

Chapter 10 B:

Sectoral Environmental Permits

EIA Espejo de Tarapacá

Región de Tarapacá Chile

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Prepared by:



Environmental management Consultants S. A
Father Mariano 103 Of. 307
7500499, Providencia, Chile
Phone: + 56 2 719 5600
Fax: + 56 2 235 1100
www.gac.cl

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10. PERMISSIONS ENