monuments, reserves of Virgin areas, nature sanctuaries, marine parks, Marine reserves or any Another area placed under official protection, in cases where the Himrespective Gislación allow it.*

#### *1.2.4.1 Indication of non-modification of project or activity*

According to DS N ° 40/2012, regulation of the system of Evaluation of Environmental impact (SEIA), in its article 12, the project Cielos de Tarapacá submitted to evaluation through the present environmental impact Study is a new project and does not modify any project that has been submitted to the SEIA previously.

### *1.2.4.2 Indication of the development of the project in stages*

According to DS N ° 40/2012, regulation of the SEIA, in its article 14, the present environmental impact study should indicate if the project or activities the project Cielos de Tarapacá submitted to evaluation will be developed in stages. If the foregoing is effective, you must provide a brief description of the stages indicating your objectives and the reasons or circumstances on which it depends, the related works or actions and their estimated duration.

In this regard, this project was raised in Chapter 1, Title number 1.2.4.1 page 1-12 of the project EIA *"Mirror of Tarapacá"*, whose environmental assessment The SEA began on August 18, 2014; As a stage of power generation through a photovoltaic park of 600 MWac.

**Objective of the mirror stage of Tarapacá**

It consists in the development of an electricity generation project based on a hydraulic pumping plant with seawater of 300 MW in addition to the construction and operation of a high voltage power line of 65 km that will connect to SING in the substation Lagunas Exi Stent. The plant is underground and the water will circulate through tunnels, have a reservoir of approximately 375 ha of surface and 52 million of $M^3$ Capacity at a height of 608.5 M.A.S.L.

This stage would use part of the photovoltaic generation to pump seawater during the day and accumulate it in a reservoir from where it will be possible to return it to the sea and generate electricity in the hydraulic plant during the night taking advantage of the flow and height of Fall.

The project Espejo de Tarapacá is located in the region of Tarapacá in the provinces of Iquique and Tamarugal, in the communes of Iquique where It will be the hydraulic plant and in Pozo Almonte because a part of the line of high tension is located in this commune.

**Reasons or circumstances that depend on the stage**

The dependence on the implementation of this stage lies in technical and economic considerations that are currently unpredictable and of which their development depends in the future, such as:

I. Do not have technical problems for the feasibility of connecting a hydraulic pumping station In the S/E Lagunas Existing and owned by a third party and
Ii. The distance of the PUnto or customers for a power supply contract.

**Actions and works associated with the mirror stage of Tarapacá**

The Main Activities planned for the construction phase of this stage are as follows:

- Habilitation of slaughter facilities, roads and construction services.
- Transport of machinery and materials to the project area.
- Excavations and construction of tunnels, Cave of machines and underwater work.
- Construction of Pipeline Works.
- Membrane installation in the reservoir
- Construction of the high voltage electric transmission line
- Substation construction.
- Construction of control room and ancillary operations and installations.
- Connection and start-up.

For its part, the operation phase considers the following activities:

- Operation of LA hydraulic pumping station, its substation and the high voltage electric transmission line.
- Equipment Maintenance and support works.

The duration of the construction is estimated at 4.5 years, being able to do tests and eventually operate from the year 3.5. The lifespan of the project is considered indefinite as long as maintenance is carried out.

### 1.2.5 Estimated amount of investment

The amount of investment of the project *Cielos de Tarapacá* is from Approximately USD $1,000 Million

### 1.2.6 Project Lifetime

The useful life of the project is indefinite, this means that while there is a strategic and economic justification for the renovation of equipment, the photovoltaic park can continue to operate with the corresponding maintenance.

## 1.3 Location of the project

### 1.3.1 Political-Administrative division

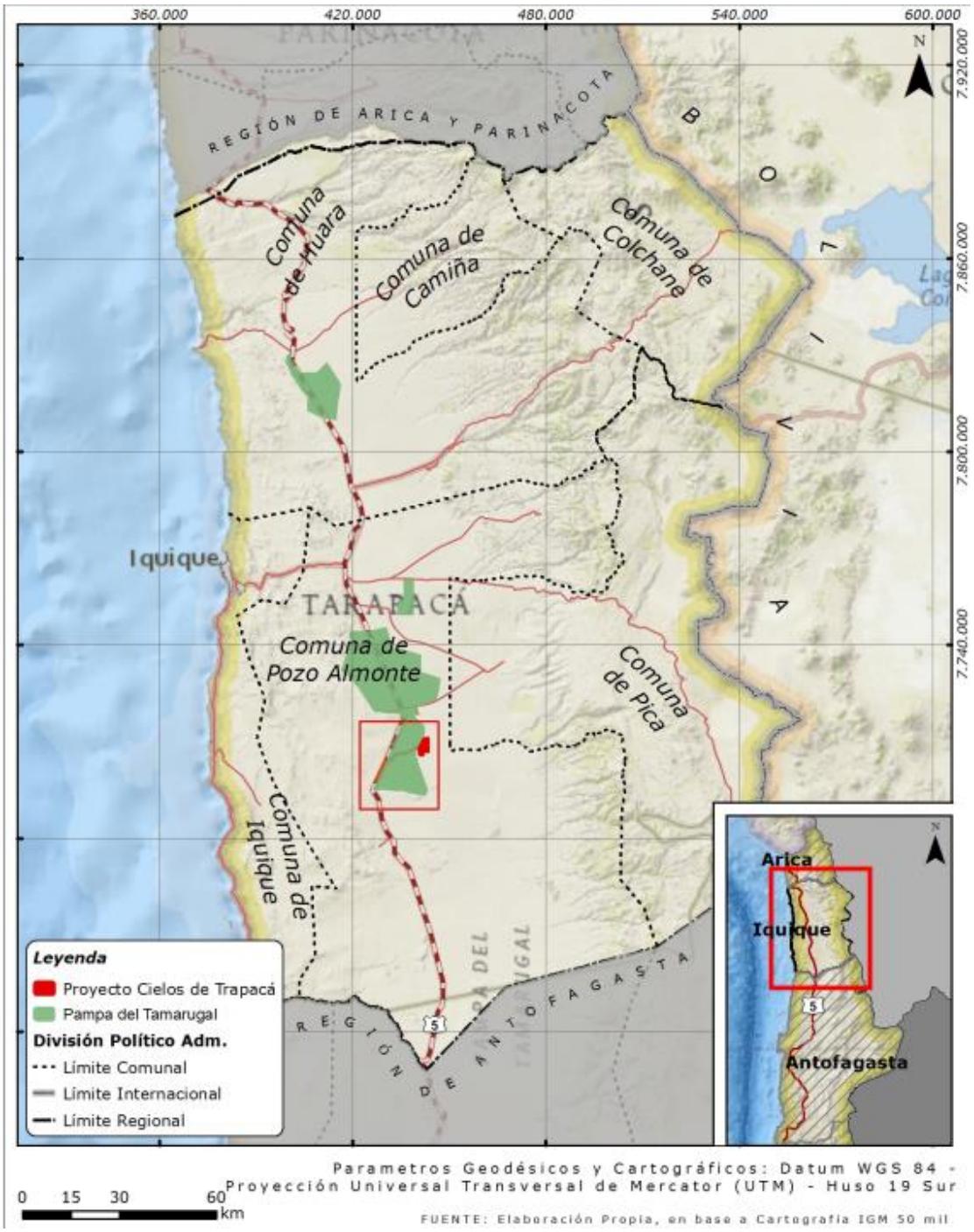
The project is located in the region of Tarapacá, El Tamarugal province, Pozo Almonte commune, at 53 km Of the urban area of Pozo Almonte and 88 km from Iquique.

The closest locality to the project is the town of Victoria, which is 8.5 Km, and then the Cologne Painted that is located 9 KmApproximately. The Rest Of the localities are more than 10 km from the project.

According to EL C Current Regulatory PlanOmuna de Pozo Almonte, the project is located in the rural area. Therefore, as provided in article 2.1.29 of the General Ordinance of Urbanism and Constructions, in the rural area the installations or buildings of energy infrastructure, sanitary or transport, are always understood admitted.

In the Figure エラー! 指定したスタイルは使われていません。-2 Se muThe general location of the PProject at Datum WGS84 Spindle 19:

***Figure** エラー! 指定したスタイルは使われていません。**-2. Park Location Photovoltaic Cielos de Tarapacá***




Source: Self-elaboration

### 1.3.2 Cartographic representation

The site area of the project is defined by the UTM coordinates that are presented in the table 1 for Photovoltaic Park, table 2 for LAT, 3 table for substation Lift and table 4 for the SUbestación SEccionadora.

Below In the Table 1, it is Present The coordinates corresponding to the photovoltaic park, as required by the RSEIA.

**Table 1. Photovoltaic Park coordinates Cielos de Tarapacá**

| Vertices | UTM coordinates (WGS 84-spindle 19) | |
|---|---|---|
| | This | North |
| To | 440,496 | 7,705,525 |
| B | 442,116 | 7,705,524 |
| C | 442,116 | 7,706,524 |
| D | 443,766 | 7,706,525 |
| E | 443,760 | 7,711,374 |
| F | 442,035 | 7,711,414 |
| G | 441,233 | 7,710,098 |
| H | 440,116 | 7,707,964 |

Source: Own Elaboration.

Then in the Table 2, The coordinates corresponding to the project's LAT are presented.

| Table 2. LAT coordinates | | |
|---|---|---|
| Vertices | UTM coordinates (WGS 84-spindle 19) | |
| | This | North |
| 1 | 427,229 | 7,698,493 |
| 2 | 427,707 | 7,698,671 |
| 3 | 430,373 | 7,704,290 |
| 4 | 431,716 | 7,704,191 |
| 5 | 433,461 | 7,706,112 |
| 6 | 436,838 | 7,706,679 |
| 7 | 440,010 | 7,708,382 |
| 8 | 442.382 | 7,708,382 |

Source: Own Elaboration.

Below In the Table 3**,** Is They present the coordinates corresponding to the elevator substation (SEE).

| Table 3. Elevator substation coordinates | | |
|---|---|---|
| Vertices | UTM coordinates (WGS 84-spindle 19) | |
| | This | North |
| 1 | 442,040 | 7,708,483 |
| 2 | 442,179 | 7,708,483 |

| Table 3. Elevator substation coordinates | | |
|---|---|---|
| Vertices | UTM coordinates (WGS 84-spindle 19) | |
| | This | North |
| 3 | 442,179 | 7,708,302 |
| 4 | 442,040 | 7,708,302 |

Source: Own Elaboration.

To Continuation in the Table 4, Is Present The coordinates corresponding to the sectional substation (SES).

| Table 4. Dissecting substation coordinates | | |
|---|---|---|
| Vertices | UTM coordinates (WGS 84-spindle 19) | |
| | This | North |
| 1 | 427,112 | 7,698,512 |
| 2 | 427,112 | 7,698,399 |
| 3 | 427,194 | 7,698,399 |
| 4 | 427,194 | 7,698,512 |

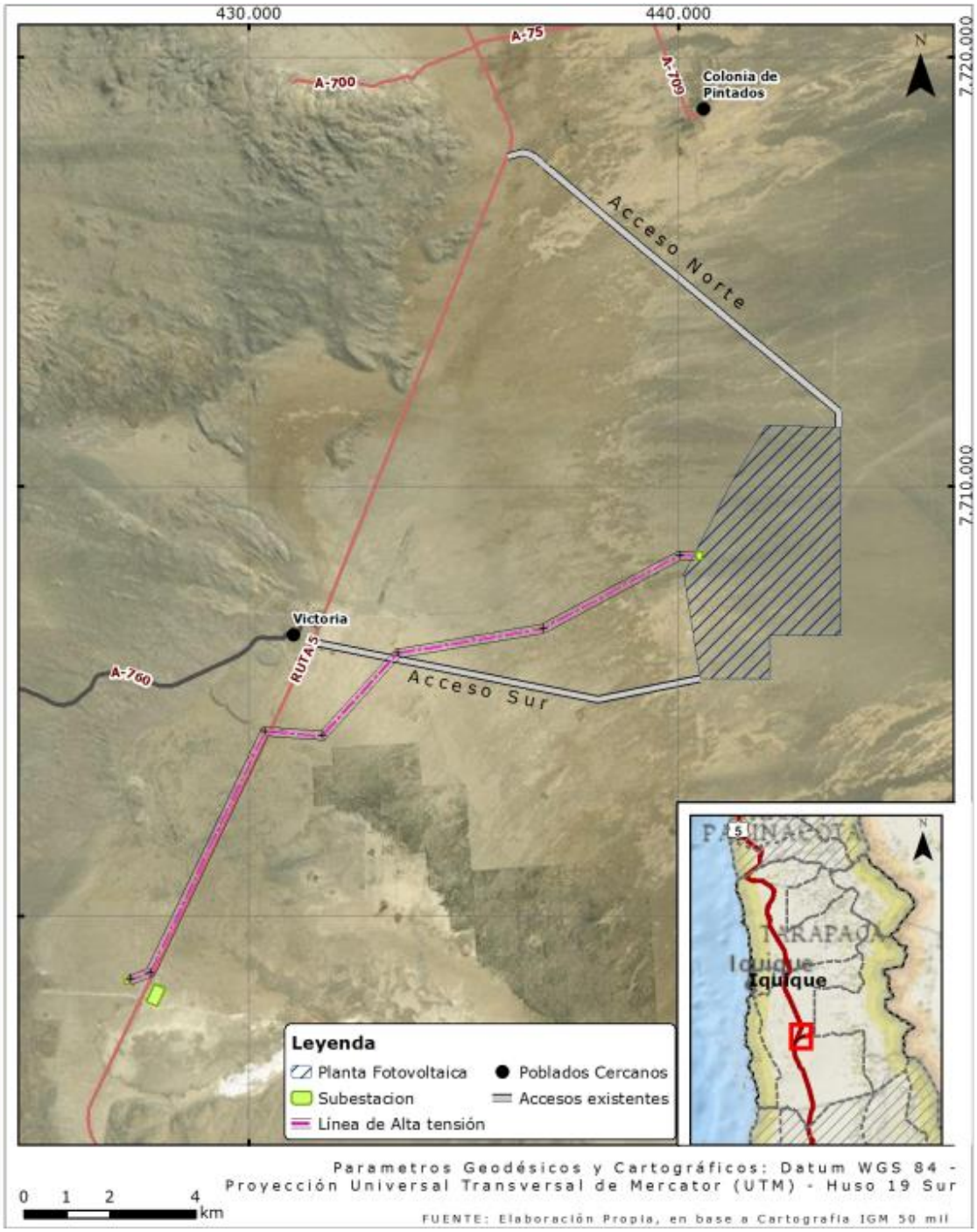
Source: Own Elaboration.

The transmission line begins its travel in the project, crossing the railroad line, in the National reserve Pampa del Tamarugal in a way Diagonal is presented parallel to an existing line and then crosses Route 5 north to continue south parallel to it in its last 6.3 km approximately. Finally, the line Comes To the

disconnecting substation.

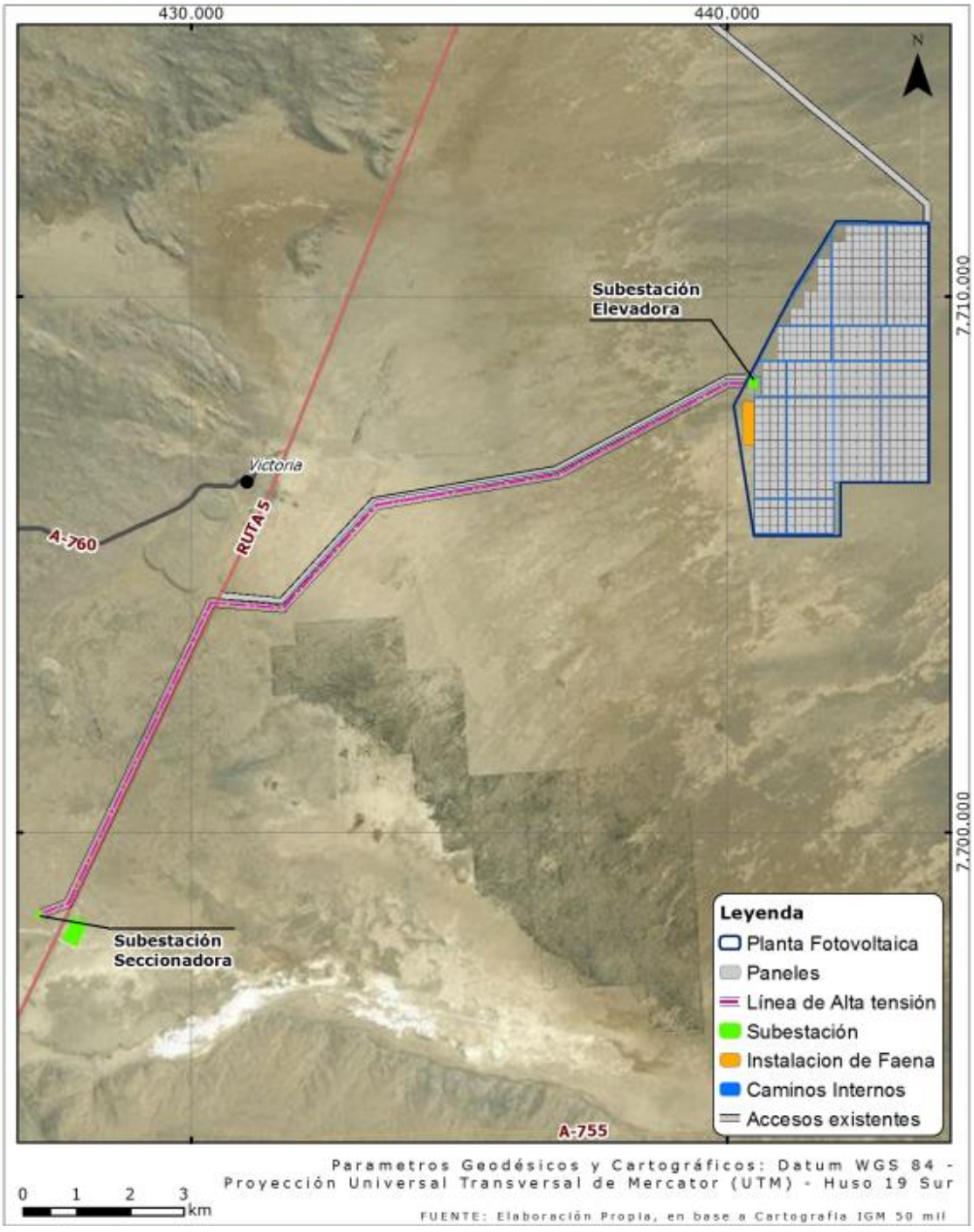
In the Figure Next, the area of direct occupancy is appreciated by the photovoltaic park's facilities and its associated works.

***Figure** エラー! 指定したスタイルは使われていません。**-3. Photovoltaic Park Location Cielos de Tarapacá***




Source: Self-elaboration

***Figure*** *エラー! 指定したスタイルは使われていません。* ***-4. IFacilities of the Photovoltaic Park Cielos de Tarapacá***



Source: Self-elaboration

In the **Annexes 1.2.1**, **Annex 1.2.2**, **Annex 1.2.3**, **Annex 1.2.4**, it is They present the plans corresponding to the park Photovoltaic, LAT, SUbestación Forklift (SUsa)And Disconnecting substation (Ses), Respectively.

### 1.3.3 Project surface

The project is at an approximate height of 1,000 M.A.S.L., it will occupy a total area of approximately 1.615 Ha for Photovoltaic Park and forklift Substation, an approximate total length of 18 KM for the transmission line (LAT), with a safety strip of 50 m (25 meters per side), and 4.24 ha for the case of the Disconnector substation.

The area of intervention of the project will be bounded by the surface where the works described below will be installed In the Table 5.

**Table 5. surface of the permanent installations of the project**

| Work | Surface (HA) |
|---|---|
| Photovoltaic Park area[1] | 1.615 |
| Transmission Line (18 km) and security strip of 50 m | 90 |
| Forklift Substation | 2,51 |
| Disconnecting substation[2] | 4,24 |
| External roads[3] | 14,80 |
| **Total** | **1.726.55** |

[1]Includes photovoltaic modules and their supporting metal structures, roads Internal, elevator substation and installation of slaughter North.

[2]Includes the South Slaughter facility

[3]Composed of the two access roads, north and south, and a width of 7 m. Most of them will be placed on the existing footprint.

In addition To Then In The Table 6 is indicated To The surface to be occupied

by the temporary works of the project.

| Table 6. Surface of temporary project installations | |
|---|---|
| **Work** | **Surface (Ha)** |
| Installation of tasks North | 1630 |
| Installation of tasks South (S/E sectioning) | 0.09 |
| **Total** | **16.39** |

Source: Self-elaboration

### 1.3.4 Access roads to the project

To access the terrain of the future photovoltaic complex, there are two access roads.

- North Access: Via Route 5, from an existing detour located 2.7 kilometers south of route A-75. In this detour you have to turn east along the route that goes towards Quebrada Blanca, in which you will find the path to the project, About 10 kilometers, turning south.
- South Access: You arrive on a road from the former Victoria office, located at 300 meters approximately south of the junction with the route A-760, heading east. Advanced 9 km, approximately, towards the north, by this route you will find the South access to the installations of the Cielos de Tarapacá Photovoltaic Park.

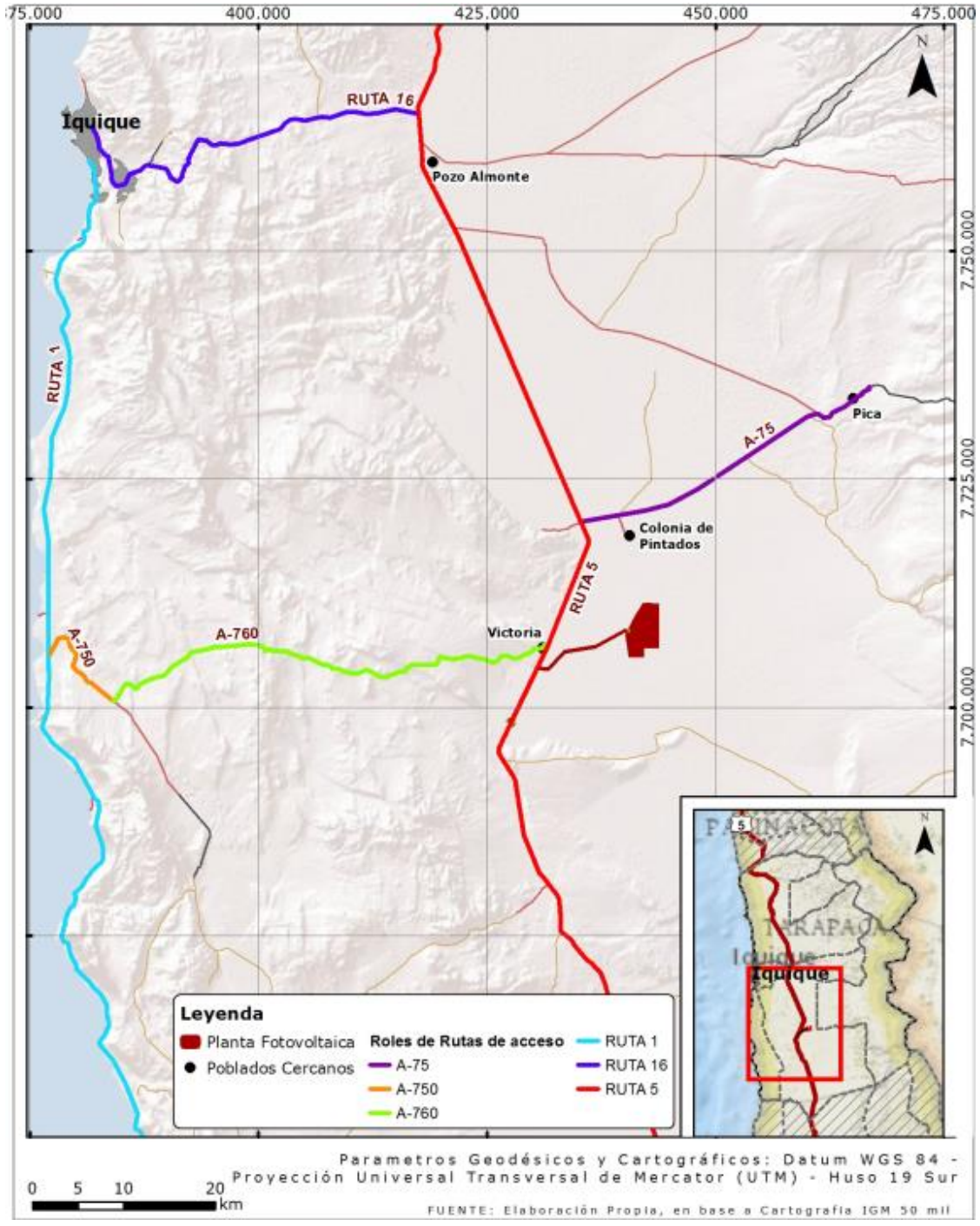
The coordinates of both access are presented in The Table 7, While the Cartographic representation is presented in the Figure エラー! 指定したスタイルは使われていません。**-5** of this chapter.

| Table 7. Coordinates of Crossing the road with a roadsCceso to the project WGS 84 Datum19 S | | |
|---|---|---|
| **Access road** | **UTM East** | **UTM North** |
| North Access | 443,629 | 7,711,377 |
| South Access | 440,498 | 7,705,561 |

Source: Own Elaboration.

In the **Annex 1.2.5** Attached plane corresponding to access roads ToL Project.

***Figure*** *エラー! 指定したスタイルは使われていません。* **-5. Access roads to the project**




Source: Self-elaboration

### 1.3.5 Justification of The location of the Project

This photovoltaic park will deliver energy, clean, renewable and emission-free, to the interconnected system of the Norte Grande of Chile (SING), Contributing to the Availability Energy in this area, and helping to meet the state's objective of increasing the percentage of electric energy from non-conventional renewable energies Ncre In the power supply matrix. It should be recalled that this project corresponds to the second stage of the hydro-electric pumping Central Project *"Mirror of Tarapacá"*.

On the other hand, the justification for the location of the photovoltaic park was determined, mainly for the following reasons:

i. Favorable results of solar radiation corroborated by monitoring of the National Energy Commission and the German Technical cooperation (GTZ), within the framework of the project *"Non-conventional renewable energies"*. These solar radiation values are within the highest in the world, which justifies the installation of a solar park in this area

ii. It is close to the energy demand centers.

iii. Topographical conditions make the site ideal for the emplacement of photovoltaic modules.

The above, Together with the availability of terrain, it allowed to determine that the place is optimal for the location of the photovoltaic park, since in terms of generation of energyOlogy demonstrates a high potential And it is also close to SING's electric transmission lines and high energy consumption centers.

## 1.4 Description of parts, actions and physical works of the project

The Project It consists in the installation and operation of a photovoltaic park of a maximum power of 600 MWac, The Installation and operation of a SubEStation Forklift To 220 Kv, The Construction and operation of a line of ToLta TEnsion of 220 Kv, of approximately 18 Miles long, and the Installation And operation of a SubEStation Disconnector. The 600 MWac They will be implemented in three phases of 200 MW each.

The Cielos de Tarapacá Photovoltaic Park, considers works of the Following Type:

- Works Main, which are indispensable for the generation and transmission of electric power.
- Works Temporary Are The works IndisThinkable for construction that have a temporary character and its duration says relation with the duration of the construction stage.

In short, the projectOr under evaluation is made up of five Works Main Permanent:

- Photovoltaic Park.
- Forklift Substation (SEE).
- High Voltage electric transmission line (LAT).
- Disconnecting substation (connection to the project *"Mirror of Tarapacá"*).
- Roads.

Within the temporary works, the project considers two facilities of slaughters.

### 1.4.1 Park Photovoltaic

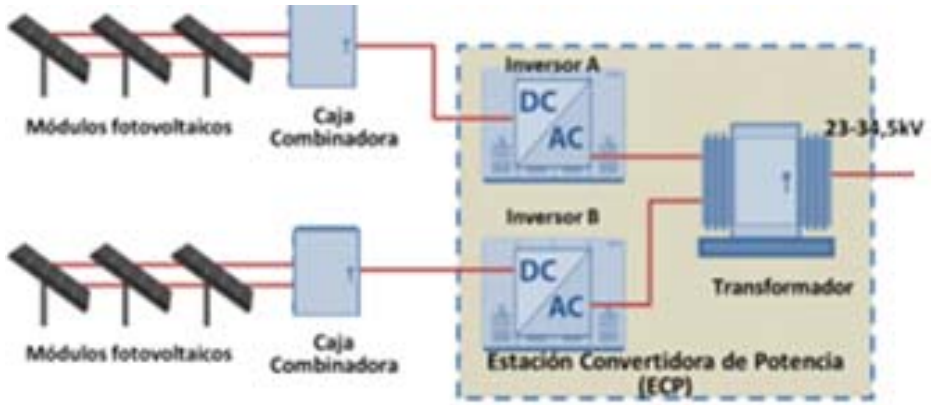
The following describes the components of the photovoltaic park:

1) Arrangements (Elements of the generation: photovoltaic modules, tables and followers. Transmission and conversion elements: boxes Combination Plates and station Converting Power (ECP))
2) Underground wiring
3) Switch Boards (PVCS)
4) Aerial wiring
5) Weather Stations
6) Surveillance booths
7) Control and Communication Building
8) Operation and Maintenance
9) Internal roads
10) Perimeter fencing

#### *1.4.1.1 Arrangements*

The Project Counts CoN three phases of 200 MW each A And Each One of these phases consists of approximately 50 arrangements. In the Figure エラー! 指定したスタイルは使われていません。-6 The general outline is shown of an arrangement.

***Figure*** *エラー! 指定したスタイルは使われていません。* ***-6. General outline of an arrangement***




Source: Cielos de TARAPACÁ SpA

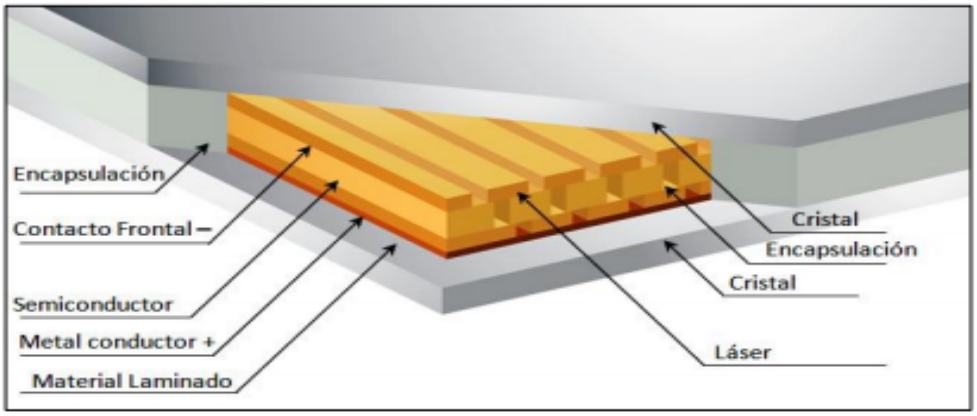
The constituent parts of the arrangements are described below.

### *i. Photovoltaic modules*

For each Arrangement will be needed Approximately 44,640 Modules Photovoltaic, which will be of thin-film photovoltaic technology (*Thin Film*), without prejudice to the use of crystalline silicon modules Whose efficiency will not be less than its thin-layer simile. The technical specifications of the modules are Attached in EL **Annex 1.3** Of Present Eia.

The Next Figure Mur a Scheme Thin-layer Modules.

**Figure** エラー! 指定したスタイルは使われていません。**-7. Thin-layer Solar module (Thin Film)**




Source: Cielos de TARAPACÁ SpA

### *ii. 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 along with the modules is called A "table".

### *iii. Follower*

The tables, in turn, are fixed mechanically on a horizontal axis which is supported by four vertical metal poles. This structure is called A "follower" (see Figure エラー! 指定したスタイルは使われていません。-8 And Figure エラー! 指定したスタイルは使われていません。-9).

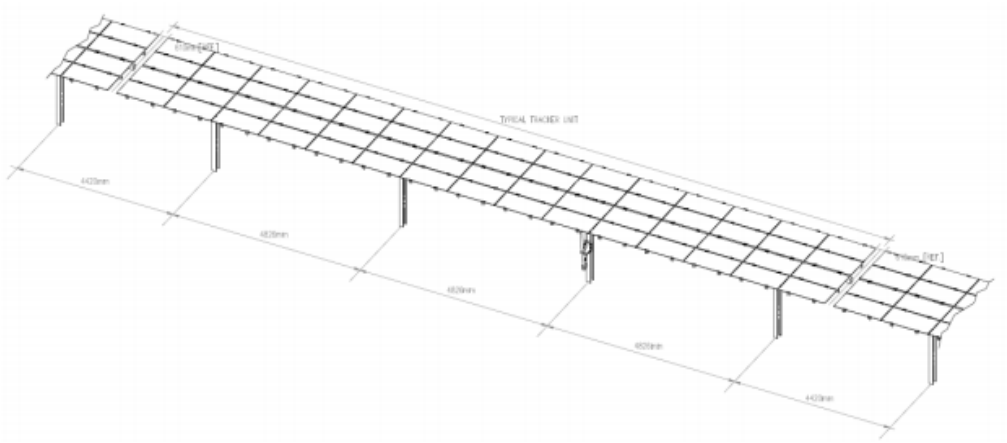
For each arrangement are considered Approximately 744 followers.

Each follower can hold three tables of modules to make Around Of 60 modules By SFollower. The Modules of each SFollower They will be connected through low voltage DC cables fixed to the structures.

**Figure** *エラー! 指定したスタイルは使われていません。* **-8. Support System**

Source: Cielos de TARAPACÁ SpA

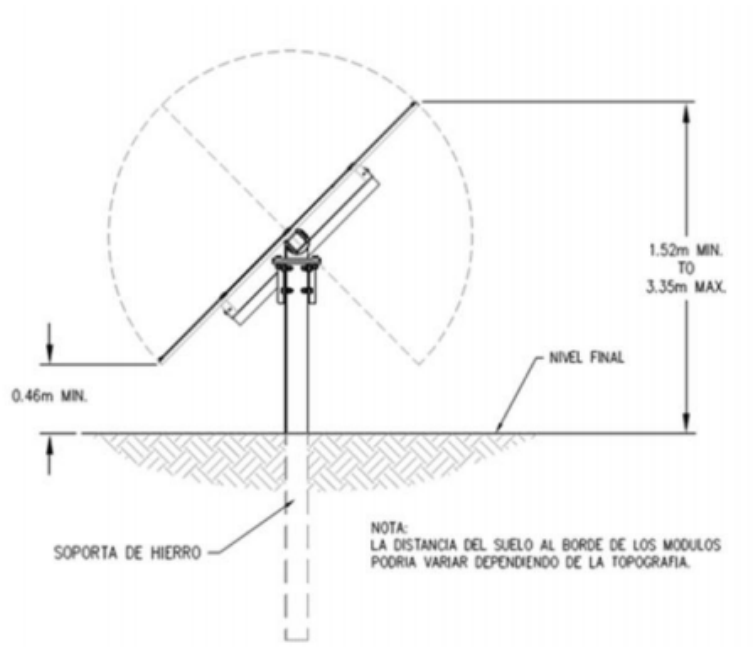
**Figure** *エラー! 指定したスタイルは使われていません。* **-9. Typical follower isometric view.**



Source: Cielos de TARAPACÁ SpA

The highest point of each follower With respect to the ground, It is obtained during the morning and afternoon hours, when the followers are inclined at their maximum angle. In this position, a top end of the panel can be Get to be toApproximately To 3 m from the surface (see Figure **エラー! 指定したスタイルは使われていません。**-10). When the panels of photovoltaic modules are horizontal, more or less parallel with the ground, the average height of the follower with respect to the surface, will reach The 2 m.

***Figure*** *エラー! 指定したスタイルは使われていません。* ***-10. VSide Ista of typical follower.***




Source: Cielos de TARAPACÁ SpA

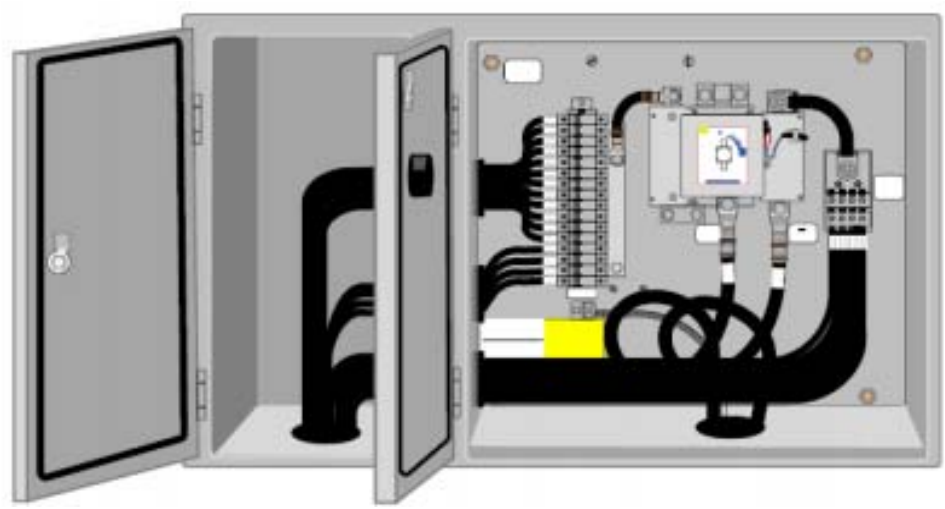
The vertical support elements (poles Metal) Of the followers consist of bases that Preferably Be Standing in the field. When for technical reasons the poles can not be piles, Will be buried Stands On piles or micro piles of concrete.

### *iv. Combo boxes*

Each arrangement has combo boxes. The electricity in direct current generated with the modules of each follower will be collected through one or more combo boxes. The Combiner box Adds The direct current from several followers Cables that will be connected underground or directly (depending on the proximity to the box combiner).

Here is an example of a typical combine box figure.

**Figure** エラー! 指定したスタイルは使われていません。**-11. Combo box**



Source: Cielos de TARAPACÁ SpA

### *v. Station CPower Onvetidora (ECP)*

The electricity grouped in each combo box is Transmitted to an inverter located in the Power Converter Station (ECP).

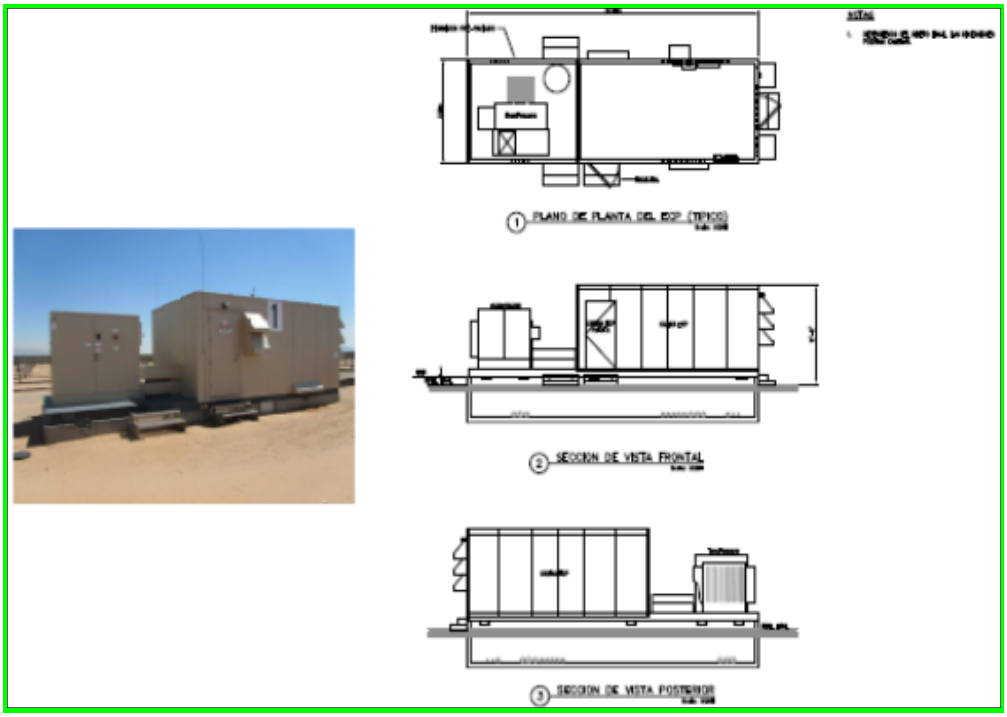
Inverters will convert DC power to low-voltage AC (AC) power.

Subsequently, the inverters are connected to transformers that raise the output voltage to medium voltage (MT), approximately 33 KV.

Each ECP has equipment to communicate wirelessly with the following units, in order to Control the operation and detect any anomalous condition. ECP also has emergency power supply (Consisting of a UPS of approximately 1.9 kVA using maintenance free sealed lead acid batteries) Enough to rotate the followers to their resting position in the case of strong winds and loss of main electrical connection.

In the Figure **エラー! 指定したスタイルは使われていません。-12** is displayed A photo and a LOh-Typical out of a power converter station.

**Figure** エラー! 指定したスタイルは使われていません。**-12. Typical ECP Power converter station**




Source: Cielos de TARAPACÁ SpA

From the ECP, where the current is transformed into alternating current, medium voltage cables (MT) come out that run underground to the Photovoltaic Combinning Switchgear (PVCS).

### *1.4.1.2 Wiring Underground*

From the ECP, where the current is transformed into alternating current, medium voltage cables (MT) come out that run underground to the Photovoltaic Combinning Switchgear (PVCS).

### *1.4.1.3 Boards of switches: Photovoltaic Combinning Switchgear (PVCS)*

The output current of each transformer will be added in Plant switches called PVCS (PhotoVoltaic Combinning Switchgear).

The PVCS are are connected in parallel with the feeder circuit of the plant, which in turn will be connected to the plant substation

In the Figure エラー! 指定したスタイルは使われていません。**-13** is displayed, as a reference, a picture of a PVCS Booth.

***Figure*** *エラー! 指定したスタイルは使われていません。****-13. Station PVCS TípicTo***

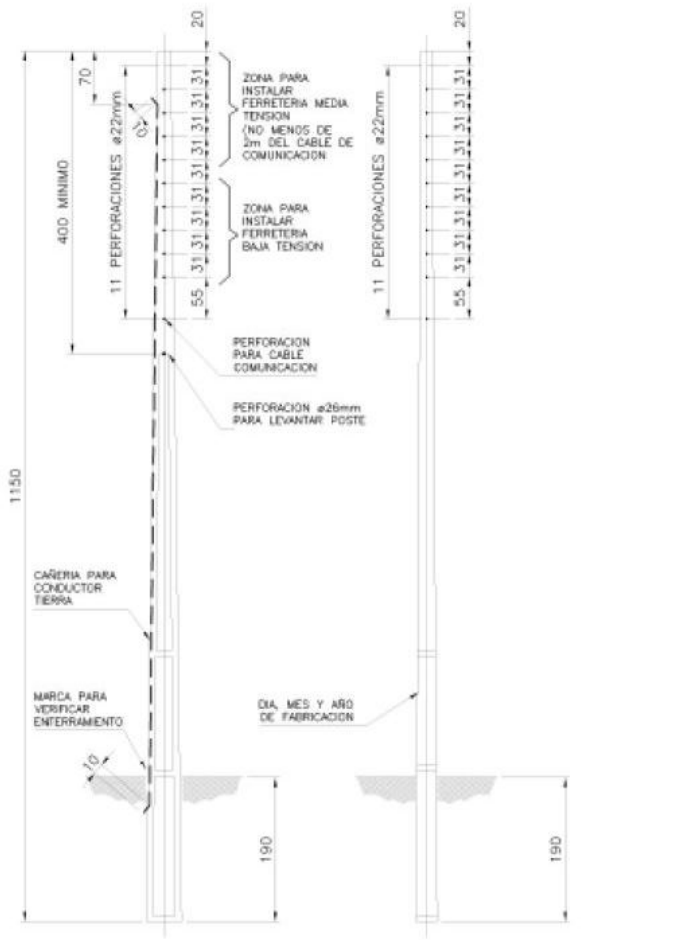

Source: Cielos de TARAPACÁ SpA

From the Photovoltaic Combinning Switchgear (PVCS) begins the line of Average Air tension (Alternating current), which runs through the interior of the park to reach theBestación Elevator.

### *1.4.1.4 Wiring Air*

From the Photovoltaic Combinning Switchgear (PVCS) begins the line of medium tension MT Which runs through the interior of the park until it reaches the elevator substation of the Park. In the Figure エラー! 指定したスタイルは使われていません。-14 A MT post is shown as a reference.

**Figure** エラー! 指定したスタイルは使われていません。**-14. Scheme of Pole MEdia tension**



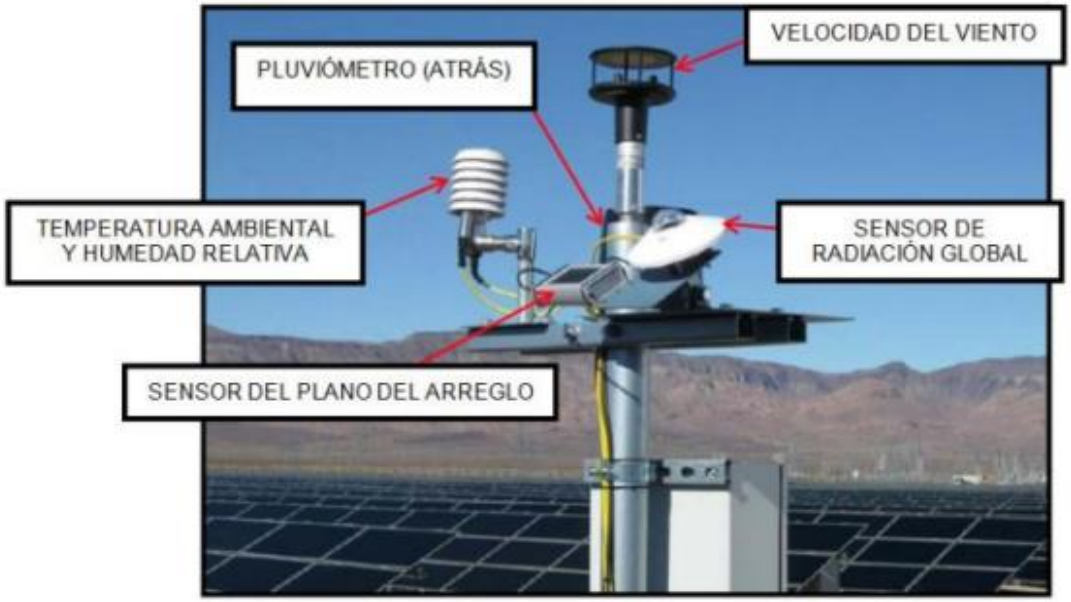

Source: Cielos de TARAPACÁ SpA

### *1.4.1.5 Weather Stations*

DI enter the photovoltaic park, Two weather stations will be installed (See Figure エラー! 指定したスタイルは使われていません。-15), In order to deliver information About atmospheric temperature and humidity, direction, wind speed and solar irradiation To the tracking system. This allows the fans to rotate to a flat position during high wind speed times, preventing them from

occurring Physical damage to the modules by The Torque that can cause.

***Figure** エラー! 指定したスタイルは使われていません。**-15. Weather station Type***




Source: Cielos de TARAPACÁ SpA

### *1.4.1.6 StandS of vigilance*

The photovoltaic plant will have Two StandS Surveillance, one for North access And another for South access of the photovoltaic Park.

The surveillance booth consists of a conteiner enabled as a security office where the entrance and exit of vehicles and persons will be monitored. Into the Pfv.

The location of the surveillance booth can be seen in the lay-out Presented in The **Annex 1.2.1**.

#### 1.4.1.7 Control Building and communication

The park control building will be located next to the substation control building and will be the place where the Park. LA installation corresponds to an office type Conteiner.

The project will have a monitoring and acquisition Control system Data (SCADA) that will allow the monitoring and remote control of the inverters and other components. The SCADA system will be able to monitor what is produced by the project and its availability, in addition to conducting diagnostic tests on the equipment.

#### 1.4.1.8 Operation and maintenance

It consists of a number of offices-Conteiner Adapted for the maintenance area.

The Communications Control Center of the site or *"Site Communication Control Center (SCC) "* Located in the Operations and Maintenance Building (O&M) you will have a power backup system consisting of a 5 kVA nominal power (Uninterruptible power Supply) server UPS.

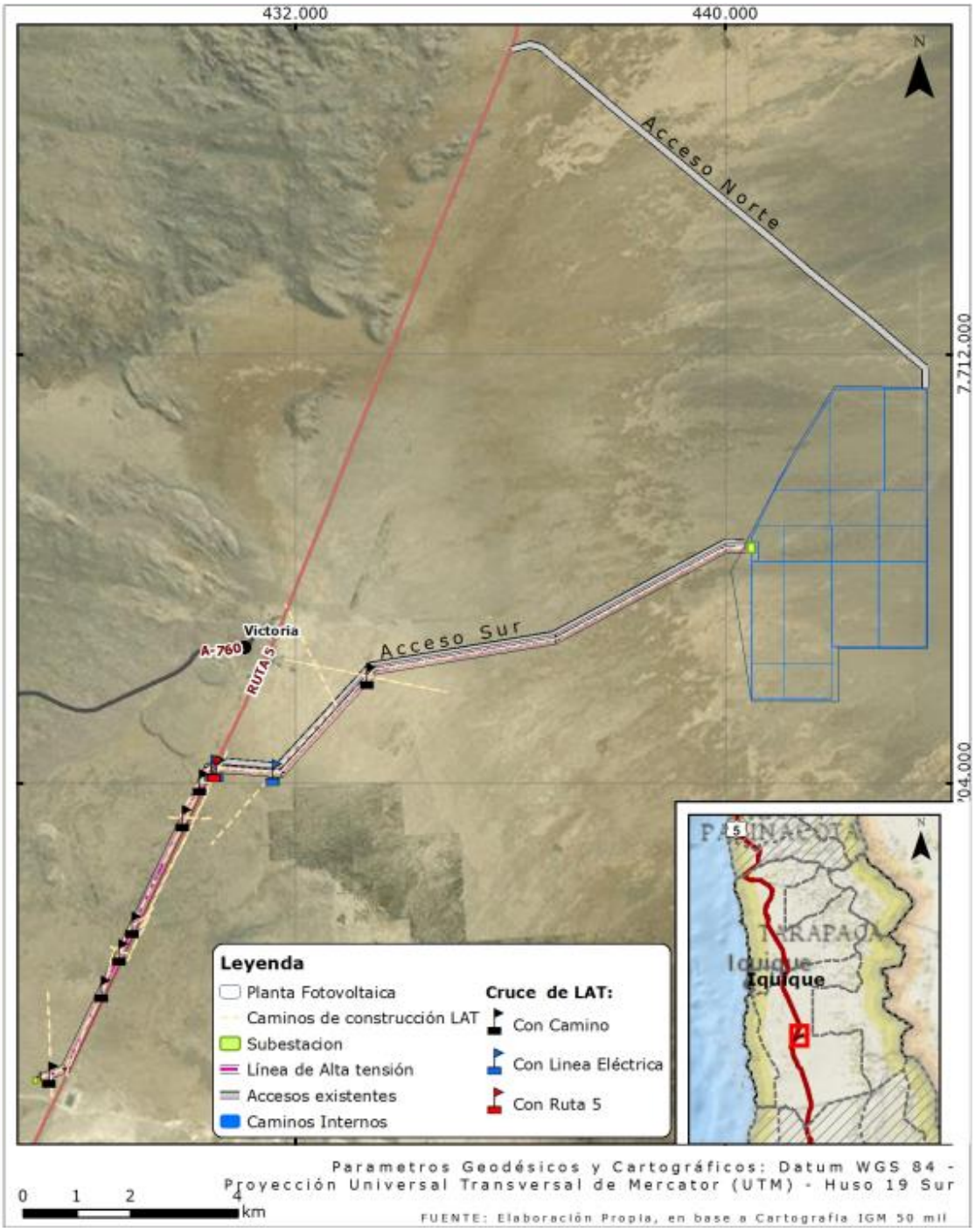
#### 1.4.1.9 Internal roads

Its main objective is to provide connectivity to the project, both in the phase of Construction as in the phase of operation and maintenance of the works.

The internal roads have a strip of APRoximadamente 7 meters Wide and a dust suppression system.

In the Figure エラー! 指定したスタイルは使われていません。-16 It is observed the configuration of internal roads proposed for the photovoltaic park.

***Figure* エラー! 指定したスタイルは使われていません。*-16. Roads Internal photovoltaic plant***




Source: Cielos de TARAPACÁ Spa

#### *1.4.1.10 Perimeter fencing*

In order to hinder access to persons outside the Pfv, perimeter fences with simple torsion mesh will be available.

### 1.4.2 Substation ELeVar

The forklift substation will be in the same sector of the photovoltaic park. This section considers the following works:

1) Main unit
2) Electric Room
3) Ancillary services
4) Telecommunications system
5) Grounding Mesh
6) Aerial Ground Mesh
7) Control Building and Operation Substation
8) Perimeter fencing

#### *1.4.2.1 Main unit*

Drivers from the Photovoltaic Combinning Switchgear (PVCS) will connect to the forklift substation. The lift substation has the function of transforming the voltage from the medium voltage level (33 Kv), up to the level to be used for the transmission of the generated energy (220 Kv).

This SUbestación It will be built in the photovoltaic park and the circuits of Average Tension that collects the energy generated by the photovoltaic park. The surface used by the substation will be 26,000 $M^2$ Approximately and the location coordinates of the same are displayed in the following table.

| **Table 8. Projected substation coordinates (UTM WGS84 H19)** | | | |
|---|---|---|---|
| **Substation Lift** | **Vertex** | **UTM East** | **UTM North** |

| Table 8. Projected substation coordinates (UTM WGS84 H19) | | | |
|---|---|---|---|
| | 1 | 440,413 | 7,708,483 |
| | 2 | 440,553 | 7,708,483 |
| | 3 | 440,553 | 7,708,302 |
| | 4 | 440,413 | 7,708,302 |

Source: Own Elaboration.

The Substation ELeVar will be of the weather type, ie all its main equipment is installedRan To Outdoors; It consists of a high-voltage patio in 220 Kv which has a double-bar configuration with transfer.

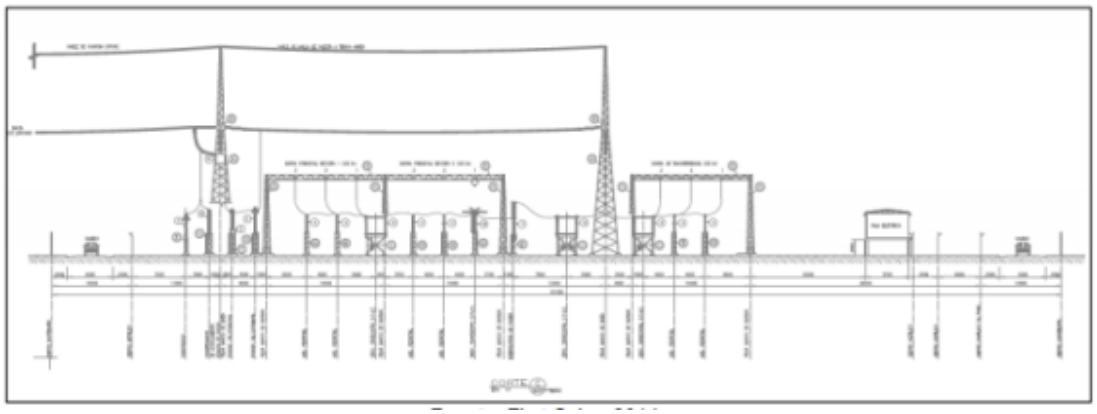
The courtyard of 220 Kv Of the substation consists of eight (8) Cloths of 220 Kv, which Have the following unitsIs:

- 18 QArarrayos 245 Kv
- 4 Power Transformers
- 6 Disconnects Tripolar 245 Kv With grounding
- 14 Disconnects Tripolar 245 Kv Without grounding
- 18 Potential Transformers 245 Kv
- 18 245 Current Transformers Kv
- 7 three-phase actuating switches Monopolar 245 Kv SF6
- 93 245kV Pedestal Insulators

The substation considers the installation of power transformers, whose purpose will be to raise the voltage of the solar plant of 33 Kv To the standard voltage of the 220 system Kv.

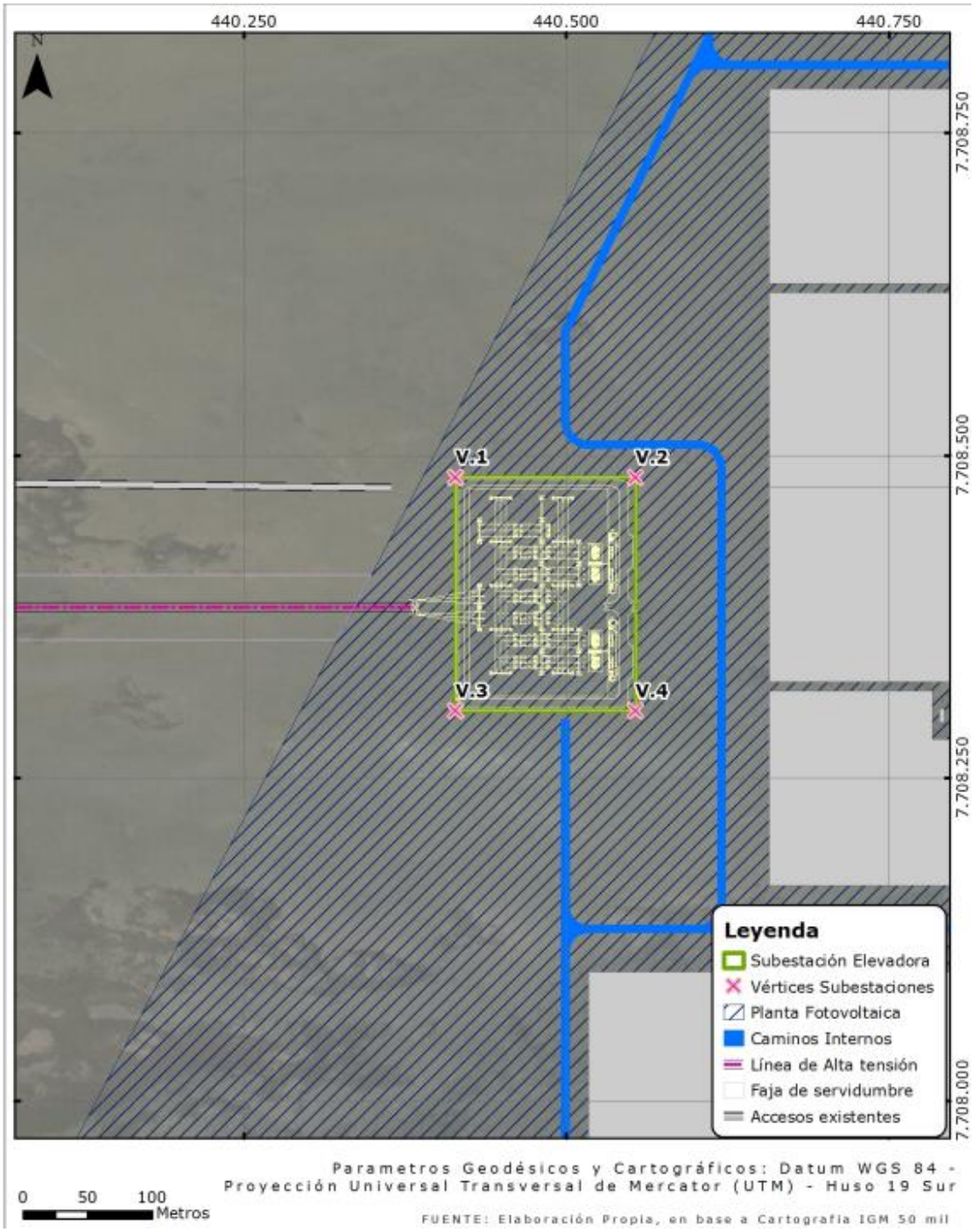
In theS following figures are presented the ESQUemas With the facilities of the of the Substation.

***Figure** エラー! 指定したスタイルは使われていません。**-17. Equipment layout in elevation (C-cut)***



Source: Cielos de TARAPACÁ Spa

**Figure** エラー! 指定したスタイルは使われていません。**-18. Layout of equipment in plant**




Source: Cielos de TARAPACÁ Spa

In the **Annex 1.2.3** (Sub planeEStation Forklift), the provision of The substation in the field and the DIsposición of equipment in plant.

The main works of the substation are described below.

### *1.4.2.2 Electric Room*

It is considered the construction of an electric room (See **Annex 1.2.3 -** Substation plane Lift And **Annex 12.6** - Floor plan of architecture Electrical Room building) in the courtyard of the substation, which will house the following equipment:

- Control cabinets, protection and measurement, in addition to the auxiliary service cabinets, which supply the necessary energy to the equipment of each cloth of 220 Kv, the equipment of 33 Kv and control, protection, measurement and telecommunications equipment.
- Battery banks and battery chargers, Corresponding To a generator group of 50 Kva, a battery charger and a 110 battery bank Vdc of lead acid-free sealed maintenance, which gives it a 24-hour autonomy.
- The medium voltage cells considered for the reception of the cables from the photovoltaic park.

### *1.4.2.3 Services ToUxiliares (SS/AA)*

Because it is a new project, the capacity of ancillary services It must be projected according to the consumption required by the equipment to be fed and thus cover the demands of the equipment considered. The Ancillary services Direct current of the substation will be taken from the battery Bank of the maintenance free sealed type, which will be located in the electric room, next to the battery charger and distribution cabinets of Direct current (Cc) On 110 Vdc. The SS/AA alternating current of the substation will be taken from

the bar of 33 Kv, through a Transformer of 33/0.4 Kv, dedicated to power the SS/AA in alternating current.

#### *1.4.2.4 Telecommunications system*

In order to communicate the elevator S/E with the S/e Sectioner, a telecommunications system based on optical fiber will be considered which goes through the OPGW type guard cable.

#### *1.4.2.5 Grounding Mesh*

The Substation design considers the measurement of ground resistivity and the design of the grounding mesh. All electrical equipment, metal structures, boards and other elements defined in the project plans will be solidly connected to the Earthing grid.

#### *1.4.2.6 Aerial Ground Mesh*

Within the design of the substation, an aerial earthing mesh is considered to comply with the total coverage of all the conductive equipment and rooms, by virtue of protecting them against eventual atmospheric discharges. The aerial mesh will also be connected to the grounding base mesh.

#### *1.4.2.7 Control Building and Operation Substation*

The substation operation building will be located within the lift substation area as indicated in The **Annex 12.3** Of this EIA, and will be the place of remote control during the operation phase of the substation.

This The building will have a special sector which is destined to battery room and lubricants storage, and that will be independent of the rest of the installations. Within this area an office and sanitary facilities will also be enabled for a Maximum of 20 Workers. These Installations shall comply with the requirements established in DS No. 594/99 of the Ministry of Health, *"Regulation on basic sanitary and environmental conditions in the workplace".*

#### *1.4.2.8 Perimeter fencing*

To the purpose of Protect security and avoid Impeding access to others To The Substation, perimeter fences with simple twisting mesh will be available.

### 1.4.3 High Voltage air transmission line (LAT)

The High Voltage line (LAT) of 220 Kv, will have an extension of approximately 18 km, and have a safety strip of 50 m wide; 25 m to each side from the line axis throughout the route.

This LAT considers a total of 65 towers (suspension towers, Anchorage and finishing), conductive cables, insulators and electrical elements of support.

The main components of thes towers of the LAT are The following:

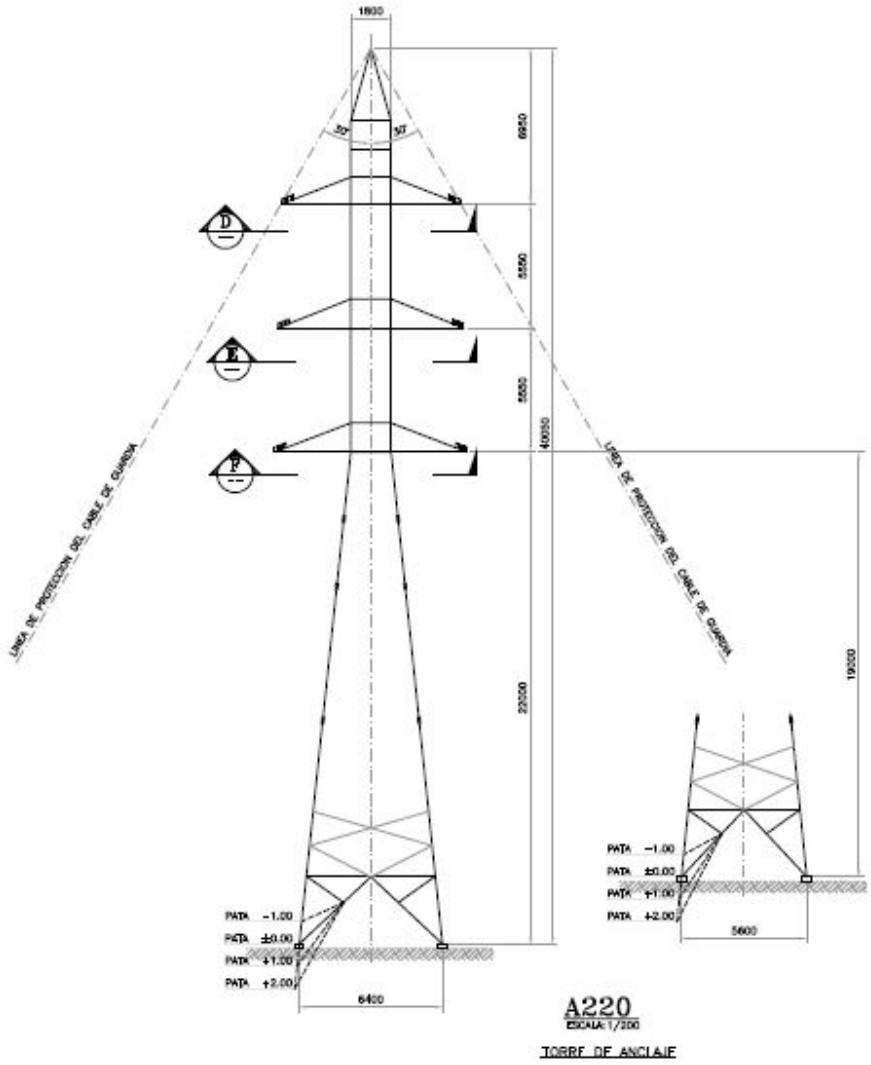
- With Producers.
- Guard Cable
- Insulators
- Shock absorbers
- Responding to Earth

As part of the AC The events, the towers have number plates Life-threatening lacquers. They will also have protections to prevent the birds from stopping in the crossings of the towers. The anti-climb protections will also be installed. On the other hand it is envisaged the installation of Guardaperchas Specially designed to prevent birds from being placed on the insulators, these basically correspond to a set of steel tips that are placed on the insulators in order to avoid the points that involve the risk of contact of birds with conductors

The Foundations were of reinforced concrete consisting of four independent excavations that are filled with concrete and with or without compacted filling. In cases where it is not possible to use concrete foundations, as is the case of the firm rock, special foundations are used.

In the Following Figure are shown The Towers type To use.

***Figure** エラー! 指定したスタイルは使われていません。**-19. Structures Support Type (tower)***




Source: Cielos de TARAPACÁ Spa

The towers ContaRán With a Pyramidal trunk design of double circuit, metallic, lattice, Self-supporting and of Galvanized steel.

In the Table 9 Is They deliver the UTM coordinates of each of the towers and in the Figure **エラー! 指定したスタイルは使われていません。-19** The route of the transmission line is presented.

LAT starts in the auction structure of the future S/E lagoons, UTM coordinates 7,698,493.29 N – 427,229.68 E (vertex 1, V1), And ends in the auction structure of the S/E Cielos de Tarapacá of UTM coordinates 7,708,382.56 N – 442,008.79 E, at an approximate height of 983 M.A.S.L. (vertex 8, V8).

***Table 9. UTM coordinates of each of the towers***

| Structure | | Vertex | UTM coordinates (WGS 84-spindle 19) | |
|---|---|---|---|---|
| N ° | Type | | This | North |
| 0 | R220 | V1 | 427,229.68 | 7,698,493.29 |
| 1 | S220 | - | 427,463.87 | 7,698,580.77 |
| 2 | A220 | V2 | 427,707.63 | 7,698,671.82 |
| 3 | S220 | - | 427,814.80 | 7,698,897.69 |
| 4 | S220 | - | 427,964.84 | 7,699,213.90 |
| 5 | S220 | - | 428,093.44 | 7,699,484.93 |
| 6 | S220 | - | 428,222.05 | 7,699,755.97 |
| 7 | S220 | - | 428,350.65 | 7,700,027.00 |
| 8 | S220 | - | 428,479.26 | 7,700,298.04 |
| 9 | S220 | - | 428,629.30 | 7,700,614.25 |
| 10 | S220 | - | 428,779.34 | 7,700,930.46 |
| 11 | S220 | - | 428,942.53 | 7,701,274.38 |
| 12 | S220 | - | 429,077.00 | 7,701,557.78 |
| 13 | S220 | - | 429,227.04 | 7,701,873.99 |

| *Table 9. UTM coordinates of each of the towers* | | | | |
|---|---|---|---|---|
| **Structure** | | **Vertex** | **UTM coordinates (WGS 84-spindle 19)** | |
| **N °** | **Type** | | | |
| 14 | S220 | - | 429,377.08 | 7,702,190.20 |
| 15 | S220 | - | 429,527.12 | 7,702,506.40 |
| 16 | S220 | - | 429,666.45 | 7,702,800.03 |
| 17 | S220 | - | 429,805.77 | 7,703,093.65 |
| 18 | S220 | - | 429,955.81 | 7,703,409.86 |
| 19 | S220 | - | 430,095.13 | 7,703,703.48 |
| 20 | S220 | - | 430,234.46 | 7,703,997.10 |
| 21 | A220 | V3 | 430,373.78 | 7,704,290.72 |
| 22 | S220 | - | 430,672.97 | 7,704,268.70 |
| 23 | S220 | - | 431,022.03 | 7,704,243.01 |
| 24 | S220 | - | 431,371.08 | 7,704,217.32 |
| 25 | A220 | V4 | 431,716.92 | 7,704,191.87 |
| 26 | S220 | - | 431,918.65 | 7,704,413.92 |
| 27 | S220 | - | 432,120.38 | 7,704,635.96 |
| 28 | S220 | - | 432,322.12 | 7,704,858.01 |
| 29 | S220 | - | 432,523.85 | 7,705,080.05 |
| 30 | S220 | - | 432,688.31 | 7,705,261.06 |

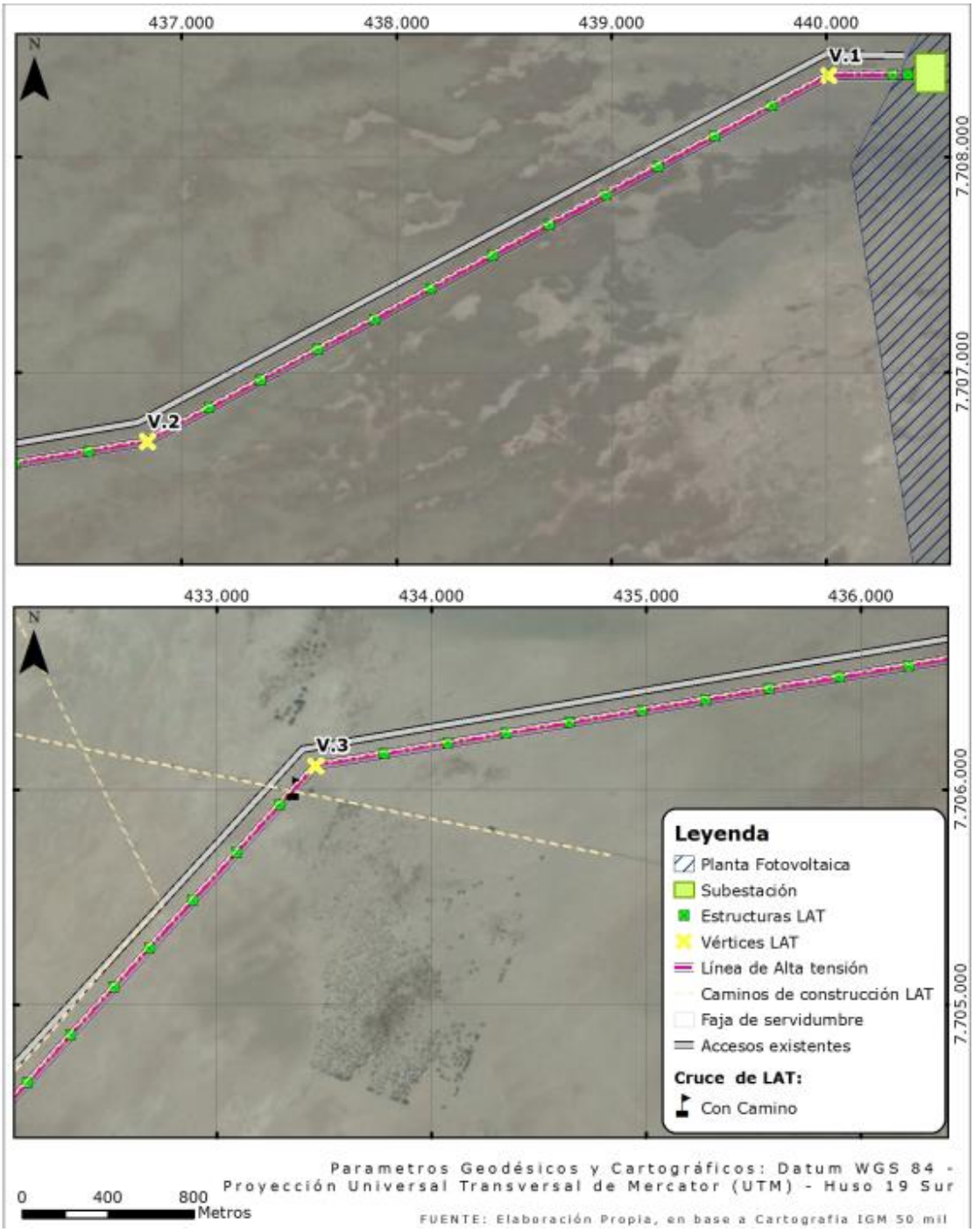
| *Table 9. UTM coordinates of each of the towers* | | | | |
|---|---|---|---|---|
| **Structure** | | **Vertex** | **UTM coordinates (WGS 84-spindle 19)** | |
| **N °** | **Type** | | | |
| 31 | S220 | - | 432,890.04 | 7,705,483.11 |
| 32 | S220 | - | 433,091.77 | 7,705,705.15 |
| 33 | S220 | - | 433,293.50 | 7,705,927.20 |
| 34 | A220 | V5 | 433,461.61 | 7,706,112.23 |
| 35 | S220 | - | 433,782.13 | 7,706,166.06 |
| 36 | S220 | - | 434,077.98 | 7,706,215.74 |
| 37 | S220 | - | 434,349.19 | 7,706,261.28 |
| 38 | S220 | - | 434,645.04 | 7,706,310.97 |
| 39 | S220 | - | 434,982.01 | 7,706,367.55 |
| 40 | S220 | - | 435,277.87 | 7,706,417.24 |
| 41 | S220 | - | 435,573.73 | 7,706,466.92 |
| 42 | S220 | - | 435,902.04 | 7,706,522.05 |
| 43 | S220 | - | 436,222.55 | 7,706,575.88 |
| 44 | S220 | - | 436,567.72 | 7,706,633.84 |
| 45 | A220 | V6 | 436,838.92 | 7,706,679.38 |
| 46 | S220 | - | 437,125.25 | 7,706,833.13 |
| 47 | S220 | - | 437,367.53 | 7,706,963.23 |

| *Table 9. UTM coordinates of each of the towers* | | | | |
|---|---|---|---|---|
| **Structure** | | **Vertex** | **UTM coordinates (WGS 84-spindle 19)** | |
| **N °** | **Type** | | | |
| 48 | S220 | - | 437,631.84 | 7,707,105.15 |
| 49 | S220 | - | 437,896.15 | 7,707,247.07 |
| 50 | S220 | - | 438,160.46 | 7,707,388.99 |
| 51 | S220 | - | 438,446.79 | 7,707,542.74 |
| 52 | S220 | - | 438,711.10 | 7,707,684.66 |
| 53 | S220 | - | 438,975.40 | 7,707,826.58 |
| 54 | S220 | - | 439,217.69 | 7,707,956.67 |
| 55 | S220 | - | 439,482.23 | 7,708,098.72 |
| 56 | S220 | - | 439,746.54 | 7,708,240.64 |
| 57 | A220 | V7 | 440,010.84 | 7,708,382.56 |
| 58 | S220 | - | 440,310.84 | 7,708,382.56 |
| 59 | R220 | V8 | 440,382.52 | 7,708,382.56 |

Note R: Tower of Remate, S: Suspension tower, A: Anchorage Tower.

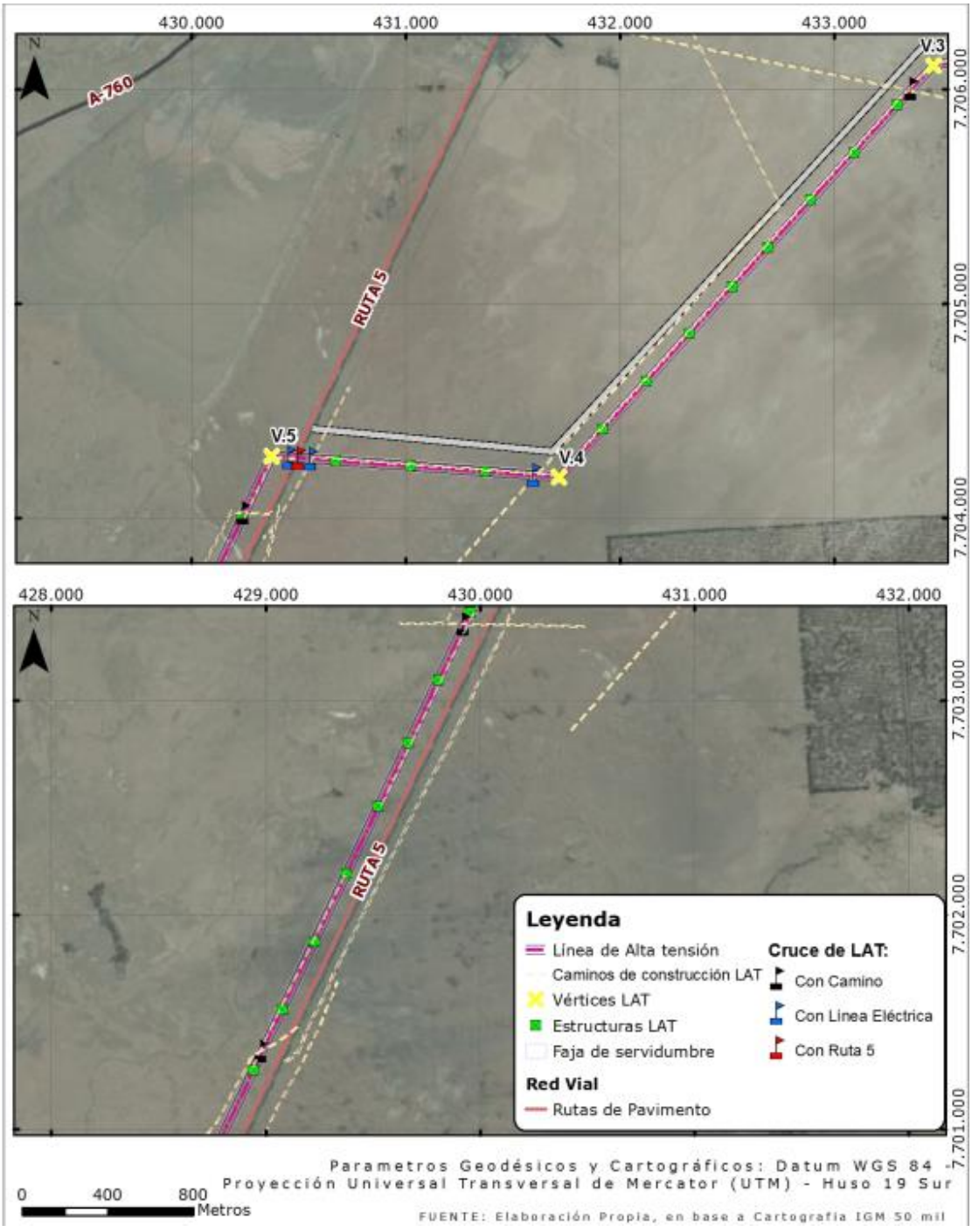
Source of self-elaboration.

**Figure** エラー! 指定したスタイルは使われていません。**-20. Tracing of LAT**



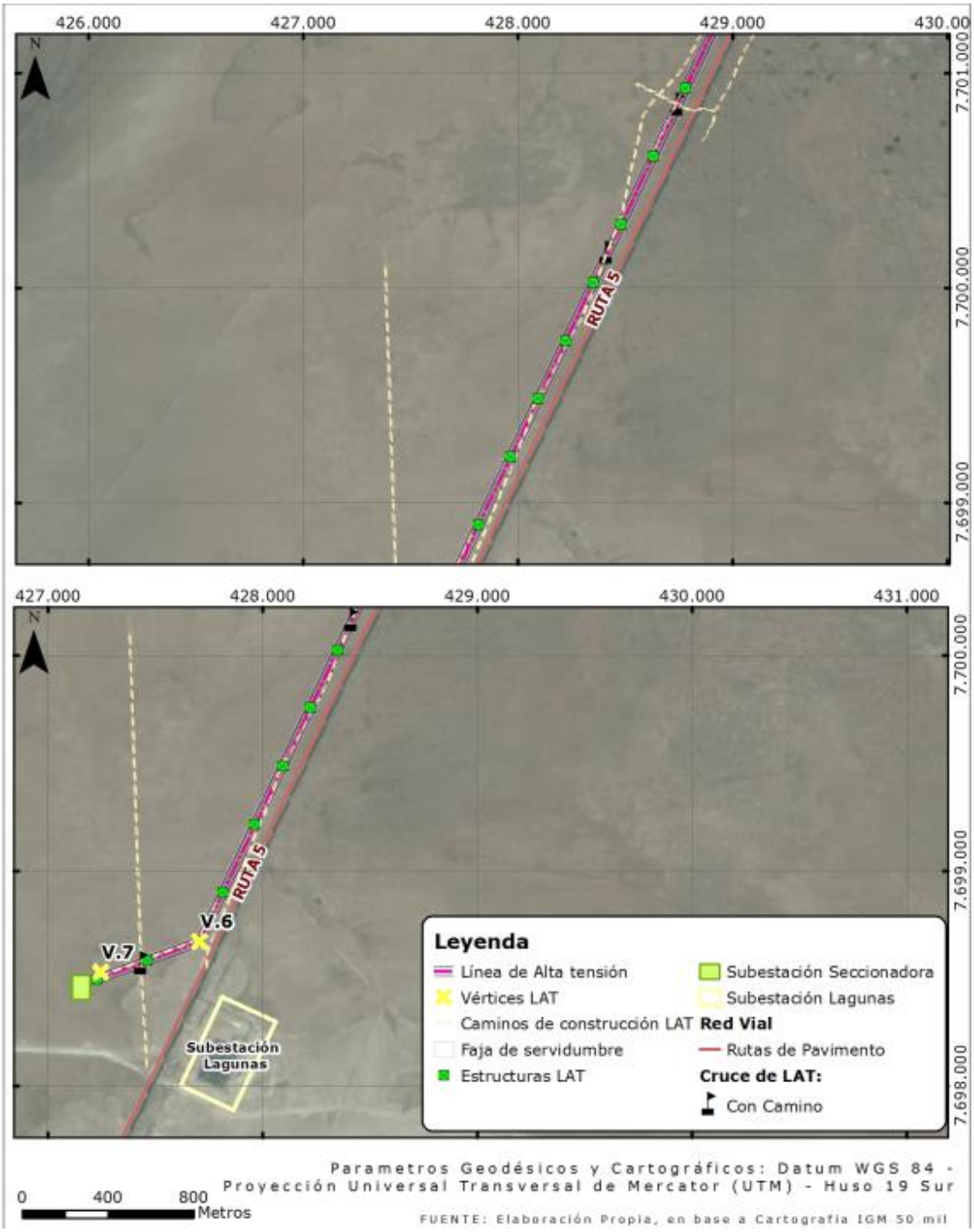

Source: Cielos de TARAPACÁ Spa

**Figure** エラー! 指定したスタイルは使われていません。**-21. Tracing of LAT**




Source: Cielos de TARAPACÁ Spa

**Figure** エラー! 指定したスタイルは使われていません。**-22. Tracing of LAT**




Source: Cielos de TARAPACÁ Spa

The route of the line will not affect the land of agricultural use. In the vicinity of the route envisaged for the transmission line, there are no buildings, no dwellings, no buildings, nor orchards or corrals.

In its route, the transmission line must cross the following existing installations:

- Between the structure n ° 21 and N ° 22 it must cross with the Highway 5 north.
- The structure n ° 24 and N ° 25 must be crossed with Transelec-owned Lagunas-Pozo Almonte transmission line.

The land where trans the power line will be owned by private owners, tax properties and national public goods.

Within the works of Lat It is also considered as external path the access footprint, located on the strip of security of Lat, for the Construction Maintenance and operation of the same.

More detail of the plot and UOf all towers, crosses and parallelisms can be found in the **Annex 12.7** Plane of Interconnection North transmission line.

### 1.4.4 220k disconnecting substation V

The sectional substation will be located near the Lagunas substation and will be the meeting point for the LAT of the mirror stages of Tarapacá and Cielos de Tarapacá. The works considered are:

1) Main unit
2) Ancillary services
3) Grounding Mesh
4) General Service House
5) Perimeter fencing

#### *1.4.4.1 Main unit*

This substation will form part of the 220 system Kv And As mentioned, will allow you to connect the projects *"Heavens of Tarapacá "* And *"Mirror of*

*Tarapacá"* Up to the Injection point of the large North interconnected system (SING), located in the Lagunas substation, owned by the Transelec company.

The sectional substation will inject the SING power surplus Generated by the joint operation of the projects "photovoltaic Park Cielos de Tarapacá" and "Espejo de Tarapacá".

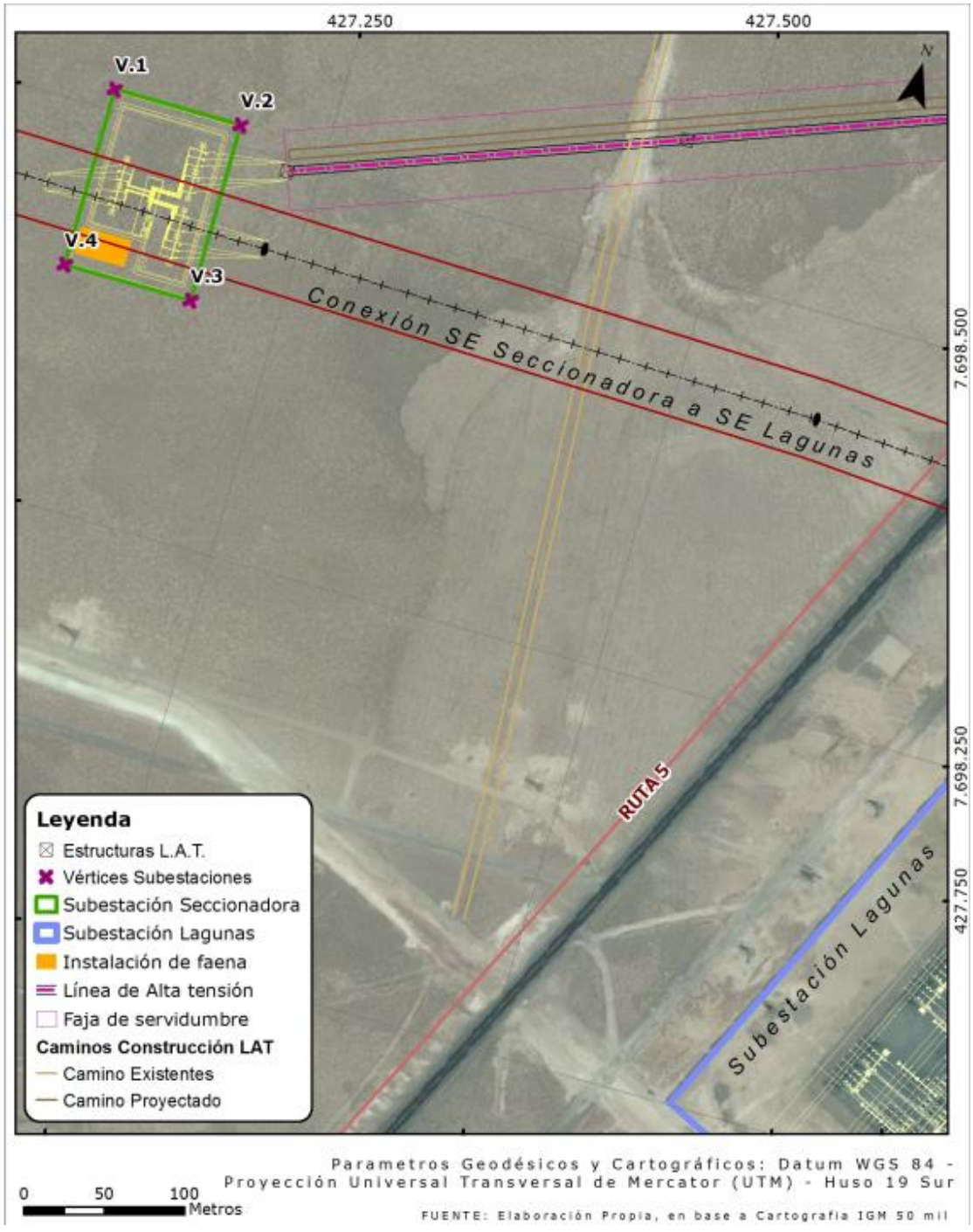
The surface used by the substation will be 9,212 $m^2$, its coordinates are presented in the Next table.

***Table 10. Projected substation coordinates (UTM WGS84 H19)***

| | Vertex | UTM East | UTM North |
|---|---|---|---|
| **Disconnecting substation** | 1 | 427,112 | 7,698,512 |
| | 2 | 427,194 | 7,698,512 |
| | 3 | 427,194 | 7,698,399 |
| | 4 | 427,112 | 7,698,399 |

Source: Own Elaboration.

**Figure** エラー! 指定したスタイルは使われていません。**-23. Scheme S/E sectioner**




Source: Cielos de TARAPACÁ Spa

The dissecting substation will be GIS type, it receives the LAT from the S/E Cielos de Tarapacá (Project under evaluation) and the S/e Mirror of Tarapacá, Enlazándolas with the S/E Lagunas.

This substation, will section the LAT 2x220 Kv Mirror of Tarapacá-S/E Gaps between structures 1 and N º2 that are part of the project *"Mirror of Tarapacá"*.

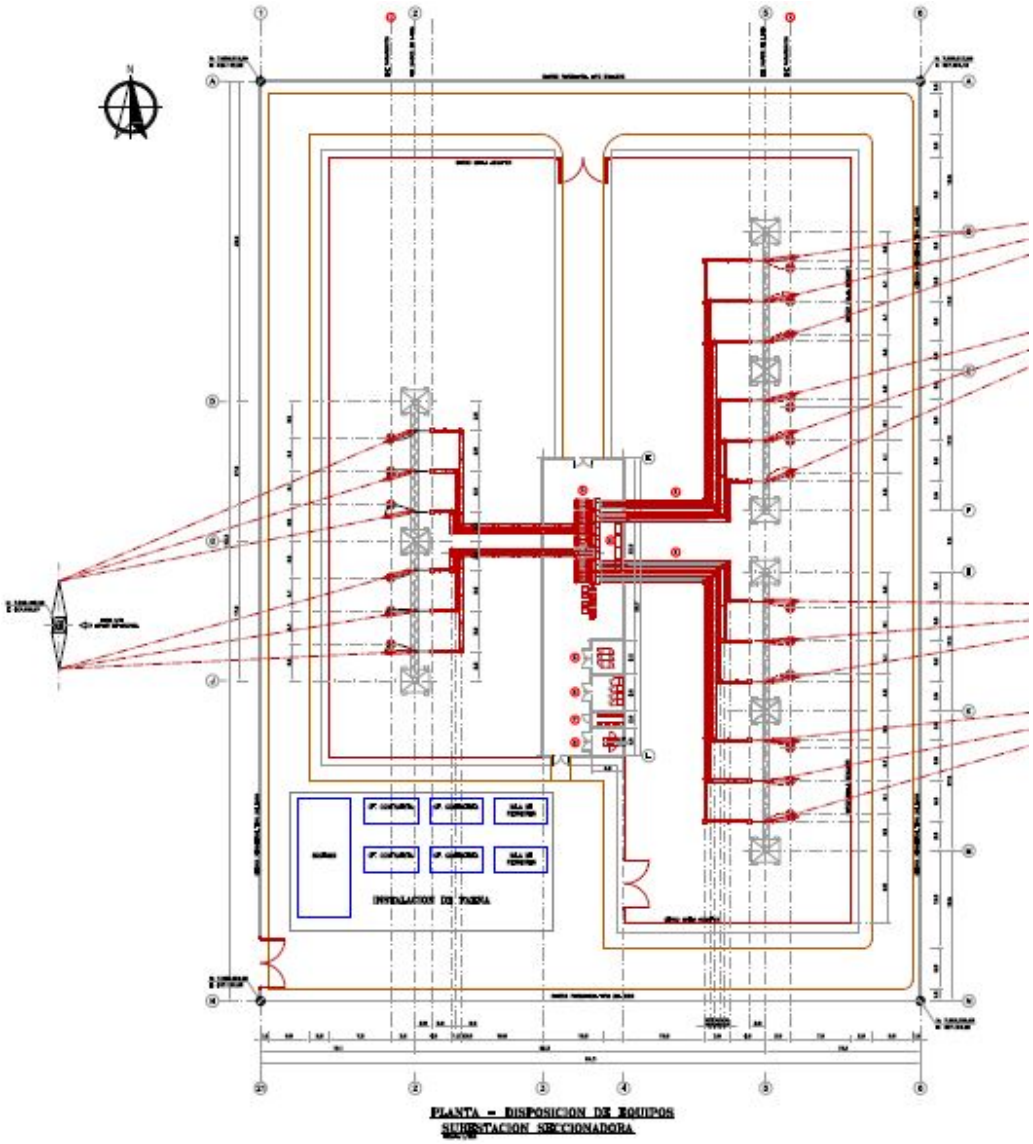
The S/E Sectioner Be In double-bar scheme, plus transfer bar, in 220 Kv And will consist of eight (8) protective cloths: The first two for manoeuvres (bar and transfer coupling), the third and fourth cloth for the two (2) circuits of the line segment between the S/E and the S/e lagoons, the fifth and sixth for the LAT 2 X220 Kv Mirror of Tarapacá-S/E Lagunas, the seventh and eighth cloth for LAT 2x220 Kv Parque Cielos de Tarapacá-S/E Lagunas.

In the **Annex 1.2.4** the provision is presented Of the substation in the field and the disposition of equipment in plant.

The main electrical equipment of the S/E Disconnector considers the following:

- 18 Lightning arrester 245 Kv
- GL Control boards and protections (GIS)
- GL Gas insulated Substation (GIS), 245 Kv
- GL Gas insulated Cable (GIC)
- GL Room Communications Rack
- GL Control Board rooms and protections
- GL Battery Banks 125 Vdc
- GL generators SSAA, 50 KW, 0.4-0,231

**FiGura** エラー! 指定したスタイルは使われていません。**-24. Layout of equipment in plant**




Source: Cielos de TARAPACÁ Spa

The main works of the substation are described below.

### *1.4.4.2 Ancillary services*

The area for ancillary services will be located within the General Service House.

To satisfy the supply of auxiliary services of the substation is considered the installation of a potential transformer for auxiliary services of 220/0.4 Kv. This transformer will feed the general Board of Auxiliary Services, considering the Essential services as well as non-essentials.

Essential services will be supported by a generator of sufficient capacity to keep the battery chargers powered from 125 Vdc and 48 Vdc, the Operation Motors of the switches and Disconnects, and other substation needs.

The auxiliary services of direct current (Vdc) will be supported by two (2) stationary battery banks of 125 Vdc and two (2) of 48 Vdc.

#### *1.4.4.3 Grounding Mesh*

The sectioning substation contemplates a ground mesh buried in the yard of 220 Kv, and the connections will be made to it of all the equipment, structures Metal, Poles, metal fences, etc. It is also Considered A grounding mesh under the General Service House.

#### *1.4.4.4 General Service House*

Is Contemplates A General Service house, of reinforced masonry, of an approximate area of 367 $m^2$, with an area Sufficient to include the rooms intended for control and protection equipment, telecommunications, ancillary services, batteries, in addition to the facilities required for a bathroom and other units. An air conditioning system and an air extraction system will be included depending on the requirements of each unit.

It is also considered, the construction of electric gutters in the yard of 220 Kv, in the General Service house and in the generator set.

A lighting system will be installed throughout the substation enclosure and a video surveillance system.

#### *1.4.4.5 Perimeter fencing*

In order to hinder access to persons outside the substation, perimeter fences with simple torsion mesh will be available.

### 1.4.5 Roads

The project considers two external roads connecting it with Route 5. The roads consider a belt of seven (7) meters wide and a dust suppression system. In the North access road an existing road will be used which leads to Quebrada Blanca to which a junction will be added to the park. In the case of the South access will be used a footprint that starts in the locality of Victoria to which will be added a section until arriving to the project.

If necessary, a project will be made to access the property that modifies the existing one, to be presented and approved sectorially by the direction of highway, before the execution of the project.

Within the photovoltaic park are considered permanent roads and the entire area for circulation during construction. The high voltage line will have a path for its construction, operation and maintenance.

### 1.4.6 Installation of tasks

The objective of this activity is the habilitation and implementation of the physical conditions that allow the correct development of the Phase of Construction and start-up of the project.

The project proposes the construction of two (2) slaughter facilities, which are:

- North Slaughter Facility (In the photovoltaic Park (PV) To provide service to the construction of the PFV, the forklift substation).
- Installation of South Slaughter (to provide service to the construction of the Disconnecting substation, near the Lagunas substation.

The disposition of these Tasks Can be seen in The **Annex 1.2.9** And **Annex 1.2.10**. The instal to Northern Tasks An approximate area of 16.3 ha while the

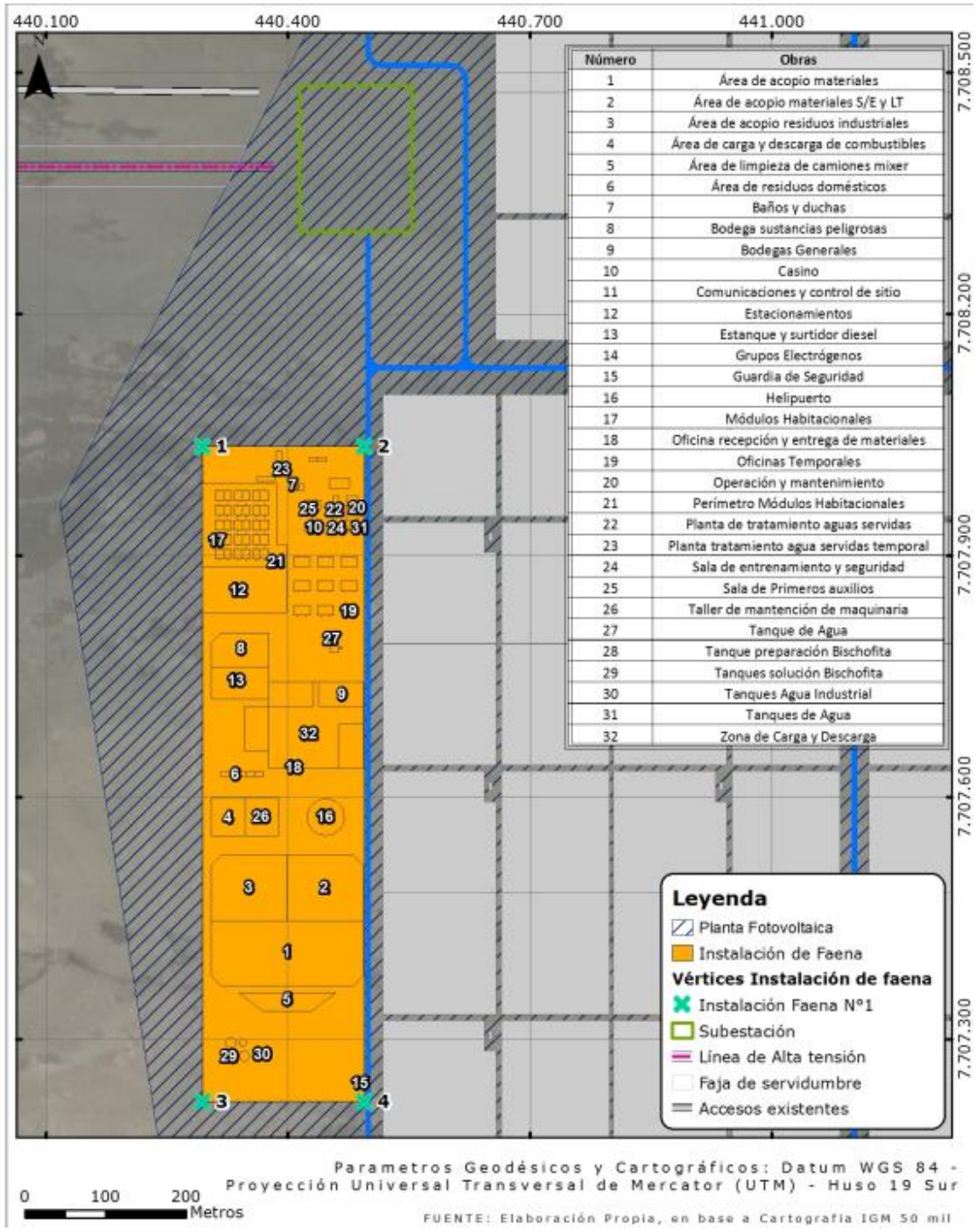
Instalación of Southern Tasks, it contemplates an area of 0.09 ha.

#### *1.4.6.1 North Operations Facility*

##### *i. Location*

The North Operations facility will be located within the enclosure of the PFV Figure エラー! 指定したスタイルは使われていません。-25).

**Figure** *エラー! 指定したスタイルは使われていません。* **-25. Location of the Instalación Norte**




*Source: Own Elaboration.*

It then presents the coordinates UTM WGS 84, Zone 19 S.

| ***Table 11. I Coordinate box Installation Norte UTM WGS 84, Zone 19 S*** | | |
|---|---|---|
| Vertex | North | This |
| V1 | 7,708,036 | 440,294 |
| V2 | 7,708,036 | 440,494 |
| V3 | 7,707,223 | 440,494 |
| V4 | 7,707,223 | 440,294 |
| V5 | 7,707,964 | 440,116 |

*Source: Own Elaboration.*

### *ii. Facilities*

The slaughter plant consists mainly of four (4) areas:

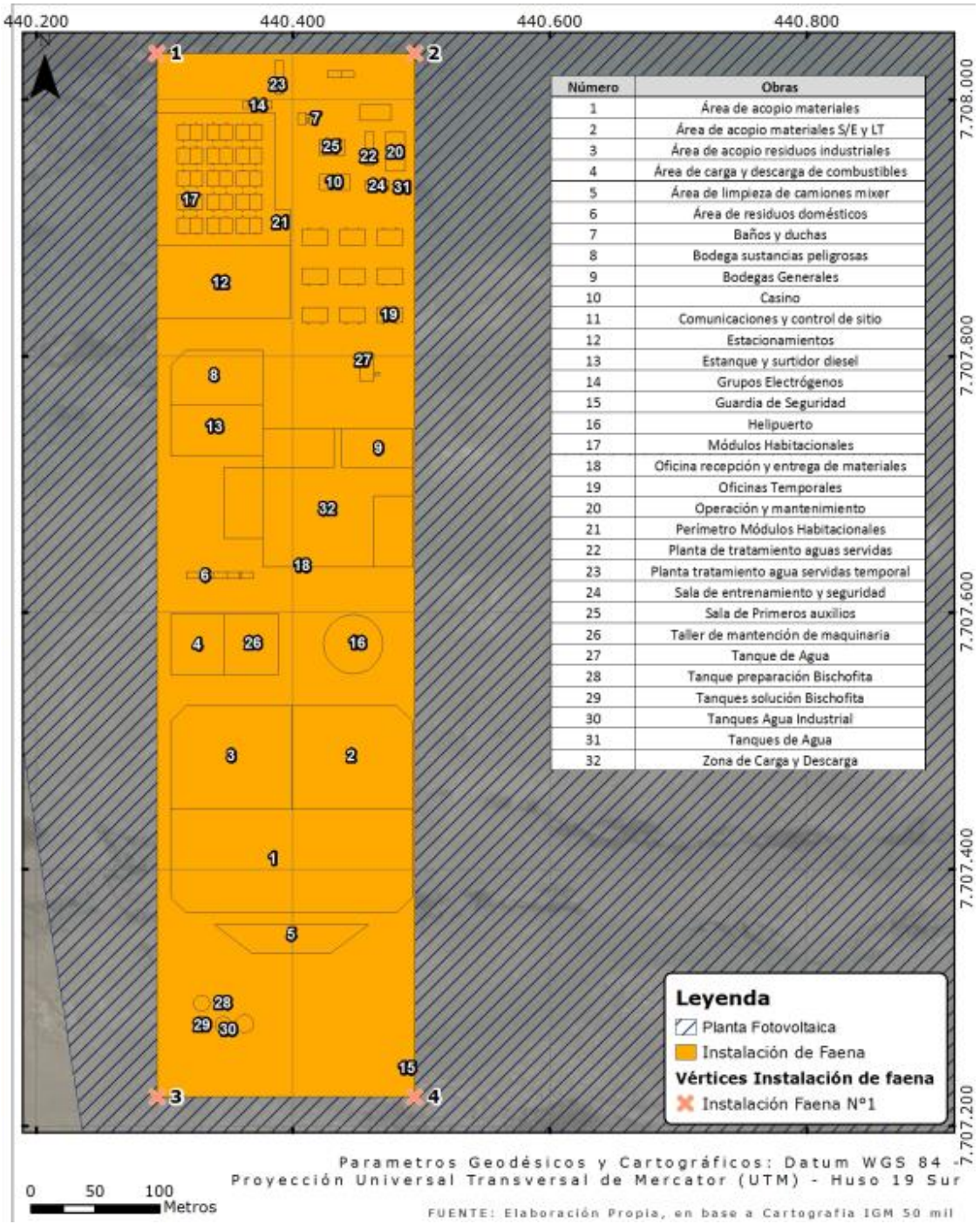
- Service Area
  - Offices.
  - Casino.
  - Housing modules.
  - Parking.
  - Ancillary services.
- Storage area
  - General wineries.
  - Warehouse of dangerous inputs.
  - Non-hazardous waste cellar.
  - Hazardous waste hold.
  - Waste area assimilated to Domestic.
  - Ponds and diesel pump.

- Collection Area
  - Collection of inputs.
  - Heliport.
- Area Mixer And Bischofita
  - Bischofita area.
  - Washed area Mixer.

Below The disposition of the different installations within the task is presented. These facilities will be withdrawn once the constructive work is completed With the exception of the following works:

- The Modular Water Treatment plant
- Hazardous Substances Wineries
- Hazardous waste hold
- Qatio of industrial waste collection
- Operation and maintenance buildings (O&M)

**Figure** エラー! 指定したスタイルは使われていません。**-26. Disposal of the Operations facility**




| Número | Obras |
|---|---|
| 1 | Área de acopio materiales |
| 2 | Área de acopio materiales S/E y LT |
| 3 | Área de acopio residuos industriales |
| 4 | Área de carga y descarga de combustibles |
| 5 | Área de limpieza de camiones mixer |
| 6 | Área de residuos domésticos |
| 7 | Baños y duchas |
| 8 | Bodega sustancias peligrosas |
| 9 | Bodegas Generales |
| 10 | Casino |
| 11 | Comunicaciones y control de sitio |
| 12 | Estacionamientos |
| 13 | Estanque y surtidor diesel |
| 14 | Grupos Electrógenos |
| 15 | Guardia de Seguridad |
| 16 | Helipuerto |
| 17 | Módulos Habitacionales |
| 18 | Oficina recepción y entrega de materiales |
| 19 | Oficinas Temporales |
| 20 | Operación y mantenimiento |
| 21 | Perímetro Módulos Habitacionales |
| 22 | Planta de tratamiento aguas servidas |
| 23 | Planta tratamiento agua servidas temporal |
| 24 | Sala de entrenamiento y seguridad |
| 25 | Sala de Primeros auxilios |
| 26 | Taller de mantención de maquinaria |
| 27 | Tanque de Agua |
| 28 | Tanque preparación Bischofita |
| 29 | Tanques solución Bischofita |
| 30 | Tanques Agua Industrial |
| 31 | Tanques de Agua |
| 32 | Zona de Carga y Descarga |

*Source: Cielos de TARAPACÁ Spa*

### *iii. Service Area*

It will have temporary offices for the administration of the work. They consist of containers duly adapted for the work in slaughter.

There will be a casino for the supply of food to the staff, which will be endowed with potable water, kitchen, refrigeration systems, cellar and sanitary. The installation shall comply with the requirements established for this matter in DS No. 977/96, sanitary regulations for foodstuffs. On the other hand, the casino will be operated by an external company authorized by the health care of the region of Tarapacá.

For the housing of the workers during the construction will be available of housing modules. These modules consist of properly adapted containers. This complex will be able to accommodate the maximum capacity of workers that the project considers for the construction phase.

The Slaughter facility considers a guard house, which consists of a conteiner authorized as security office where the entrance and exit of vehicles and people will be supervised and the coordination of all the tasks of safety of the task is carried out.

On the other hand, the project contemplates a parking space in the operations facility. The parking space will have 50 Parking lots, on a compacted floor.

In addition, in this area, the basic infrastructure will be available to provide service to the previous installations including two wastewater treatment plants, Generator sets, water tanks, communications and site control, Showers and dressing rooms. The whole particular system of wastewater will be processed sectorially before the health of the region, once obtained the favorable RCA of the project Market background in relation to the final disposition of the wastewaters of the project are detailed in the Annex 10-2 of this EIA (PAS 138).

The location of each of the facilities in the service area can be seen in the plan

of installation of slaughter In the **Annex 1.2.9**.

### *iv. Storage area*

The project considers general-purpose wineries to be used for the storage of material that does not classify as a hazardous substance. These wineries will serve to store various materials for the Construction and be able to perform a correct organization and inventory management.

On the other hand, the facilities will have a warehouse for the storage of dangerous substances, the characteristics of which shall be in accordance with the provisions of DS No. 78/09 "regulations for the storage of dangerous substances". For its design, the following considerations have been taken:

- The winery will have external and internal signs indicating the classes and divisions of the stored substances, according to the official Chilean standard n ° 2190 of 2003, or the one that replaces it.
- The winery will be closed in its perimeter by walls or walls solid, resistant to the action of the water, fireproof, with light roof and solid floor resistant structural and chemically, smooth, washable and waterproof and non-porous.
- This wine cellar will store substances such as paints, adhesives, sprays, thinner, etc. It is estimated in any case that the storage will be less than 12 tonnes.

A salvage patio will be enabled in which non-hazardous waste generated by the project will be temporarily stored during the construction phase, in accordance with the provisions of article 18 of the Ministry of Health, DS No. 594/99. This place will consist of a fenced enclosure with metal mesh and access gate.

The materials stored shall be ordered and segregated for subsequent reuse, recycling or final disposal at approved sites, in accordance with article 19 of the Ministry of Health, DS No. 594/99.

For household waste, it is considered a temporary collection area in the slaughter plant. Inside the enclosure will be located containers of solid material

with lid, whose contents will be removed by a company that has sanitary authorization every 3 days and transferred to a sanitary landfill approved by the sanitary Authority.

The characteristics of the way in which waste is temporarily stored Not dangerous are detailed in PAS 140, attached in The **Annex 10.4**.

In the same way, a warehouse will be enabled for temporary storage of hazardous waste that will be generated during the construction phase of the project, which shall comply with the requirements of Decree No. 148 of 2004, *"Sanitary regulations on hazardous waste management"*. This is:

- It will have a continuous, waterproof and resistant base.
- It will have a perimeter closure.
- It will be roofed and protected from environmental conditions such as humidity, temperature and solar radiation.
- It will have a retention capacity of runoffs or spills not lower than the volume of the container of greater capacity or to 20% of the total volume of the stored containers.
- It will have signage according to the Nch 2190 Of2003.
- You will also have restricted access.
- It will have safety measures and fire-fighting equipment.
- It will have one (1) extinguisher (for the class B fuel elements the appropriate extinguishers are used).

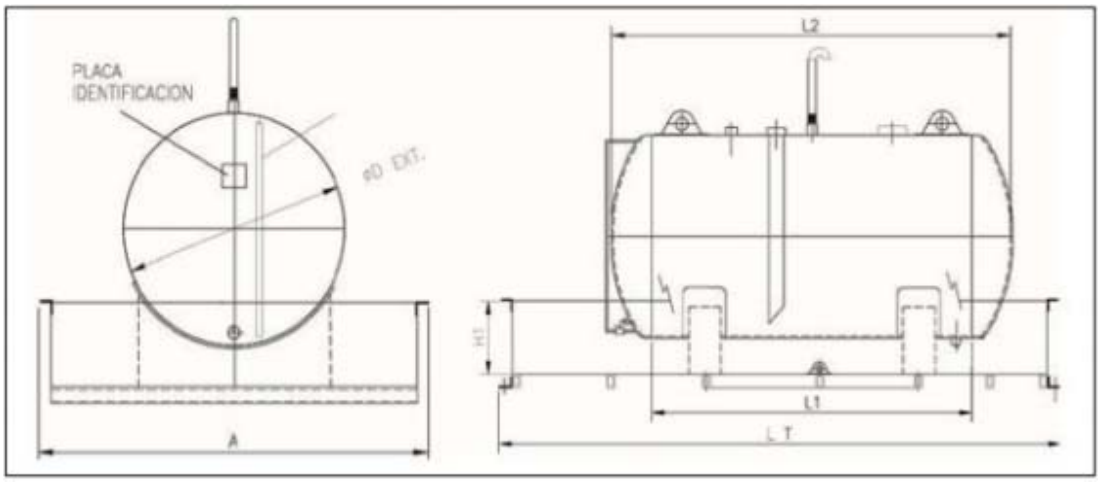
Storage will not extend beyond 6 months and the amount will be less than 12 tonnes per annum.

The characteristics of the Winery are presented in PAS 142, attached in the **Annex 10.5**.

There will be an area where the diesel ponds and suppliers are to be located, for the supply of generators, vehicles and machinery (heavy and light). In this area seven (7) ponds, stationary, surface, horizontal and steel are installed ASTM A-36, certified by the Superintendency of electricity and fuel (SEC). Six (6) Ponds will have a capacity of 3 $m^3$ and a pond will have a capacity of 20 $m^3$.

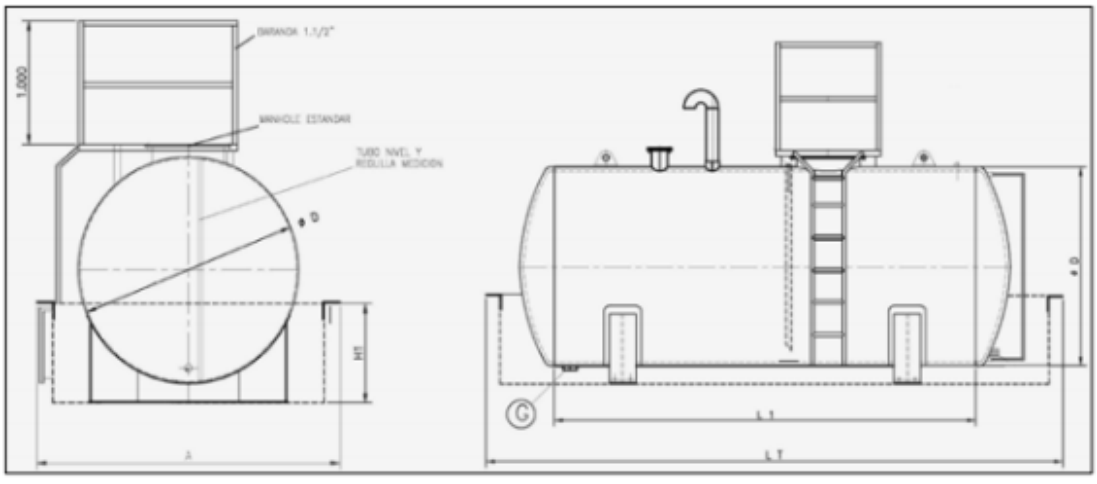
Below are two Schematics of the ponds.

***Figure** エラー! 指定したスタイルは使われていません。**-27. Pond Dimension 3 m³***




Source: Cielos de TARAPACÁ Spa

***Figure** エラー! 指定したスタイルは使われていません。**-28. Dimension Pond 20 m³***




Source: Cielos de TARAPACÁ Spa

The ponds of 3 $M^3$ Associated with The slaughter facility will be displaced within the project area, to the extent that its use is required in other areas. These ponds will be registered with the Superintendency of electricity and fuels in a

manner to comply with DS N ° 160/086.

Each of the ponds will have a watertight anti-spill container with a capacity of 110% of the capacity of each tank. In the Figure エラー! 指定したスタイルは使われていません。-29 Is Observed As a reference a photo of a Pond With the proposed containment system.

***Figure** エラー! 指定したスタイルは使われていません。**-29. Reference photo of Pond***


Source: Cielos de TARAPACÁ Spa

The following tables present the dimensions and characteristics of the ponds and the Dimensions and characteristics of the pretile for these ponds.

| ***Table 12. Dimensions and characteristics of ponds*** | | | | | | |
|---|---|---|---|---|---|---|
| **Pond Dimension** | **Volume ($M^3$)** | **Amount** | **D (M)** | **L1 (M)** | **L2 (M)** | **Weight (kg)** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Tank without platform** | 3 | 6 | 1.22 | 2.50 | 3.00 | 600 |
| **Tank with platform and ladder** | 20 | 1 | 1.93 | 6.50 | 7.20 | 2.900 |

Source: Cielos de TARAPACÁ Spa

| ***Table 13. Dimensions and characteristics of pretile for ponds*** | | | | | | |
|---|---|---|---|---|---|---|
| ***Pond Dimension*** | ***Volume (m3)*** | ***Amount*** | ***H1 (mm)*** | ***A (M)*** | ***LT (M)*** | ***Weight (kg)*** |
| **Tank without platform** | 3.3 | 6 | 500 | 1.50 | 4.60 | 500 |
| **Tank with platform and ladder** | 22.0 | 1 | 100 | 2.80 | 8.00 | 2.900 |

Source: Cielos de TARAPACÁ Spa

The fuel and facilities will be supplied by companies authorized by the Superintendency of electricity and fuels to provide these services and these companies will be responsible for processing all approvals required Above organism.

The ponds will be located in the fuel storage area with a waterproof concrete surface in order to prevent any type of soil contamination at the time of loading or unloading. In this sector we will have anti-spill kits, safety sheets, safety signage and fire extinguishers. If any spills occur, the spill response plan procedure that is presented in the **Chapter 8** of the present study.

The access to this area will be restricted by means of a fence and access port, it will be duly signposted with prohibition of smoking or to ignite in a perimeter of 6 meters and will be counted on extinguishers of dry chemical powder of a capacity of 10 kilograms. Five (5) 3 M ponds$^3$ They will be destined to the fuel supply of the generators that will be in the installation of operations.

The remaining two (a 3 m pond$^3$ And a 20-M pond$^3$) will be destined to the storage of fuel for machinery and vehicles of the project.

The supply of fuel for machinery and vehicles will be carried out through a truck-tank with authorization SEC of capacity less than 5 m$^3$. The supply will comply with the safety conditions demanded by the Ministry of Economy, Development and reconstruction (ds No. 160/08) and shall be in charge of the machinery responsible.

In order to carry out the correct supply of the tank trucks, the area for the supply will be adjacent to the fuel storage area described above having the same characteristics and will be separated from the ponds in at least 4 meters of the nearest pond. It will also have gutters in its perimeter, which are connected to a watertight trench impervious to diesel. The moat shall comply with the characteristics referred to in article 69 of DS no 160/08, which include:

- The watertight trench will be separated from the liquid fuel storage ponds incorporated into the system And of other buildings in the Installation For a minimum distance of 20 m.
- The remote watertight trench will have a capacity of 20 m$^3$ Which corresponds to the capacity of the largest of the ponds to which it serves.
- The drainage route must be such that, if the liquid fuel flowing through it is ignited, do not endanger the ponds, buildings or structures nearby.

*v. Collection Area*

In order to improve the logistics of assembly of equipment during the construction phase, an area of collection of inputs will be available which will be required for the planned works, such as Poles, brackets, Pipes, CABles,

irons, wood, equipment, among others.

In this same area, a temporary heliport will be enabled for the construction period of the photovoltaic park, in order to have a place available for the landing of rescue helicopters in the event of a serious accident during construction, which Require immediate emergency transportation.

The heliport will be of compacted ground with slopes that do not exceed 3% in all its directions. The heliport will comply with the current regulations of the Directorate General of Civil Aeronautics.

### *vi. Area Mixer And Bischofita*

The trucks Mixer Entering the works will require washing only their discharge canoes and tools to provide concrete (shovels, wheelbarrows, etc.), in order to prevent the residual concrete particles adhering to the canoe, spill to the ground or can Detach and project while the truck is in transit. In order to perform the washing in the installation of operations, an area where the trucks Mixer They can wash their discharge canoes.

The canoe wash area will consist of a perimeter of straw bales covered by a single sheet of waterproof PVC plastic that must be free of holes or rips.

When solids are removed from the wash area, the bales or plastic cover may be damaged. If the plastic or straw bales are damaged, they will be replaced with new bales and a new plastic coating. The plastic and bales shall be disposed of as industrial waste deposited as debris in the industrial waste yard for subsequent removal and disposal at an authorized disposal site in the region.

After the washing area is used by several trucks, the water used decants from the solids.

The residual water will evaporate or can be sucked and used as an input for the Bischofita mixture. The remaining solids will be fragmented and deposited as debris in the industrial waste yard for subsequent removal and disposal at an authorized disposal site in the region.

In this regard, the project envisages infrastructure for the elaboration of solution with magnesium chloride (*Bischofita*) or equivalent, for use as a dust suppressant on unpaved roads. In general terms it is envisaged:

- Access ramp and download platform.
- 83 m Preparation Pond$^3$ Approximately.
- 97 m industrial water accumulation ponds$^3$ and 97 M solution$^3$ Approximately.

### *1.4.6.2 South Operations Facility*

#### *i. Location*

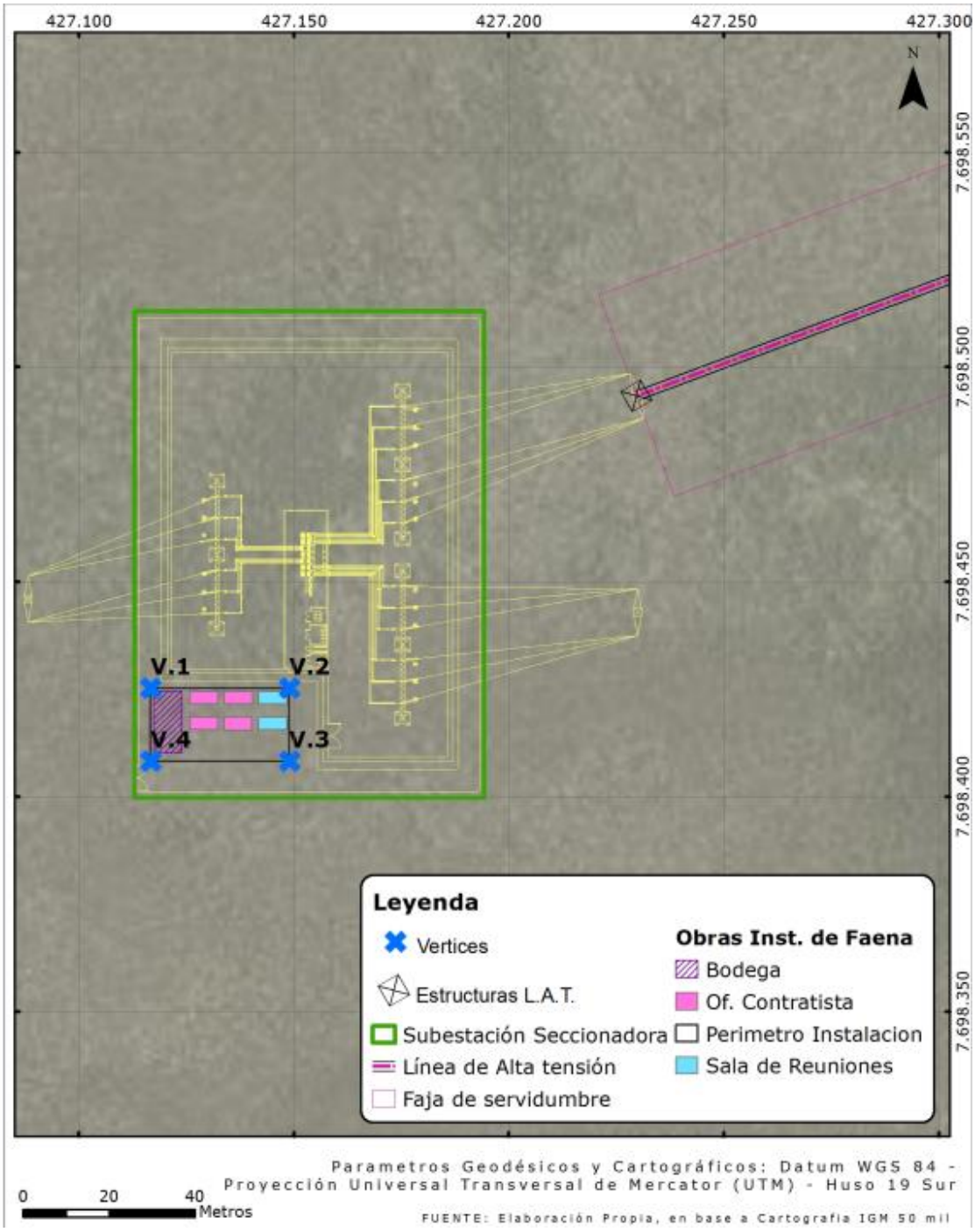
The South Operations facility will be located within the enclosure of the Disconnecting substation. It then presentsn the coordinates and the Location of the facilities.

Table 14. Box From coor South Slaughter Facility UTM WGS 84, Zone 19 S

| Vertex | North | This |
|---|---|---|
| V1 | 7,698,408 | 427,115 |
| V2 | 7,698,408 | 427,148 |
| V3 | 7,698,428 | 427,115 |
| V4 | 7,698,428 | 427,148 |

*Source: Own Elaboration.*

***Figure*** *エラー! 指定したスタイルは使われていません。* ***-30. Location Of the South Operations facility***




Source: Cielos de TARAPACÁ Spa

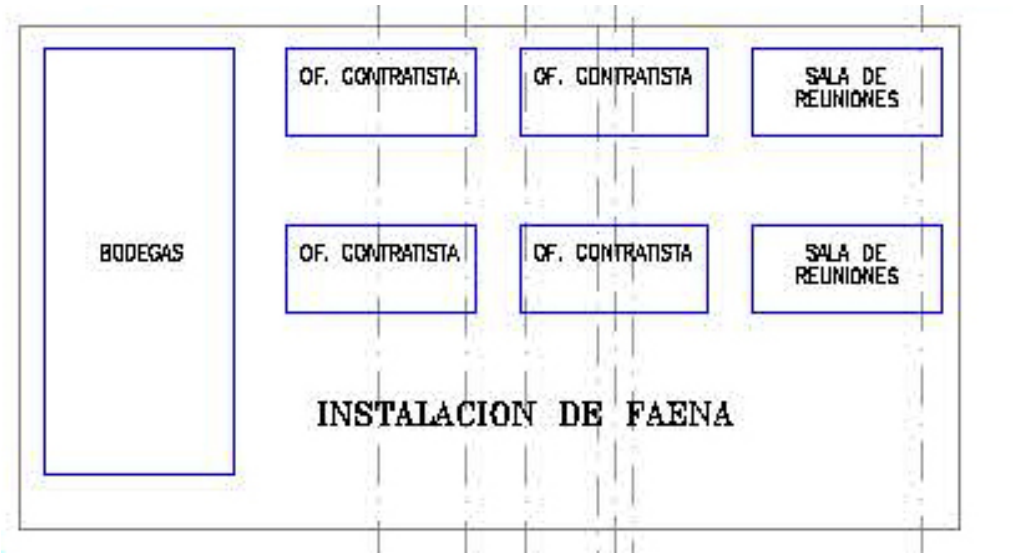
### *ii. Facilities*

The slaughter plant consists mainly of two (2) areas:

- Service Area: Offices.
- Storage area: Winery.

In the Figure **エラー! 指定したスタイルは使われていません。-31** The disposition of the different installations within the task is presented. These installations will be withdrawn after the construction work has been completed.

***Figure** エラー! 指定したスタイルは使われていません。**-31. Disposal of the Operations facility***




*Source: Own Elaboration.*

### *iii. Service Area*

Temporary offices for the administration of the work will be counted. These consist of containers duly adapted for the work in slaughter, as indicated above.

The slaughter facility considers a surveillance booth that consists of a conteiner

enabled as a security office where the entrance will be monitored and exit of vehicles and people and will be carried out the coordination of all the tasks of safety of the task.

#### *iv. Storage area*

The project considers a general-purpose winery which will be used for the Storage of material that does not classify as a hazardous substance. This warehouse will serve to store various materials for the construction.

In addition to the non-permanent works mentioned above, mobile working fronts will be implemented, which will be located in different sectors as the works advance, so as to have availability of short-distance tools and supplies; These mobile installations will be equipped with Drinking water and chemical baths.

Finally, indicate that the facilities of slaughter will have perimeter fence and access control.

## 1.5 Construction phase Description

During the construction phase all the works will be carried out for the implementation of the project considering the temporary and permanent installations.

The Constr phaseuction 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 first phase implies a greater number of works and/or actions, since it includes the installation of camp, Slaughters (includes warehouses for storage of materials, waste, casino, administrative offices, etc..), Assembly of structures, installation of panels, underground cabling construction of substations and high-voltage aerial laying.

The S Two Phase Following S Contemplatesn A smaller number of works and/or activities, since basically the assembly of structures will be carried out, the

Installation of panels and underground cabling. At the end of the Construction of the Phase Three Is They add to the dismantling activities of the installation of slaughter and camp, so as to make the ground In conditions similar to the situation without a project.

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

**Phase 1 (200 MW)**

- Preparation of the Terrain and Access roads
- Installation of slaughter and camp
- Network Enabling Connection paths
- Installation of the perimeter fence of the photovoltaic park
- Enabling of Material download and storage areas
- Structural and electrical installation (panels and assembly of structures)
- Construction Lat
- Construction substations
- Construction Control Room and operations
- Connection tests

**Phase 2 (200 MW)**

- Land preparation and Access roads
- Network Enabling Connection paths
- Structural and electrical Installation
- Connection and start-up

**Phase 3 (200 MW)**

- Land preparation and Access roads
- Network Enabling Connection paths
- Structural and electrical Installation
- Connection and start-up

- Closing of the construction phase

### 1.5.1 Parts, works and associated actions (Phase 1)

#### *1.5.1.1 Preparation of the Terrain*

The preparation of the terrain has the objective to adapt the topography of the terrain to the technical and constructive specifications of the projected works.

The activity consists in the clearing and cleaning of the terrain, compaction and levelling in the locations where the works will be located. The cleaning of the ground must be the minimum necessary to allow the photovoltaic installation and thus to reduce the dust emissions during the construction and during the operation of the project.

Any earth movement shall be used as a filling material and in the case of surplus material being generated, This will be evenly and compactly on the surface of the terrain surrounding the project itself, but always within the boundaries of the project area.

There will be a project to access the property to enable permanent and temporary access, which will be presented for sectoral approval (before the road management) toS of the project execution.

#### *1.5.1.2 Road network Habilitation*

The routes should be prepared for Access to the project in the event are not in a suitable condition. This is essential to start the construction stage, because it will be by the access roads where all the inputs and machinery necessary for the construction stage will arrive.

The internal roads and The connection footprints within the project will have a rolling folder of about 7 m wide See the **Annex 12.5** Where the route of the network of roads in plant is presented.

#### *1.5.1.3 Slaughter Installation*

The objective of this activity is the habilitation and implementation of the physical conditions that allow the correct development of the construction and start-up of the project.

#### *1.5.1.4 Installation of the perimeter fence of the photovoltaic park*

The perimeter of the photovoltaic park will have a perimeter fence of Approximately 2 m high, galvanized steel poles every 3 m with small shoe and with cable spined on the super part IOR by security measure.

The security system to be installed It will only be anti-intrusive.

#### *1.5.1.5 Enabling of Material download and storage areas*

The areas to be used for the discharge and temporary storage of the materials utilized in the construction phase of the park shall be considered. Although its habilitation will be in the first phase, these installations will be used during the rest of the phases, until the end of the construction stage.

The areas that will be available for this purpose will be:

- Area of loading and unloading of material, located inside the facility of slaughter and adjacent to the general wineries of the slaughter.
- Material collection area, located inside the slaughter plant.

Due to the large space that would be needed to store the modules, the order of these will be considered under the methodology *Just In time*, in order to minimize the time and space needed for storage. This methodology consists of transportingr The modules Received To your installation site as you Build way to download them near the site where they will be installed. In this way, the space of the mentioned areas is prioritized to store investors, cables, metallic structures among other.

#### *1.5.1.6 Structural and electrical Installation*

The installation of the photovoltaic arrays includes the installation of the poles, the support tables and the photovoltaic modules ECP and PVCS, building of

O&M and SCC.

First we proceed to the installation of vertical poles for the support of the tables (see Figure エラー! 指定したスタイルは使われていません。-32). As a first option of foundation, one proceeds to the direct driving of the pole with a hammer drill. Only in cases where this solution is not feasible, we proceed to a pre-drilling, then proceed with the post-driving. If, after drilling, a foundation is required for that specific post, the post will be attached to the micro-pile mixture.

If it is necessary to pierce, before being driven, it will be moistened to avoid dust.

***Figure** エラー! 指定したスタイルは使われていません。**-32. Anchored metal structures for module fixation***

Source: Cielos de TARAPACÁ Spa

In turn, trenches are dug for the installation of underground AC (alternating current), DC (direct current) and fiber optic cables for the communication of the equipment. Excavators will be used and Trenchers To open ditches, lightweight tilt loaders for filling and lightweight flatteners for compacting.

Soil humidification is considered to avoid dust lifting.

The excavated land will be kept next to the trench and will be used to fill it once the conductors have been installed and tested. The excavated land will not be removed from the project site. The trench itself will be filled first with sand (or the appropriate native material) to provide a suitable base for installed drivers and sand (or appropriate native material) will be deposited on the installed conductors. The remaining filler will consist of the excavated and compacted native soil. During the filling will be installed marking tape, to indicate the type of drivers insWinged under. While the cable laying is carried out the installation of the boxes is also carried out Combination Plates And the installation of the support tables on which the photovoltaic modules are mounted.

The transport of the photovoltaic modules to the work will be carried out by means of ramp trucks, which comply with the weight and width allowed according to the Manual of roads. In the event of non-compliance, the Authority will be notified and the transfer with Carabineros de Chile will be coordinated.

***Figure** エラー! 指定したスタイルは使われていません。**-33. Installation of Modules***

Source: Cielos de TARAPACÁ Spa

At the same time, the foundations for the ECP are prepared with their transformer, PVCS, O&M Building and SCC for their subsequent assembly, where small cranes, tractors and fork lifts will be required.

### *1.5.1.7 Construction Lat*

The airline will be high voltage (220 Kv) and will have an approximate extension of 18 km, will have a path, A bondage strip of 50 m wide (25 m on each side).

The activities to be developed will be:

- Land Habilitation.
- Ground-wire Installation.
- Installing the structure.
- Installation of conductor cable and guard cable, fiber optic.
- Tensado of the cables and auctions.

The assembly of the metal structures is considered by means of mobile working fronts. When the terrain and the design of the line it Allow, the anchorage will be carried out with the same material of the excavations. In cases where this is not possible, concrete foundations will be used. In the case of the firm rock, special foundations are used.

• Concrete Foundations:

This type of foundation is generally used in angle and mooring towers and for all special structures that require great resistance.

• Rock Anchor:

In cases where the tower is located in places where there is firm rock, it is possible to use the same rock for the tower Anchorage.

For these works, transport vehicles of crews, trucks and machinery are used to transport the materials, to mount the towers and to install the electrical cables and of complementary services.

Before performing any operation tests, the continuity of the phases will be verified, the sequence and grounding will be measured.

#### *1.5.1.8 Construction of Substations*

The substations Projects are the "weatherproof" type, that is to say, all your main equipment will be installed outdoors

The first work to be done Its him External safety lock. It consists of a fence with a height above 2 m high. Once the fence is built, the equipment grounding mesh will be installed at a depth of no less than 0.6 m, to then build the communication channels between the control booth and the equipment to

be installed in the courtyard of the substation.

For the development of the Reseda design criteria with the construction of the substations, the following premises have been considered:

- The new facilities will be designed using conventional AT maneuvering equipment.
- The airlines of at will end up in a portal, at this point and towards the inside of the substation, the lightning rods are installed, Disconnects With and without grounding, current transformers, power switch.
- The structures of the yard maneuvering equipment and the bar and line frames will be designed to withstand the seismic requirements in compliance with current regulations.

### *i. Substation Platforms*

This activity considers the excavation for the construction of the foundations necessary for the installation of the electrical equipment of the substation. In order to do this, the ground where the structures will be placed is initially enabled by a surface preparation Adapting to the construction characteristics of the substation.

Most of the extracted material will be used in the filling and compaction of the excavations while the surplus will be scattered evenly on the site adjacent to the foundations.

Once the ground is habilitated, the foundations of each structure will be carried out by the placement of the Construction Moulds and the foundation's armatures for later refilling with concrete.

### *ii. Grounding Mesh*

will be built a grounding mesh in each Substation, to which primary equipment, high and low structures, substation yard fences, and any metal elements that are installed will be connected. The mesh will be buried 60 cm under the level of finished floor of the substation, will be installed at the time of the escarpment. This mesh is required to provide protection to personnel and

equipment against possible electric shocks.

### *iii. Substation Foundations*

The foundations of high structures will be designed according to current regulations, considering the types of soil indicated in the geotechnical report.

In general the design of foundations will be made with concrete quality H25, a emplantillado H10, steel bars of reinforcement quality A63-42H and a concrete coating is required on the armatures of 5 cm.

The concrete necessary for the development of this activity will be supplied by companies of the sector present in the area and transferred to the working front by means of concrete mixers, that have the pertinent authorizations.

### *iv. Substation Pipeline Construction*

Contemplates Perform the civil works corresponding to pipes and then make the corresponding wiring that will allow all the equipment of the substation to be connected.

In the design, pipelines must include a 10% reserve. This reservation, must be free, And It will be destined to satisfy the necessities of eventual modifications or complements after the final reception of the works.

In the design of the canalizations it will be considered as basic principle, the segregation of the systems, so that any problem that affects one system does not affect the other. In order to comply with this objective and without being interpreted as a definition, it will be considered for example, the use of independent pipes and laying areas, the obturation with adequate materials of the passes of trays and ladders through Walls, slabs and towards boards, as well as entry by different points to boards when they have duplicate power, etc.

### *v. Mounting of substation structures, supports and equipment*

Once the land with their respective excavations and foundations is ready, the equipment belonging to the substation shall be assembled: installation of switches, Disconnects, Transformers, etc. This task It will be the responsibility

of the contractor, which must be a certified company and authorized to carry out this type of works.

Once the ground is in condition, with the grounding mesh installed and the communication channels in place, the electrical equipment will be mounted and interconnected. Once the assembly and interconnection stage is finished, it will be passed to a test stage, to check that everything is well before the start-up of the substation.

The system of protection and safety, consists of control equipment arranged in the control room, which will record all the events produced in the equipment of the substation.

#### *vi. Transformation (For forklift substation)*

Transformers will be located in a protected area with fire barriers, built of reinforced concrete.

If the transformers contain dielectric oil, the design will consider a peripheral basin surrounding the transformers. The pools will be sealed and their capacities will be 110% of the volume of oil that could be accidentally poured. These pools will have a slope Towards a sump that leads to a container pit where the oil can be removed to give it disposal according to the current regulations.

The container trench will be constructed of a waterproof material, with sufficient volume to contain all the oil of a transformer. For the proper functioning of the container pit, it will be taken into account QUE The final outlet tube is straight, almost horizontal, with air discharge, pNo siphon effect and the Installation will dispose of appropriate extinguishing devices.

### *1.5.1.9 Connection tests*

In this phase, the physical and electrical conditions of the installations will be verified. Different types of tests will be carried out on both the photovoltaic equipment and the substation and transmission line. The Reception tests of the construction phases are several, among them it is possible to emphasize the

putting in line of the SCADA monitoring system, the electrical equipment is tested and the operational availability is verified. Concrete resistance tests are also carried out, testing of compacted densities, measurement of the resistances of Grounding, among others. These tests, are considered as assurance protocols D(e) The quality of construction and They look for malfunction caused by defective assembly or improper transport, as well as check the condition of the equipment for final commissioning.

### 1.5.2 Parts, Band associated actions (phase 2)

Phase two aims to implement another 200 MW, so as to complete with phase one 400 MW in total. During this phase the following works and/or activities will be carried out:

- Land preparation and Access roads
- Network Enabling Connection paths
- Structural and electrical Installation
- Connection and start-up

These works and/or activities are similar to those described in Phase 1.

### 1.5.3 Parts, works and associated actions (phase 3)

Phase three aims to implement another 200 MW, so as to complete together with phases one and two 600 MW In total. During this phase the following works and/or activities will be carried out:

- Land preparation and Access roads
- Network Enabling Connection paths
- Structural and electrical Installation
- Connection and start-up
- Closing of the construction phase

These works and/or activities are similar to those described in Phase 1 and 2,

except for closing of the construction phase.

#### *1.5.3.1 Closing of the construction phase*

Once the construction works and the test and start-up activities of the project have been completed, the dismantling and removal of all the elements outside the terrain that have been part of the construction facilities, with the exception of:

- The Plant Water Treatment Modular
- Bodegas of hazardous substations
- Winery of hazardous waste
- Atio of industrial waste collection
- Operation and maintenance buildings (O&M)

It is then necessary to reinstate The surfaces where these facilities were found to leave it as close to its original state.

The elements of the installation of operations that can be reused as the containers of the camp, will be taken to facilities authorized for their restitution and the elements that cannot be reused will be taken to places duly authorized and Authorized To their final disposition.

### 1.5.4 Maintenance of construction Equipment

The maintenance of equipment will be carried out during the 3 phases of construction. It will be carried out in the same photovoltaic park in an area reserved for this purpose, with mesh Spill Where the stipulated maintenance will be carried out, between it, the oil change of the machinery. In case of not being able to carry the machine to the workshop, the site will be conditioned for its repair *In situ*. Is shall constitute Like this A sort of temporary mechanical workshop at the fault site inside the slaughter facility. Precautions to consider in any repair area are the Following:

- It will be fitted with a soil protection (e.g. metal plates, sand, tarpaulin), which acts as an insulator in the event that small quantities of lubricants,

oils or any residue are spilled during machine maintenance. Contaminated, taking the necessary precautions to not cause any contamination of the soil.

- Finished the repair, the area will be neat and the waste will be collected, temporarily stored in the collection sites And finally arranged at nearby authorized sites. Hazardous waste shall be transported by authorized companies to final disposal sites which have the corresponding sanitary authorizations. The contractor will be required to pay special attention to the methodology of maintenance and repair of equipment in general.

### 1.5.5 Estimated dates and work or action that begins

This phase has a duration of 4.5 Years and envisages the following activities: preparation of work areas, habilitation of access roads and internal, construction of physical works of the project, transport and assembly of modules, construction and assembly of towers and electrical lines, both As aerial and then start-up.

The following is presented in the Table 15 LTo the estimated date, the duration and activity that stables the start and end of this phase:

***Table 15. Dates and duration of the construction phase***

| Phase | Estimated Start date | Startup activity | Duration | Term activity |
|---|---|---|---|---|
| Construction | November 2015 | Ground preparation for the installation, or fencing, or Demonstration of the purchase of photovoltaic | 4.5 years | End installation Wiring and Equipment. |

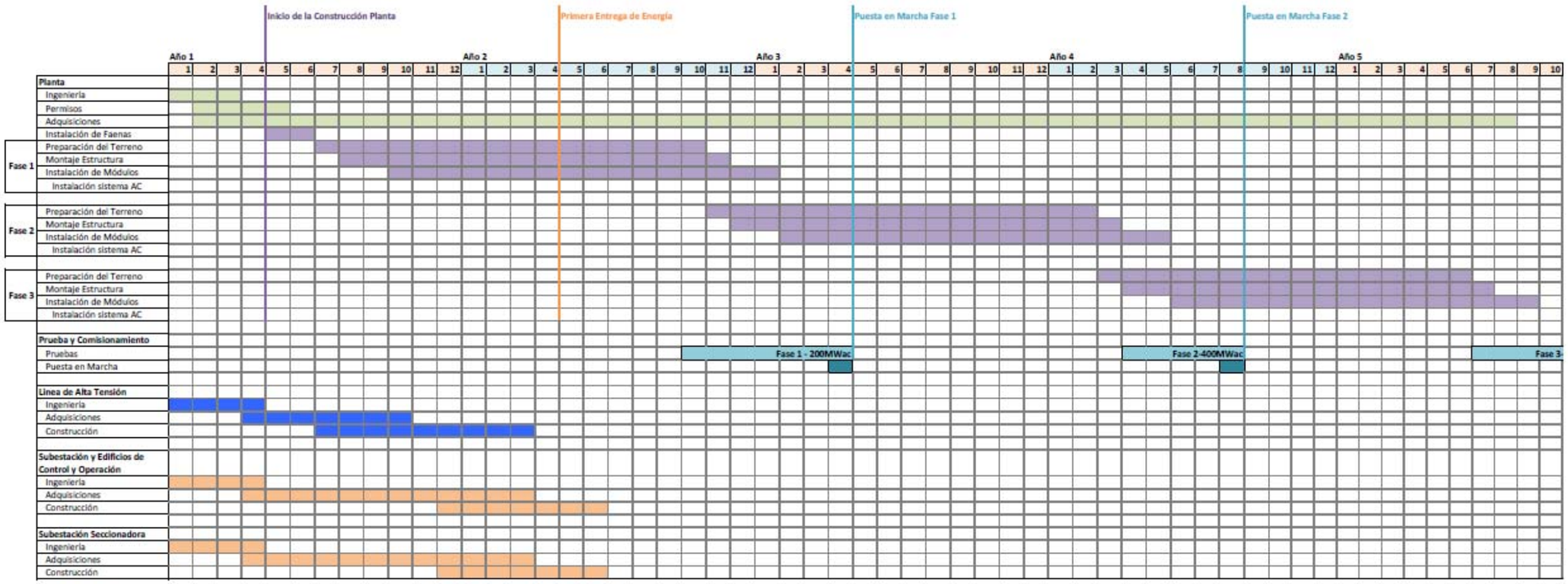
| *Table 15. Dates and duration of the construction phase* | | | | |
|---|---|---|---|---|
| **Phase** | **Estimated Start date** | **Startup activity** | **Duration** | **Term activity** |
| | | panels in the SEC or, construction way of Access. | | |

Source: Self-elaboration

### 1.5.6 Timeline of the main parts, works and actions

En the Table 16 Sand presents The planning that describes the schedule for the implementation of the project in the construction phase.

***Table 16. Schedule of activities for the construction phase***




Source: Self-elaboration.

### 1.5.7 Labor

Labor during construction is estimated to be 500 workers on average, A maximum of 600 employees can be reached.

Typical working hours will be from 8:00 am to 6:00 pm, but some activities must be carried out after sunset for safety reasons because in this way the photovoltaic modules will not be energized, like for example to carry out the Electrical terminations for Which artificial lighting will be used. It is for this reason that for this type of tasks will be carried out night shifts.

The Number of workers for all works are indicated in the Table 17**.**

***Table 17 Demand for Year of construction work***

| **Annual Staff** | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|
| **Average number of workers** | 345 | 495 | 495 | 510 | 325 |
| **Maximum number of workers** | 600 | 600 | 550 | 600 | 500 |

Source: Own Elaboration.

From the table above it follows that the maximum number of workers corresponds to a quantity of 600, the years 1, 2 and 4, while the years 3 and 5 have the least demand for labor that corresponds to 500-550 Workers.

### 1.5.8 Requirements of the Construction phase

#### *1.5.8.1 Energy requirements*

For the construction stage the generators to be used are the following:

- A 100 KW generator for camping
- Two 20 KW generators for operations installation
- Ten generators of 5 KW for the working fronts

#### *1.5.8.2 Drinking water requirements*

The water to be used for human consumption will be determined as indicated in DS No. 594/1999 of the Ministry of Health. A provision of 100 L/Room/day for consumption in hygienic services and drinking water. The water for human consumption will be provided by means of potable water tanks or purified, cold and hot water dispensers, which will be supplied by a duly certified local company, complying with all the physicochemical requirements, Radioactive and bacteriological provisions established in the applicable regulation, those defined in the standard Of Nch 409/1 of. 05 on drinking water requirements.

On the basis of the above described personnel required for construction, (recital 100 L/Room/day), the requirement of drinking water for consumption, showers, sinks and bathrooms on site will be of 60,000 L/day in period *Peak*, for each of the phases of the construction stage (phase 1, 2 and 3), which implies that a storage capacity of 60 m is required$^3$.

***Table 18. Drinking water requirement***

| Construction phase | Workers per stage of the project | Water requirement (L/day) |
|---|---|---|
| PeaK:i | 600 workers | 60,000 |

Source: Own Elaboration.

### *1.5.8.3 Water requirements for other uses*

For road wetting or excavation activities, a number of 40 m$^3$Day. Water will be supplied in 10 m tank trucks$^3$ of capacity. This activity will take place 4 times a day.

The water requirement shall be covered by treated water and, as requested, through the Water purchase By Suppliers That count with The due Authorization.

### *1.5.8.4 Health services*

For this stage, sanitary facilities for the use of personnel will be enabled. These facilities will be composed of bath, sink and shower; They will be located in the field of operations installation. The number of artifacts shall

be that set out in article 23 of DS no 594/99.

The installation of the construction of these installations will be done in accordance with the regulations of household Potable water and sewerage facilities (RIDAA). For the treatment of wastewater, a modular treatment plant, see more background in the Annex 10-2.

In addition, the construction phase will require the habilitation of portable chemical baths for personnel who are locked Jando on the work fronts. The service of installation and maintenance of the chemical baths will be contracted to a company authorized by the Sanitary authority. In the Figure エラー! 指定したスタイルは使われていません。**-34** You see a picture of a working front type.

***Figure** エラー! 指定したスタイルは使われていません。**-34. Mobile working front (chemical baths and drinking water)***

Source: Cielos de TARAPACÁ Spa

The Agua Available on the work fronts For the consumption of the workers, it will be provided by means of dispensing machines with bottles of 20 litres, service that will be lent by an enterprise that has the respective permissions or through bottled water.

The amount and distribution of these work fronts will meet the With the requirements established in DS No. 594/99 of the Ministry of Health, "Regulations on basic sanitary and environmental conditions in the workplace".

### *1.5.8.5 Power*

Casinos will be available for the supply of food to staff, which will be isolated from work areas and any source of pollution. In addition it will be equipped with potable water, kitchen, refrigeration systems, cellar and sanitary.

The installation will comply with the requirements established for this matter in DS no 977/96, sanitary regulation of food. The casino will be operated by an external company authorized by The health of the REgión Tarapacá.

### *1.5.8.6 Accommodation*

The project considers housing modules within the installation of operations consisting of containers duly adapted for the accommodation of workers during construction. This will be able to accommodate the maximum capacity of Workers who consider the project. Its location can be seen in the plan of installation of slaughter in the **Annex 1.2.9** Plan installation of operations.

### *1.5.8.7 Transport*

Transport flows in the construction phase are associated with the transport of workers, supplies and construction materials and machinery.

The project buses for the transportation of workers between the city of Pozo Almonte Or The park.

For the transport of electrical equipment and materials, the existing public road network will be used, mainly using trucks and vans.

Contractors shall be required to take appropriate safety measures to transport electrical and material equipment from the source of supply to the site of the work. The environmental aspects of this work will be supervised by the contractor and reported to the principal through the technical inspection of works (ITO).

It is then presented in the Table 19 the detail of the Number of trips considered for the construction phase of the photovoltaic park:

| *Table 19. Travel for project construction phase* | | | |
|---|---|---|---|
| **Reason for the trip** | **Travel[1] / year** | **Type of vehicle** | **Destination Source** |
| Transfer of workers in a van | 1,950 | 4x4 truck | Pozo Almonte-Photovoltaic Park |
| Transfer of workers in buses | 445 | 40 passenger Bus | Pozo Almonte-Photovoltaic Park |
| Transfer of materials (photovoltaic units, Transformation and investor centers, equipment transfer) | 440 | 40 "Porta Conteiner trucks | Puerto San Antonio-Photovoltaic Park |
| Transfer of drinking water | 2,160 | Tank Truck | Pozo Almonte-Photovoltaic Park |
| Fuel transfer | 52 | Tank Truck | Pozo Almonte-Photovoltaic Park |
| Transfer of waste | 220 | Truck | Photovoltaic Park-Manager |
| Transfer of concrete and aggregates | 688 | Truck Hopper | Pozo Almonte-Photovoltaic Park |
| Conteiner Transport for Slaughter plant | 400 | Truck Bed | Pozo Almonte-Photovoltaic Park |

Source: EOwn labor.

[1] It is understood by travel a roundtrip transfer.

In the project area, every vehicle will travel at a maximum speed of 40 km/h for vehicles with cargo and 50 km/h for no-load vehicles. As a

measure of prevention against collisions and abuses, they will circulate at all times with the low lights on.

The terrestrial transport of the equipment will comply with the requirements arranged by the direction of highway in relation to the weight by axis and dimensions allowed. In the case of special equipment, of weights and sizes on the usual, the authorization will be requested and the requirements that the road management requires for these effects will be fulfilled.

When appropriate, land transport will be supported by private escorts and Carabineros de Chile. In addition, the transfers will be made preferably by day, properly signposted with signs and beacons.

#### *1.5.8.8 Buying goods and hiring services*

This activity will contemplate the purchase of the goods (inputs, raw materials and material) and the hiring of the services necessary to build the project.

For the purchase of goods, it will be necessary to import the equipment, such as conductors, insulators, cables, electrical equipment, etc., which usually come in wood packaging, having to comply with resolution N º 133/2005 of SAG, which establishes the Regulations for the entry of wood packaging that may be a vehicle of pests.

As for the materials, éhese correspond to those that are required for the planned works, such as pipes, cables, irons, Woods, among others, which will be stored in a patio equipped for this purpose, located next to the slaughter plant, also They will enable material and module collection areas in the photovoltaic installation area, in order to improve the logistics of assembly of equipment during the construction phase.

On the other hand, it will be subcontracted to companies specializing in associated services, such as:

- Supply and maintenance of chemical baths.
- Security (guards).
- Personnel transportation.
- Telecommunications.

- Removal and final disposal of industrial, non-hazardous, hazardous and domestic waste.

In this context, the competent authorisations shall be required for each service, by means of the resolutions issued by the competent authority.

### 1.5.9 Construction phase Inputs

#### *1.5.9.1 Machinery and Support vehicles*

For the construction activities of civil works, the following machinery shall be used:

***Table 20. Construction phase Machinery***

| Activity | Machinery | Amount |
|---|---|---|
| Site preparation | Grader | 2 |
| | Scraper Tractor | 1 |
| Structural installation | Pneumatic Spike driver of Poles (mounted on Skid or similar | 10 |
| | Drilling machine | 10 |
| | Crane Fork SUV (125 HP) | 5 |
| | Crane Fork SUV (99 HP) | 5 |
| | Mini Forklift Trucks / Bobcat or similar | 10 |
| Electrical Installation | Trencher | 2 |
| | Mini Forklift Trucks | 10 |
| | RETROEXCA LoaderVLoves | 2 |
| Substation | Telescopic Crane Truck | 2 |
| | Excavator | 1 |
| Transmission line | Telescopic Crane Truck | 4 |

| | | |
|---|---|---|
| | Backhoe | 2 |
| | Grader | 2 |
| Access roads | Backhoe | 2 |
| | Front Loader | 2 |
| | Grader | 2 |
| | Compactor/Flattener | 2 |
| | Mini Forklift Trucks | 2 |
| | Primer Truck | 2 |
| | Paver And Asphalting Finisher | 2 |

Source: Cielos de TARAPACÁ Spa

For the assembly stage of equipment, in the substations Trucks, cranes, machinery and suitable tools will be used for the specialty being developed.

For the conduction stage of the conductors and fiber optic cable, trucks, cranes and equipment of laying and brake will be used, suitable for the type of Conductor to use.

### *1.5.9.2 Concrete*

It will be used in the construction of the control and operation Buildings of the park and the substation and will be supplied by trucks Betoneros From Plants of Concrete manufacture of contractor companies. The project requires a total of 23,500 $m^3$ of concrete during its construction phase. Preferably trucks They'll wash the canoes in Their plants.

However, in cases where the distances of transfer from the front of concreting hinder the above, to avoid that in the return of the trucks is Desprenda concrete waste, be counted on the ground With A system for Store the Grouting resulting from the washing of canoes in metal drums of approximately 200 litres. For this, trucks Mixer They will be equipped with a water system. Polyethylene will be placed under the drums as a protective

measure to prevent soil contamination. Once the concreting process has been completed, the waste will be transferred to the temporary collection warehouse of the slaughter plant, in the Inert waste section, and then sent to an approved final disposal site. More background Of the truck washing system in the **Annex 10.3.**

### *1.5.9.3 Aggregates*

The additional material required for fillings and gravel necessary for high-tension patios shall be acquired only by authorized companies in the region. Without prejudice to this, it will be privileged to use for these purposes the material that is Get from the excavations inside the premises where the project is located. It is estimated that the aggregate requirement will be Next:

- Arena: 23,301 Ton For all phases of construction.
- Gravel 2,256 Ton For all phases of construction.

### *1.5.9.4 Steel rod*

It will require 716 tons of iron for the construction phase That are distributed in a Maximum of 160,000 metal poles and 120,000 support tables for each phase of the construction stage of the project.

### *1.5.9.5 Fuels*

It should be noted that there will be inside the slaughter plant, a warehouse of fuel storage where seven ponds, stationary, surface, horizontal and steel ASTM A-36, with certification of the Superintendency of Electricity and fuel (SEC). Six 6 Ponds will have a capacity of 3 $m^3$ and a 1 Pond will have a capacity of 20 $m^3$.

### *1.5.9.6 Hazardous substances*

For the hazardous substances to be stored for the construction phase, the following are the types and quantities required:

| Table 21. Hazardous Substances – construction phase | | |
|---|---|---|
| **Product** | **Monthly consumption** | **Amount Stored** |
| Enamel | 5 L | 31 L |
| Enamel | 615 $cm^3$ | 3,846 $cm^3$ |
| Oil Pneumatic tool | 26 L | 33 L |
| PVC Cement | 8 L | 10 L |
| 400 Synthetic SAE 5w-40 | 260 L | 325 L |
| Doro | 260 L | 3,846 L |
| Synthetic enamel | 26 L | 81 L |
| ABC Extinguishers Dry Chemical powder | 8 kg | 1,151 Kg |
| ABC Extinguishers Dry Chemical powder | 13 kg | 244 kg |
| Gadus S2 V220 1-Grease | 26 L | 33 |
| Gadus S2 V220 2-Grease | 26 kg | 33 |
| Gadus S3 V220 C 2-Grease | 26 kg | 33 |
| Liquefied | 59 kg | 293 Kg |
| Havoline Automatic Transmission Fluid MD-3 | 26 L | 98 L |
| Hexafluoride SF6 Sulphur | 80 kg | 398 Kg |
| Graphite Dry-Aerosol Lubricant | 615 $cm^3$ | 3,847 $Cm^3$ |
| MOBIL ALMO 529 | 26 L | 33 L |
| MOBILGREASE XHP 222 | 5 kg | 52 Kg |
| Gaseous nitrogen | 7 $M^3$ | 10 $M^3$ |
| Nytro Hoist I | 39 $m^3$ | 146 $M^3$ |
| Ultra Diesel Oil | 13 $m^3$ | 33 $M^3$ |

| Table 21. Hazardous Substances – construction phase | | |
|---|---|---|
| **Product** | **Monthly consumption** | **Amount Stored** |
| Rando Hd | 260 L | 325 L |
| Shell Morlina Oil 150 | 26 L | 33 L |
| Spirax S4, S5 | 26 L | 98 L |
| Tellus S2 | 260 L | 325 L |
| Tellus S3 | 260 L | 325 L |
| Toner Printer | 3 kg | 10 kg |
| UltraDuty Grease Ep | 26 kg | 33 Kg |
| WD-40 | 615 $cm^3$ | 3,846 $CM^3$ |

Source: Cielos de TARAPACÁ Spa

For EL Storage of dangerous substances, a hold shall be established, in order to comply with the provisions of the decree 78 Dangerous (see Location in **Annex 1.2.8** Plan of work installation).

### 1.5.10 Location and amount of renewable natural resources to be extracted or exploited

The extraction or exploitation of renewable natural resources during this phase is not envisaged.

### 1.5.11 Project emissions

#### *1.5.11.1 Emissions to the AtmóSfera*

During the construction phase, particulate material will be generated in activities that consider moving materials and to a lesser extent earthworks (product of the ditches). These activities correspond mainly to: transport and loading of material with vehicles and machinery (by the transit in unpaved roads), construction of canalization and roads of service.

The emissions of particulate matter associated with these activities are characteristic of a constructive task that includes material transfer activities and, to a lesser extent, ground movements. On the other hand these emissions will be temporary. The emission estimation for the different Phases of the project is presented in greater detail in **Annex 1.4,** of this EIA.

Gaseous emissions will be generated due to the internal combustion processes of the engines of light vehicles, trucks, generators and of the machinery used in this phase.

The result of the emission estimation indicates that the largest emission of pollutants corresponds to $No_X$ During the construction phase of the project, product of the operation of machinery and Gensets

The following table shows the summary of breathable particulate matter (MP10) emissions, MP2.5, carbon monoxide (CO), oxides of nitrogen ($No_X$), sulphur oxides ($SO_X$) and hydrocarbons/volatile organic compounds (HC/COV), respectively, estimated for the construction phase of the project.

| **Table 22. Emissions estimation phase of project construction** |
|---|
| **Construction emissions** |

| Period | Emissions (Ton/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pts | MP10 | MP 2.5 | Co | Hc | $No_X$ | $SO_X$ |
| Phase 1-Year 1 | 43.27 | 19.85 | 7.52 | 19.66 | 7.64 | 73.91 | 0.90 |
| Phase 1-Year 2 | 12.81 | 5.19 | 1.46 | 3.39 | 1.25 | 12.86 | 0.20 |
| Phase 2-Year 3 | 43.25 | 20.08 | 7.70 | 20.31 | 7.53 | 77.17 | 1.17 |
| Phase 2 – Year 4 | 12.84 | 5.20 | 1.46 | 3.39 | 1.25 | 12.86 | 0.20 |
| Phase 3-Year 5 | 42.99 | 20.00 | 7.69 | 20.31 | 7.53 | 77.16 | 1.17 |
| Phase 3-Year 6 | 12.75 | 5.17 | 1.46 | 3.39 | 1.25 | 12.86 | 0.20 |

Source: Own Elaboration.

The holder has considered additional measures to reduce the generation of dust resuspended:

- Unpaved roads will be moistened and Earth Removed During the construction phase.
- A dust suppression system will be implemented for the roads.
- The traffic speed of trucks will be restricted to 60 km/h Within the project area.
- The trucks carrying the construction material shall comply with the corresponding provisions of DS No. 75/87 of the Ministry of Transport and Telecommunications which establishes conditions for the carriage of loads, for whose purposes the Building materials that corresponds They shall be properly moistened and covered, in order to control and minimise particulate matter emissions during the construction phase.
- The vehicles shall have the technical revisions per day. The maintenance Of the machinery shall be carried out according to the manufacturer's specifications in authorized mechanical workshops.
- Any vehicle registered in the National Motor Vehicle Registry after

September 1, 1994, will carry the seal proving compliance with the maximum limits of its emissions and those that do not carry it, shall not be admitted in the work. The technical inspection of works shall be responsible for verifying and requiring the contractor to comply with this obligation.

#### *1.5.11.2 Noise*

| **Table 23: Evaluation according to DS N º 38 of the MMA. Construction stage (Period Day** | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum Allowed NPC Daytime period [DBA)].** | **Evaluation according to DS N º 38 of the MMA.** |
| 1 | 35 | 55 | Meets |
| 2 | 0 | 64 | Meets |
| 4 | 47 | 61 | Meets |
| F1 | 69 | 85 | Meets |
| F2 | 43 | 85 | Meets |

Source: **Annex 1.5** Impact study Acoustic.

| **Table 24: Evaluation according to DS N º 38 of the MMA. Construction stage (Period Night.** | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum allowed NPC day period [DBA)].** | **Evaluation according to DS N º 38 of the MMA.** |
| 1 | 35 | 50 | Meets |

| Table 24: Evaluation according to DS N ° 38 of the MMA. Construction stage (Period Night. | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum allowed NPC day period [DBA)].** | **Evaluation according to DS N ° 38 of the MMA.** |
| 2 | 0 | 47 | Meets |
| 4 | 47 | 50 | Meets |
| F1 | 69 | 85 | Meets |
| F2 | 43 | 85 | Meets |

Source: **Annex 1.5** Acoustic Impact Study.

In the Previous tables It is appreciated that the projected noise levels are They are below the maximums established by the MMA DS N ° 38/11 in both day and night period.

### *1.5.11.3 Liquid waste*

#### *i. Wastewater*

Wastewater will be generated from the use of bathrooms, showers and sinks for a maximum of 600 people, which considering a provision of 100 L/person/day, will generate an effluent 60,000 liters/day, which is to be driven to a water treatment plant. The treated water will be used for humidifying and for the elaboration of the Mixture with Bischofita used in the stabilization of the roads during this phase.

The sludge generated will be removed by a clean truck pits every 6 months and Arranged at an authorized site.

For those fronts of work Distant from The sanitary services installed, will be counted on chemical baths. These will be withdrawn by an authorized

company and its contents will be arranged according to the legislation in force.

The number of baths and the volumes of water shall correspond to the provisions of DS No. 594/99 on basic sanitary and environmental conditions in the workplace and will consider a provision of 100 L/day, per person.

In this sense, during the construction phase we will proceed from the Following form:

- A copy of the current contract or order of purchase shall be kept in work between the undertaking and a sanitary undertaking, indicating the points authorized for the dumping of wastewater from chemical baths.
- The replacement of chemical baths and portable showers will be carried out every 2 or 3 days.
- A record of monitoring and monitoring of these wastes will be kept with the Documentation corresponding support.

#### *ii. Industrial liquid Waste*

In the construction phase, liquid waste will be generated from the washing of machinery that is carried out in the yard maintenance of machinery. By means of a collector grille placed on the contour of the concrete floor and connected to a watertight chamber, the residual water will be collected. Once the watertight chamber reaches 80% of its capacity will be emptied by means of the suction of its contents, which will be stored in solid containers that will be transferred to the warehouse of hazardous wastes temporarily for its subsequent handling, transport and Disposition according to what ESTABLCE ds n ° 148/03.

### *1.5.11.4 Solid waste*

#### *i. Solid waste assimilated to domestic*

It is estimated that a maximum of 18 ton/month domestic solid waste in each Construction stage ASE. This calculation comes from a maximum

approximate value of household waste generation of 1 kg/worker/day, considering a maximum of 600 workers/day.

The waste corresponds to quality waste similar to domestic sources produced by workers, which will be caused mainly by the consumption of food, remnants of paper wrappings, plastic, cardboard and other inert supplies of offices. These residues will be stored in plastic containers with lids that remain closed to avoid the proliferation of sanitary vectors and/or odors.

All waste will be removed and transferred by a company authorized by the Regional Health service to be deposited in an authorized place.

In the Table 25 The detail of the equivalent waste is given to domiciliary that will generate the project Monthly during the Construction stage.

**Table 25. Type and quantity of waste assimilated to domiciliary, construction phase**

| Type | Quantity (kg / month) |
|---|---|
| Leftover food | 4,511 |
| Papers and cartons | 4,843 |
| Plastics | 6,694 |
| Glasses | 1,952 |
| **Total** | **18,000 kg** |

Source: Self-elaboration.

For household waste, it is considered a temporary collection area in the installation of Task See background in the **Annex 10.4**.

Inside the enclosure will be located containers of solid material with lid, whose contents will be removed by a company that has sanitary authorization every 3 days and transferred to a close sanitary landfill approved by the sanitary Authority.

### *ii. Non-hazardous industrial solid waste*

Waste will be generated from the construction, assembly and unpacking of equipment, mainly wood scraps, cardboard, plastics and metals.

Containers will be counted on the different working fronts for the primary classification of the waste, then they will be classified according to their nature and arranged temporarily in an industrial waste collection yard, in the sector of Installation of operations.

Waste such as rubble, wood, ceramics, rubbers and textiles will be available in the nearest authorized dumps. Metal remains may be recycled through authorized companies.

In the Table 26 The detail of the industrial solid waste is given Will generate the project in yourS three PhaseS of construction.

**Table 26. Non-hazardous waste generated in The Phase of Construction**

| Type | Quantity (kg / month) | | |
|---|---|---|---|
| | **Phase 1** | **Phase 2** | **Phase 3** |
| Textiles | 359 | 116 | 175 |
| Rubbers | 719 | 233 | 351 |
| Ceramic | 1,078 | 351 | 526 |
| Cans | 539 | 175 | 262 |
| Woods | 216,320 | 70,211 | 105,317 |
| Remnants of Parts Metal | 1,797 | 583 | 875 |
| Debris | 12,943 | 4,204 | 6,308 |
| Papers and cartons | 45,428 | 14,759 | 22,138 |
| Plastic | 5,048 | 1,640 | 2,460 |
| **Total** | **284,231** | **92,273** | **138,413** |

Source: Self-elaboration

The removal of this type of waste will be made A1) Once every three months. In The collection enclosure for industrial solid waste, See more background In the **Annex 10.4**.

### *iii. Hazardous waste*

The waste of this type to be generated will have its origin in the different inputs used in the construction and maintenance of the machinery in the project area.

In the phase of Construction, hazardous waste will be generated in All The Phases. In The following table The detail of the hazardous industrial solid waste that will generate the project in its construction phase is given.

| **Table 27. Hazardous waste Generated In The construction phase** | | | |
|---|---|---|---|
| **Type** | **Quantity (kg / month)** | | |
| | **Phase 1** | **Phase 2** | **Phase 3** |
| Toner Of Printers | 7 | 3 | 5 |
| Used Oils | 627 | 301 | 452 |
| Oil and lubricant Buckets | 28 | 13 | 21 |
| Used Oil Filter | 77 | 37 | 55 |
| Paints, solvents and varnishes containers | 93 | 46 | 67 |
| Used Aerosol cans | 7 | 3 | 5 |
| Sand, sawdust or other absorbent material. | 56 | 26 | 39 |
| Batteries | 66 | 31 | 47 |
| Batteries | 5 | 3 | 3 |
| Contaminated cloths | 75 | 36 | 54 |
| **Total** | **1,042** | **499** | **748** |

Source: Own Elaboration.

Hazardous waste will be kept temporarily in containers with lids duly labelled. It will be fulfilled at all times to the DS N ° 148/03 in terms of its transitory disposition, transport and disposition. A warehouse of hazardous waste will be enabled, which will have The features described in The **Annex 10.5**.

## 1.6 Description of the operation phase

### 1.6.1 Parts, works and associated actions

The following activities will take place during the operation phase:

- Operation Plant Photovoltaic
- Operation of substation
- Operation LAT
- Maintenance

#### *1.6.1.1 Photovoltaic plant operation*

The Cielos de Tarapacá Photovoltaic Park will begin to Work CHen is have been installed and are operating The infrastructure for the connection of the project, that is, the high voltage line and the substations.

The total capacity of the project generation (600 MW) will be completed after Completed the Month 12 of the Year 5 OfL Planned Schedule

The photovoltaic process consists of the transformation of the energy solar ology in electric power and the operation of the modules is Evolution.

The main activities considered in the operation of the photovoltaic plant are presented below.

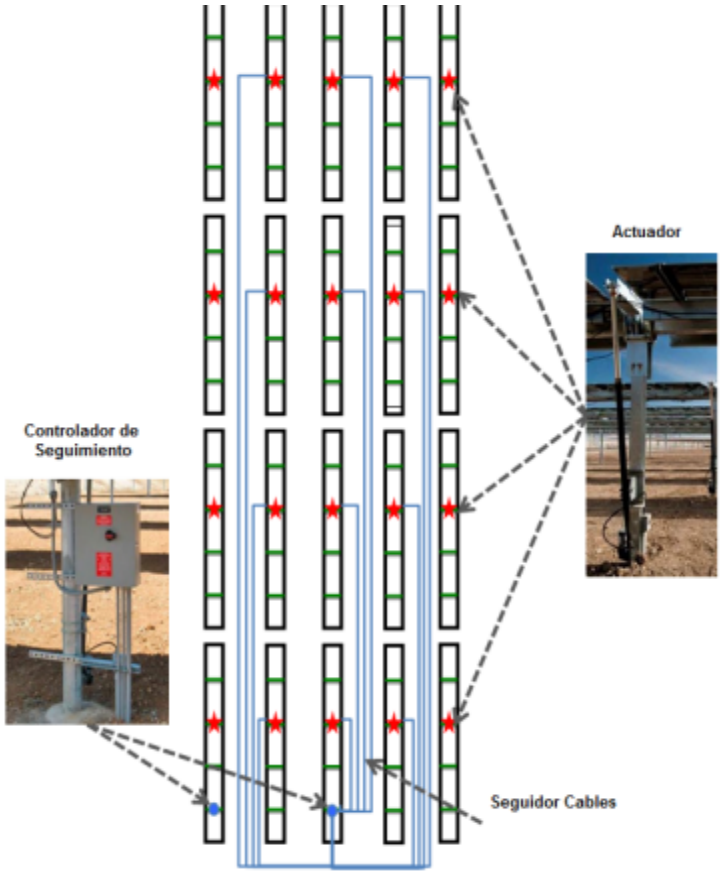
*i. Tracking System*

Each follower has an actuator which is operated by tracking controllers that send signals of power and control in order to rotate the horizontal axis of the follower and therefore the photovoltaic modules. The follow-up is carried out from east to west to follow the trajectory of the Sun (on a single axis) during the day maximizing the capture of solar filing.

Each tracking controller is capable of controlling up to 12 actuators approximately. The actuator is connected by a cable to the tracking controller as shown in the Figure エラー! 指定したスタイルは使われていません。-35. The tracking controller discriminates the position of the sun and sends a signal to the electric motor of the Actuator, which positions the photovoltaic panel in the position Optimal for MaXimizar The solar radiation

captured or in a horizontal position to reduce the aerodynamic load in the presence of strong winds.

***Figure* エラー! 指定したスタイルは使われていません。*-35. Outline of the Tracking System***




Source: Cielos de TARAPACÁ Spa

### *ii. Photovoltaic Park Monitoring*

The plant will have a global monitoring system that allows To monitor the state of the photovoltaic solar installations, through studies of the production of the fields, in an individual way (for each Inverter) or joint (for each investor group fully configurable). This system pErmite the data consultation and predictive treatment of the photovoltaic Park (studies of the evolution of the production), with which to detect differences of productions and therefore, possible defects in some installation (chains, inverter, etc.).

This system will also allow the elaboration of statistics (compared) of the productions of the different investors (or groups of investors) at different time scales and the generation of the turnover of each Meter.

*iii. Washing panels*

If weather conditions permit, the dry cleaning of panels will always be favoured in order to make the energy generation process more efficient.

If the above is not possible, the wash will develop with water, which drains to the ground and then evaporates, as it would if it were natural precipitations. It should be noted that cleaning is not considered the use of detergents, so water is not incorporated into any substance.

### *1.6.1.2 Operation of the substations*

In the operation phase, the substation will not have its own permanent staff. This will be monitored and remotely commanded from the Office of Operations, through telecommunications links via optical fiber and microwaves and by the park's maintenance staff.

This lift will be unattended (telecommanded). The presence of Personnel is considered only for maintenance activities. This process will be automated, and given these characteristics is that the project under evaluation does not require labor for its operation.

### *1.6.1.3 Operation Online Telectric Ransmisión*

*i. Activities of Inspection*

Annual terrestrial tours will be carried out for the visual inspection of the conductors, the structures and the suspension and anchorage assemblies of the structures. These inspections are intended to detect possible failures in the materials, as well as problems of soil erosion in the bases of the structures and traces of access, that could affect the stability of the structures and the continuity of the service of the work. Inspections shall be carried out once a year, for a period of 1 or 2 months, or any notice by third parties.

## 1.6.2 Estimated dates and work or action that begins

This phase contemplates the operation of all the components of the park, including its operation and its maintenance, both programmed and unscheduled. The project considers an indefinite useful life, while the project does not lack a strategic and economic justification for the renovation of equipment can continue working. A brief description of the project's development phases and related activities is presented below.

The following is the estimated date, duration and activity that stables the start and end of the operation phase:

**Table 28. Dates and duration of the operation phase**

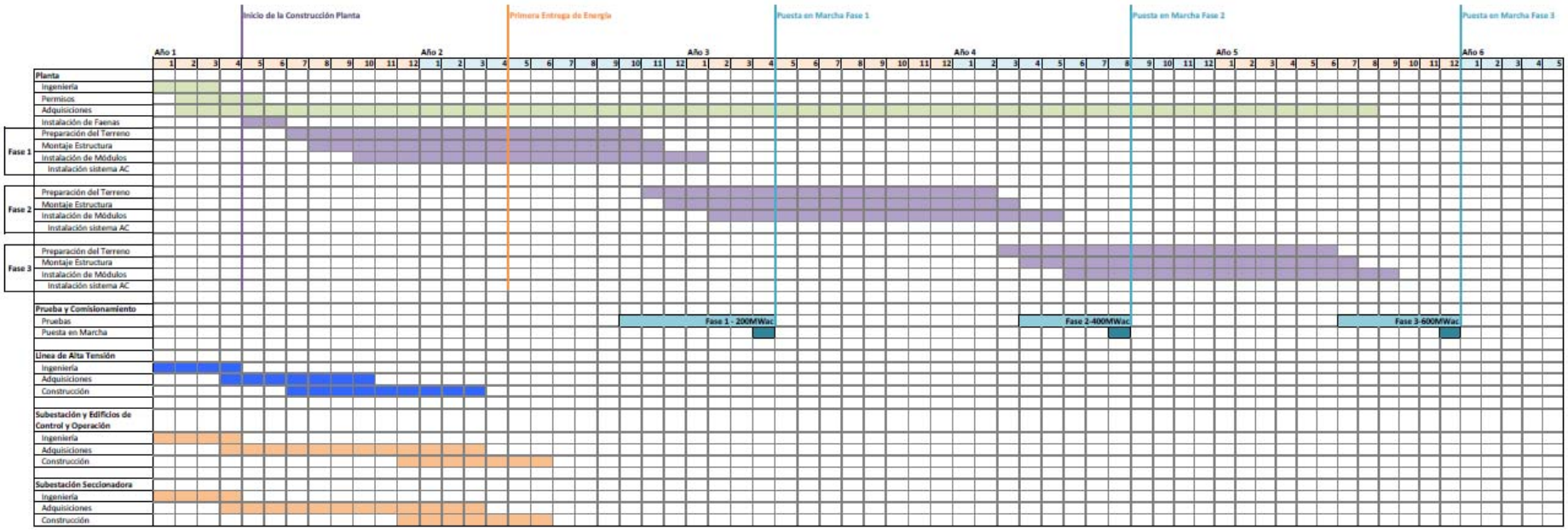
| Phase | Estimated Start date | Startup activity | Duration | Term activity |
|---|---|---|---|---|
| Operation | November 2016 | First delivery of energy. | Indefinite | End of modules operation |

Source: Self-elaboration

### 1.6.3 Timeline of the main parts, works and actions

is presented in the Table 29, The planning that describes the schedule for the implementation of the project in the Operation phase.

**Table 29. Schedule of activities for the operation phase**




Source: Own Elaboration.

### 1.6.4 Labor

For the operation and preventive maintenance activities of the project, personnel will be required to Full time of 10 people on average, being able to reach a maximum of 20 People, formed by plant operators, maintenance technicians and site security managers.

Staff will work under a shift system to meet the At all times with labor law, the respective permit shall be requested in the Regional Labor Directorate. The maintenance team will also be working during the night, doing maintenance work, when the plant is not producing power.

Additional manpower may be required for corrective maintenance activities but this will be assessed on a case-by-case basis.

### 1.6.5 Maintenance activities

Throughout the project's useful life, operation and maintenance personnel and external personnel, if necessary, will carry out preventive and non-scheduled maintenance activities; Which will be planned in advance according to the manufacturer's specifications. Emergency repairs are also considered within the activities which by their nature are not programmed.

The maintenance staff will be trained through an induction of those issues of environmental relevance that are part of the evaluation process of this project.

#### *1.6.5.1 Preventative Maintenance:*

The maintenance only consists of punctual work that goes from a few hours or a few days in a given month, and includes topics such as: maintenance of areas, maintenance of electrical equipment and power.

The Preventive maintenance protocol is mainly referred to routine inspections.

These preventive inspections are fixed in advance and for monthly, quarterly, semi-annual or yearly periods. As an example of the frequency and type of maintenance is presented to Continuation the Table 30**.**

| Table 30. Routine Maintenance protocol | | |
|---|---|---|
| **Team** | **Frequency** | **Task** |
| Photovoltaic modules | Quarterly | Is Visually inspect the modules In Search Of Breaks. |
| | | Modules are visually inspected to prevent discoloration. |
| | | Is Visually inspect The Wiring to check The Connections. |
| | | Is Visually inspect The Structure Of Mounting In for Detect The Oxidation And The erosion around In the Foundations. |
| | | Manual cleaning of localized wastes such as droppings Of Birds, etc. |
| | Semiannual | Is They clean the modules when Is Consider necessary. |
| Inverter | Semiannual | Is Perform controls Of Temperature In the Electrical switches And Finishes. |
| | | Is Visually inspect all LYou Main components and the Wiring Of Harnesses to revise discoloration Or Damage. |
| | | Is Measure The Levels Of Low voltage In the Power supply. |
| | | Is Inspects And Removes The Dust / Dirt In the Inside the cabinet. |
| | | Is Inspect seals Of The doors. |
| | | Is Check The Operation of the fan is adequate. |
| | | Is Inspects And Clean (It Replace if necessary) the Filters. |
| | | Is Check The Electrical terminations. |

| Table 30. Routine Maintenance protocol | | |
|---|---|---|
| **Team** | **Frequency** | **Task** |
| | | Is Check The Operation Of All The Security devices (Paro of emergency, The Door, switches, fault To Earth, etc.). |
| Anemometers And Weather Station | Quarterly | Inspection, calibration And Operational analysis. |
| | | Cleaning the components In the Station (Lens Pyranometer). |
| Transformers Of Medium Voltage | Semiannual | Is Performs control Of Temperature. |
| | | Is Inspect seals Door. |
| | | Is They record all the data on the meter. |
| | | Is Clean The Dirt/ Remains Of Magazine of low Tension. |
| Transformers In the Substation | Semiannual | Is Inspect Access Doors /Seals. |
| | | Is Inspected The Electrical enclosure and the Sensors wiring. |
| | | Is They record all the data on the meter. |
| Switches And Switchgear | Semiannual | Is Controls The Discoloration Of all the Equipment And Finishes. |
| | | Is Inspect the door seals. |
| | Annually | Is Check The Operation Of Opening/ Closing. |
| Airlines Of Transmission | Annually (and After Of Heavy rains) | Inspection Of all the Cables (corrosion, cutting Of Strands In the Drivers and the Angle Of The tower. |
| | | Visual inspection of the Supports/Insulators. |

| Table 30. Routine Maintenance protocol | | |
|---|---|---|
| **Team** | **Frequency** | **Task** |
| | | Visual inspection of The Discoloration In The terminations. |
| Way Access (roads) | Annually (and After Of Rains | Inspection In the Access roads And Roads What They go through drainage lines. |
| Building of maintenance | Semiannual | Review of the Detectors Of Smoke. |
| Ups | Annually | Is Performed A test of Operation to the equipment. |
| | | Inspection Of Fence To check Acts Of Vandalism and of Erosion In the Base. |

Source: Cielos de TARAPACÁ Spa

The basic or minor preventive maintenance of the electrical lines considers the washing of insulators with energized line, using the usual methodology applicable to high voltage lines; Visual inspection of structures and insulator chains; The realization of measurements of thermography, verification and maintenance of paints.

The inspection of insulators and structures along the entire line will be carried out in a pedestrian and vehicular form.

The measurement of thermography will be performed at least once every three years, along the entire line. No major equipment will be used, only handheld tools and remote measuring equipment such as Thermovisor.

The cleaning of insulators is done with demineralized water, which is charged to a specialized supplier.

If relevant, clearance work will be carried out of the safety belt, in order to maintain the imprint of LAT in optimal conditions. The The need for this action will be from the inspections carried out in the safety belt.

### *1.6.5.2 Corrective Maintenance:*

Corrective Maintenance is a response to unscheduled events that require special support, such as anomalies detected in maintenance Preventive, fault repairs What Compromise the continuity of the service, these are handled case by case with the appropriate resources. The interventions performed can be with or without service cut. Some examples of the main corrective maintenance events are listed in the Table 31.

**Table 31. Protocol for corrective Maintenance**

| Team | Task |
|---|---|
| Electrical installations And Control | Unexplained decline In the Tension Of Open circuit operation In The chain (s). |
| | Failure in the Follower Of Control Of System |
| | System of Monitoring detects electrical problems(s)-Different levels Of Alert. |
| | Cables, failures Of Electrical resistance |
| | Electrical Protection Devices- Switches, fuses, Etc.<br>- Failure Of Operation. |
| | Part AC failure Electric. |
| | Failure in Devices Of Interface Failure under conditions of operation And Reactive work. |
| Followers From a Axis | Bolt Failures Of Gear Of Transmission Of System. |
| | Screw faults Of Structure And Blocks. |
| | Failure in Photovoltaic module screws. |
| | Failure in the Cable connectors Of Photovoltaic modules. |

| Table 31. Protocol for corrective Maintenance | |
|---|---|
| **Team** | **Task** |
| | Failure in the System Of Transmission gear. |
| Investors | Replace Inverter IC-Board. |
| | Reset Of Inverter. |
| | Correct Lack Of Record-based Verifiers Of Oscilografía. |
| | Failure in Finishes AC and Dc. |
| | Reset Of Connectors Multi-pin, cooling fan failures, disconnect Of Cables AC and DC. |
| Anemometers And Weather Station | Fault repair (poor calibration, sensor, communication, etc.). |

Source: Cielos de TARAPACÁ Spa

### 1.6.6 Reque Rimientos of the Opera phase

#### *1.6.6.1 Health services*

In this phase there will be permanent facilities of sanitary services, destined to the use of the personnel of operation and maintenance. These facilities shall be composed of bath, sink and shower and shall be located within the operation and maintenance building and its quantity shall be that established in article 23 of DS No. 594/99.

For the treatment of wastewater, the use of A Treatment Plantor modular aerobic digestion. A major history of the particular sewer system in the **Annex 10.2.**

#### *1.6.6.2 Machinery and equipment requirements In maintenance*

Heavy machinery and generators will not be used during normal maintenance tasks. Generators could eventually be used in overnight work, for safety reasons (generators outside the substation electric room will be used for all

purposes except in emergency cases). Pick-up pickups 4x4 will be used for the displacement inside the photovoltaic park For operation and maintenance. Machinery and generators could be used for non-programmed maintenance, this will be analyzed case by case.

#### *1.6.6.3 Power*

A dining room/kitchen will be available in the O&M building which will be isolated from any source of contamination. It will also be equipped with potable water.

In this dining room the workers will be able to heat or prepare their food. The installation shall comply with the requirements established for this matter in the Ministry of Health, DS no 594/99.

#### *1.6.6.4 Vehicular Flow*

It is estimated that travel in the operation of the project will consist mainly of the transfer of personnel for maintenance. It's from the photovoltaic park and the substations, as well as the transfer of inputs, when necessary.

The following table shows LA projection of the Travel To Performed During the project's operation phase:

**Table 32. Estimated Vehicular flow for the operation phase**

| Activity | Travel[1] / year | Type of vehicle | Origin / destination |
|---|---|---|---|
| Waste removal | 168 | Proper vehicle (*) | Photovoltaic Park-Manager |
| Transfer of personnel in vans | 1,825 | 4x4 truck | Pozo Almonte- Photovoltaic Park |

(1) It is understood by travel a one way transfer and one return

(*) Due to the low amount of waste to be generated, the contractor must indicate the type of

vehicle most suitable for the transport of these wastes.

Source: Self-elaboration

Heavy equipment will not be used during normal plant operation. Operation and maintenance vehicles include pick-up 4x4 pickup trucks, used during O&M's daily activities.

#### *1.6.6.5 Waste Management*

Solid household waste shall be collected, transported and arranged by a specialized company authorized for this operation at least twice a week. Non-hazardous industrial waste shall be withdrawn by a specialized company and arranged in an approved final disposal site.

### 1.6.7 Inputs of the Opera phase

#### *1.6.7.1 Electricity*

The required electrical power will be self-supplied during the day. At night, it will be provided by extracting the energy through the plant substation. In case of The energy support systems detailed above will be used (see point 1.4.2 of this chapter).

#### *1.6.7.2 Water Drinking*

In the phase of operation of the project it will be necessary to supply potable water for the consumption of the operators and for the operation of the sanitary installations. An average demand of 100 liters of water per person a day is estimated, which must comply with the parameters of the Nch N ° 409 Of 2005, Potable Water-Part 1: Requirements.

Drinking water intended for consumption shall be provided by dispensing machines with bottles of 20 litres, service to be provided by an undertaking with the respective permits.

#### *1.6.7.3 Water for washing process*

For the process of washing panels (Cleaning the Modules), It has been

considered that such Process takes place Four times a year, this is considered a requirement for 9,826 $m^3$ Of Low-mineral water for annual maintenance, in case it is not feasible to implement cleaning in Dry. Water will be purchased through suppliers with extraction permits.

#### *1.6.7.4 Fuels*

The project does not include fuel requirements In PArch during the Phase of Operation.

#### *1.6.7.5 Maintenance supplies*

During the operation phase, only repair materials will be required for any failures in electrical equipment or modules.

The inputs used, are minor and eventual, and will be materials and/or spare parts that will be required by maintenance personnel.

**Table 33. They are Dangerous-operation phase**

| Product | Quantity stored | Unit | Activity |
|---|---|---|---|
| Gasoline | 65 | L/month | Eventual fuel supplies |
| Enamel spray | 769 | $Cm^3$/month | Trench marking |
| Protex Dsp | 33 | L/month | Anticorrosive for transformer connections |
| WD-40 | 769 | $Cm^3$/month | Lubricant, anticorrosive, multipurpose |
| Diesel oil | 1,691 | L | Substation Reserve Generator Tank/leased equipment (compressor, generator, etc.) |
| Nytro Hoist I | 146 | $M^3$ | Transformer Dielectric Oil |
| ABC Extinguishers Dry Chemical powder | 3,984 | Kg | Fire extinguishers |
| Hexafluoride SF6 Sulphur | 398 | Kg | Insulating Gas to break the electric arc In the power switches of the substation |

Source: Self-elaboration

### 1.6.8 Quantification and management of the products generated

The objective of the project is the generation of electric energy from solar energy, by installing a photovoltaic park that will have A potential of 600 MWGenerating Around 1,800 Gwh/AñOr. The energy will be supplied toL Project "Mirror of Tarapacá", allowing (in joint form) DeliveryR Renewable energy 24 hours a day to SING.

### 1.6.9 Location and amount of renewable natural resources to be extracted or exploited

During this phase, the extraction or exploitation of any type of renewable Natural resource is not envisaged.

### 1.6.10 Project emissions

#### *1.6.10.1 Emissions to the atmosphere*

During the project operation, emissions from the combustion of vehicles and suspended particles are expected to not Be Significant, since no constant emissions will be generated, only in case of transport of maintenance personnel.

It should be noted that the area of the project is not in a saturated area by any type of contaminant.

Below is The Table 34 What Summarizes the emissions generated during the operation phase:

**Table 34. Emissions estimation phase of project operation**

| Emissions operation | | | | | | | |
|---|---|---|---|---|---|---|---|
| Source Type | Emissions (Ton/year) | | | | | | |
| | Pts | MP10 | MP 2.5 | Co | Hc | $No_x$ | $SO_x$ |
| Total emissions | 8.24 | 3.11 | 0.31 | 0.03 | 0.01 | 0.12 | 0.00 |

Source: Own Elaboration.

### *1.6.10.2 Noise*

| Table 35: Evaluation according to DS N ° 38 of the MMA. Operation phase (Daytime period). | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum Allowed NPC Daytime period [DBA)].** | **Evaluation according to DS N ° 38 of the MMA.** |
| 1 | 15 | 55 | Meets |
| 2 | 0 | 64 | Meets |
| 4 | 21 | 61 | Meets |
| F1 | 61 | 85 | Meets |
| F2 | 25 | 85 | Meets |

Source: Own Elaboration.

| Table 36: Evaluation according to DS N ° 38 of the MMA. Operation phase (Period Night. | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum Allowed NPC Daytime period [DBA)].** | **Evaluation according to DS N ° 38 of the MMA.** |

| Table 36: Evaluation according to DS N º 38 of the MMA. Operation phase (Period Night. | | | |
|---|---|---|---|
| **Point** | **Projected level Exclusive contribution [DBA)].** | **Maximum Allowed NPC Daytime period [DBA)].** | **Evaluation according to DS N º 38 of the MMA.** |
| 1 | 50 | 55 | Meets |
| 2 | 47 | 64 | Meets |
| 4 | 50 | 61 | Meets |
| F1 | 61 | 85 | Meets |
| F2 | 25 | 85 | Meets |

Source: Own Elaboration.

In the table above Is It appreciates that the projected noise levels are below the maximums established by the MMA DS N ° 38/11, Both in the daytime and at night.

#### *1.6.10.3 Liquid waste*

##### *i. Wastewater*

In the operation of the project, the wastewater generated will be the product of the operation and maintenance activities carried out to the photovoltaic park. Permanent health Service facilities for the use of staff shall be counted; These facilities will be composed by bathroom, sink and shower and will be located in the operation and maintenance building.

For the treatment of wastewater, the use of A Modular treatment Plant for aerobic digestion. A major history of the particular sewer system in the **Annex 10.2.**

#### *ii. Industrial liquid Waste*

The only industrial liquid residue that can 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 demineralised water (without detergents). If soil and dust conditions permit, dry cleaning will be done to eliminate the need for water use during the cleaning of the modules.

If water is used, it will drain to the ground and then evaporate, as it would if it were natural precipitations. It should be noted that cleaning is not considered the use of detergents, so water is not incorporated into any substance.

As indicated above, this liquid residue does not require treatment and will drain onto the poster modulesIormente fall on the ground.

### *1.6.10.4 Solid waste*

#### *i. Solid waste assimilated to domestic*

Solid wastes assimilated to domestics will be generated by the operation and maintenance activities required by the photovoltaic park. A maximum generation of up to 1 kg/day/person is estimated.

The handling of these Waste, will be similar to that described for the construction phase. Then in The Table 37 The detail of the residues assimilated to domiciliary that will generate the project in its phase of operation is given.

| Table 37. Residues assimilated to Domiciliary Generated in the Phase of Operation | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Leftover food | 104 |
| Papers and cartons | 210 |
| Plastics | 286 |
| **Total** | **600** |

Source: Own Elaboration.

### *ii. Non-hazardous industrial solid waste*

The industrial solid waste generated during this phase of the project will be caused by spare parts, cables, among others, in very low quantities.

These wastes will be arranged temporarily in a site specially authorized to be then arranged in dumps approved or well recycled, depending on the nature of the waste.

In the Table 38 The detail of the industrial solid waste that will generate the Project in its operation phase.

| Table 38. Non-hazardous waste generated In the phase of Operation | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Textiles | 595 |
| Rubbers | 397 |
| Woods | 590 |
| Cans | 1.985 |
| Remains Of Parts Metal | 5,958 |

| Table 38. Non-hazardous waste generated In the phase of Operation | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Oil | 47 |
| Papers And Cartons | 114 |
| Plastic | 13 |
| **Total** | **9.699** |

Source: Self-elaboration

As for the Collection and management of Sól Waste Gone, it will be used The same system established for The construction phase.

### *iii. Hazardous waste*

It is estimated that product of the maintenance and cleaning activities of the project facilities will generate a quantity Approximate of 10 ton/year of hazardous waste, which is why it will not be necessary to develop a hazardous waste management Plan.

In the Table 39 The detail of the hazardous waste that will generate the project in its operation phase is given.

| Table 39. Hazardous waste generated in The Phase of Operation | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Toner of printers | 3 |
| Containers Of Spray Used | 2 |
| Used Batteries | 759 |
| Batteries Used | 8 |

| Table 39. Hazardous waste generated in The Phase of Operation | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Containers of coolant used | 5 |
| Contaminated cloths | 7 |
| Tubes Fluorescent | 16 |
| Filters of air | 16 |
| Scrap Electronic Computers Etc. | 16 |
| Painting solvents, acids | 2 |
| **Total** | **834** |

Source: Self-elaboration

As for the Collection, identification and management of Dangerous waste left, it will be used The same system established for The construction phase.

### 1.6.11 Management of chemical products

The following hazardous substances can be found within the substation:

Mineral oil: This oil will be free of Polychlorinated Biphenyls (PCB) as set out in exempt resolution SEC No. 610/80. It will be located inside the power transformers, which is used as a means of electrical insulation between the coils of each phase of the transformer. This oil is highly flammable at the time of a failure within the transformer. To avoid environmental contamination by some oil leakage from one of the power transformers, they are installed on an oil-collecting basin. In any case, if an oil or chemical spill is produced, an element will be applied Absorbent (sand, sawdust or other element), which will be collected and handled as hazardous waste. This means That will be

deposited in one or more solid containers that will be transferred to the warehouse of hazardous waste until the time of its final disposition.

These substances will not be stored as inputs, but are part of the equipment to be used.

## 1.7 Description of the dropout phase

The lifespan of the project is indefinite. This is achieved through the continuous renovation of the equipment according to the inspection and maintenance programs and the incorporation of technological innovations.

In the event that a phase of abandonment of the project is considered or necessary, all the legal and environmental requirements in force will be fulfilled, the mechanical and other elements will be removed in disuse, they will be transferred for reuse, recycling or they will be available In accordance with the regulations in force at an authorized location.

The manpower to be required for dismantling and the equipment, as well as the facilities corresponds to 75 People, on average, covered a maximum of 100 People.

This phase will take place, only in the event that the project lacks strategic and economic justification for the renovation of equipment. This phase is to dismantle the physical works and restore the conditions of the site, reaching the same aspect that the area had prior to the development and operation of the project.

Below In the Table 40, it is The following table shows the estimated date, duration and activity that stables the start and End of phase of abandonment.

**Table 40. Dates and duration of the abandonment phase**

| Phase | Estimated Start date | Startup activity | Duration | Term activity |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Abandonment | does not apply * | Dismantling facilities | 8 months | Closing and closing of installations |

(*) LA useful life of the project Is considered indefinite, so it is not possible to indicate a start date for this phase, however it is possible to define the start and end activity of an eventual phase of abandonment. Source: Own Elaboration.

### 1.7.1 Dismantling of permanent constructions

All constructions that are feasible to dismantle will be dismantled. The concrete works will be demolished and covered so that they are not seen in this way.

All equipment and devices that were used in the project operation will be removed.

#### *1.7.1.1 Photovoltaic Park*

The following describes the operations to be carried out for the dismantling of the Cielos de Tarapacá Photovoltaic park in the eventuality of a potential closing phase, in such a way as to restore the land to the pre-construction conditions, Minimizing the environmental impact.

The grounds where the park sits are eminently deserts, which reduce the number of possibilities of use. The characteristics of the vegetation, the soil and the topography will allow the whole terrain to recover the condition that is present.

Once the useful life of the project has been completed, the actions to be executed will be as follows:

- Dismantling of all the elements: photovoltaic modules, inverters, grouping panels, medium voltage stations, transmission lines, etc.
- Restoration of the occupied areas.

*i. removing modules*

EN first place the modules will be disconnected. Later and without any other means than the manual, the photovoltaic modules will be dismantled.

### *ii. Dismantling of tables*

EL dismantling of the followers with Sistirá basically in the MbToLaje of the structures that support the modules. Then the structures will be removed and piled up in a place destined for it, from which They will be loaded to a truck for their Definitive transport by an authorized material transport company to an authorized recycling site.

### *iii. Dismantling of electrical and electronic equipment*

SE Proceed to disconnecting, dismantling of grouping boxes, inverters, Medium voltage Transformers, ECP and PVCS. The metal components will be recovered for recycling. The remainder will be transported to an authorized manager for their final disposition.

In summary, the disconnection of all electrical equipment will be done manually together with the dismantling of the components, stacking and loading of the parts to trucks.

### *iv. Removal of foundations and buildings*

En This stage is proceeded to carry out the removal of the foundations of the ECP and PVCS. In turn the building of operation and maintenance is dismantled and later its foundations.

### *v. Perimeter grating Dismantling*

Final the perimeter gate is removed from the site, they will be piled up in a place destined for it from which they will be loaded to a truck for its definitive transport.

The recycling of the industrial material is contemplated as beams, tables, gratings, structures of the line, conductor cable of the transmission line, etc.

## *1.7.1.2 Photovoltaic Park substations*

All the equipment that make up the substation will be dismantled. These will be collected in the enclosure for this purpose, depending on the type of waste.

Finally they will be withdrawn by a company authorized for their recycling or final disposal in some enclosure authorizes of the region.

#### *1.7.1.3 Transmission line*

For the abandonment of the project, we will proceed from the Following form:

*i. Transmission line Disconnect and equipment*

Sand proceed to Energize The transmission line connected to the electrical substation and the equipment; To carry out these manoeuvres it will be necessary to take all the safeguards required for the protection of the people who participate in the activity.

*ii. Dismantling of equipment and structures*

Sand dismantle equipment and structures. The metal components will be recovered for recycling. The remainder will be transported to an authorized manager for their final disposition.

*iii. Civil works removal and land restitution*

There may be demolished in whole or in part in the case of deep foundations. Ground conditions will be restored to their original state by using soil binders.

Since the terrain will not receive practically pre-and therefore The condition on the soil will be minimal, the site will be almost as in its previous state.

### 1.7.2 Restore the Geoforma or morphology

The cutting and handling of the small slopes will continue as far as possible the dominant topography and the material removed during the field preparation activities for the followers, roads and works referred to in the project, shall be arranged uniformly on the Surface of the terrain in order to give continuity to the existing topography. This will keep the Geoforma Or morphology of the terrain, therefore, no significant restoration activities will be required.

As for the restoration of flora and fauna, the site of the project is eminently desert, which reduces the number of possibilities of use. The form of

intervention of the project, characteristics of the vegetation, the soil and the topography will allow in this case that all the terrain is available, as it is presently.

### 1.7.3 Prevention of Future emissions

The emissions envisaged in the event of an eventual phase Of abandonment are the following:

#### *1.7.3.1 Atmospheric emissions*

It is anticipated that in the eventual phase of closure and abandonment, emissions of particulate matter and combustion gases will be of a low magnitude, as they are restricted to the dismantling tasks of the installations.

The following table details the summary of particulate matter emissions of breathable size MP10, MP 2.5, carbon monoxide (CO), oxides of nitrogen (Nox), sulphur oxides (Sox) and hydrocarbons/volatile organic compounds (HC/COV), respectively, estimated for the phase of abandonment of the project.

**Table 41. Summary of total atmospheric emissions phase of abandonment (t/year)**

| Activity | Total calculated emissions (t/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Pts | MP10 | MP 2.5 | Co | Hc | Nox | Sox |
| **Abandonment** | **59.69** | **19.76** | **3.76** | **6.81** | **1.59** | **28.79** | **1.00** |

Source: Self-elaboration

From the table above it follows that emissions during the abandonment phase will be lower than those of the construction phase, mainly because of the absence of the movements of Earth (see **Annex 1.4** Report of atmospheric emissions estimation).

Considering the background The three phases of the project, the result of the estimation of emissions indicates that the higher emission of pollutants corresponds to Nox and PTS (total suspended particles) during the construction phase of the project, product of the operation of machinery and generators for the case of Nox and product of land movement and vehicular transit for the PTS case.

The emissions generated in the operation and abandonment of the project will be Low, and according to a project of this nature. It should also be noted that the drop-out emissions are limited to 8 months.

Measures to reduce the generation of dust suspended will be similar to those adopted DThe construction phase.

#### *1.7.3.2 Noise*

In the closing and abandonment phase it is anticipated that the noise generation during the dismantling of the works will be similar to that of the construction phase of the project, however it is possible that at that date the distribution of the receiving points is different from the current one. It is expected to carry out a simple analysis of the population or potential recipients before the eventual dismantling of the park in order to verify compliance at the time of abandonment.

#### *1.7.3.3 Liquid waste*

##### *i. Household liquid Waste*

In this phase, water will be generated from the use of bathrooms, showers and sinks for a maximum of 100 People, which will generate 100.0100 liters of effluent a day.

Will be enabled Chemical baths or sanitary facilities will be used To be found Still operationals of the Operation stage. For those works fronts that are located more than 75 m away from the sanitary services installed, will be counted on chemical baths. The waste will be arranged according to the legislation in force.

The chemical baths will be installed and maintained by a company authorized by the health service, will be withdrawn every two or three days and disposed its content in an authorized place, being able to correspond this, to the sewer network managed by a company for which the respective agreements must be established. A record of the monitoring and control of these wastes will be kept, with the documentation corresponding support.

#### *ii. Industrial liquid Waste*

In order to minimize the generation of some residual liquid, the equipment containing them will be removed complete, i.e. they will not be disassembled in the place, therefore this activity must be carried out in a place that has the appropriate conditions for its development and authorizations that are relevant.

As regards the operation of machinery, trucks and minor vehicles employed in this eventual phase of abandonment, in the same way as in the construction phase, these operations shall be required to be carried out outside the limits of the site of the project, In a place that has the appropriate conditions for its development and authorizations that are relevant.

### *1.7.3.4 Solid waste*

#### *i. Domestic solid waste*

In the abandonment phase, domestic solid waste will be generated that will be temporarily stored in plastic bags inside closed containers. It is considered the generation of 1 kg/day/person of waste assimilated to domiciliary, considering a maximum workforce of 100 People, an estimated generation of 3 ton/month. Handling is Cough Waste, will be similar to that described for the construction phase.

In the following table It gives the detail of the waste assimilated to domiciliary that will generate the project in its phase of abandonment

| Table 42 Residues assimilatible to Domic The iliads generated in the Phase From abandoned. | |
|---|---|
| **Type** | **Quantity (Kg / month)** |
| Leftover food | 596 |
| Papers and cartons | 821 |
| Plastics | 1,162 |
| Glasses | 420 |
| **Total** | **3.000** |

Source: Own Elaboration.

### *ii. Non-hazardous industrial solid waste*

In the abandonment phase, solid waste will be generated from the dismantling of the equipment. Depending on the Conditions, they will be sold for reuse or recycling. On the contrary, all the waste material will be duly stored and arranged at a final disposal site, according to the normative bodies in force at that date.

As for the Collection, identification and management of Sól Waste Gone, it will be used The same system established for The construction phase.

The estimated quantities of industrial solid waste are reported in the following table.

| Table 43. Non-hazardous waste generated in The Phase of Abandonment | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Textiles | 829 |
| Rubbers | 1,106 |
| Ceramic | 1,382 |

| | |
|---|---|
| Cans | 553 |
| Woods | 157,374 |
| Electrical equipment and structures | 10,753,519 |
| Debris from demolition of buildings | 2,200,605 |
| Papers and cartons | 34,945 |
| Plastic | 3,883 |
| **Total** | **13,154,195** |
| **Type** | **Amount You.)** |
| Photovoltaic modules. | **6.6 million** |

Source: Elaboration Own

According to what is established In the documents presented in the **Annex 1.3**, photovoltaic modules They are not hazardous waste, which is why disused panels will be arranged in a landfill controlled and authorized by the health service.

The industrial solid waste generated will be transferred for final disposal to a controlled landfill with sanitary authorization.

### *iii. Hazardous waste*

The type and quantity of waste hazards at this stage of abandonment, it is Present In the Table 44.

| **Table 44. Hazardous waste Generated in The phase of Abandonment** | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Toner Of Printers | 3 |
| Used Oils | 278 |
| Oil and lubricant Buckets | 13 |

| Table 44. Hazardous waste Generated in The phase of Abandonment | |
|---|---|
| **Type** | **Quantity (kg / month)** |
| Used Oil Filter | 34 |
| Paints, solvents and varnishes containers | 42 |
| Used Aerosol cans | 3 |
| Sand, sawdust or other absorbent material. | 24 |
| Batteries | 725 |
| Batteries | 3 |
| Contaminated cloths | 33 |
| **Total** | **1,159** |

Source: Own Elaboration.

It will be fulfilled at all times to the DS N ° 148/03, in terms of its transitory disposition, transport and final disposition. It will also enable AA warehouse of hazardous waste. More background in the **Annex 10.5**.

### 1.7.4 Basic Supplies

#### *1.7.4.1 Drinking water*

In the phase of abandonment of the project, a total of 100 litres per person of potable water will be available, complying with the requirements of DS no 594/99 on basic sanitary and environmental conditions in the workplace.

The number of bathrooms, washbasins and showers will also be in accordance with the provisions of DS No. 594/99.

The water for the sanitary installations will be provided by the nearest sanitary company, transferred by means of a tank truck and stored in ponds.

Drinking water intended for consumption shall be provided by means of

dispensing machines with a bottles of 20 litres, service to be provided by a company with the respective permits.

### *1.7.4.2 Health services*

Chemical baths will be enabled or those still operating as part of the existing infrastructure will be used. For the treatment of liquid waste, the wastewater treatment plant will be used.

For those work fronts that are located more than 75 m from Distance of the sanitary services installed, will be counted on chemical baths.

### *1.7.4.3 Machinery*

The machinery to be used in the abandonment phase corresponds to those presented in the Table 45**.**

**Table 45. Construction phase Machinery**

| Activity | Machinery | Amount |
|---|---|---|
| Disassembly, dismantling and removal of Civil Works | Excavator | 1 |
| | Crane Fork All Terrain | 8 |
| | Mini Forklift Trucks / Bobcat or similar | 5 |
| | Loader Retroexcabadora 2 | 2 |
| | Telescopic Crane Truck | 1 |
| Land restoration | Grader | 2 |
| | Scraper Tractor | 1 |

Source: Cielos de TARAPACÁ Spa

### *1.7.4.4 Electricity*

For the various tasks of the eventual phase of abandonment during all its duration, the electric energy will be provided by two (2) generators of 100 kw,

one (1) generator of 50 kw and one (1) generator of 7.5 kw.

### 1.7.5 Maintenance, conservation and supervision that are Necessary

Once the permanent constructions are dismantled and the Geoforma Of the area affected by the project, it will not be necessary to carry out maintenance, conservation and/or supervision activities in the areas involved.

In summary, after the abandonment phase, no future emissions are contemplated from the site of the project that would affect the ecosystem.

| Annexes Chapter 1 | |
|---|---|
| 1.1 | Owner's background |
| 1.2 | Plans |
| 1.2.1 | PFV plane |
| 1.2.2 | LAT plane |
| 1.2.3 | SEE Map |
| 1.2.4 | SES plane |
| 1.2.5 | Plane roads and accesses |
| 1.2.6 | Flat Of Architecture Plant Building Electrical Room |
| 1.2.7 | Interconnection plane North transmission line. |
| 1.2.8 | Plan installation of North Slaughter |
| 1.2.9 | Installation Plan South |
| 1.2.10 | Plane internal roads |
| 1.3 | Technical specifications of the modules |
| 1.4 | Emissions estimation |
| 1.5 | Acoustic Impact Study. |
| 1.6 | Study of electromagnetic fields |
| 1.7 | Photomontages |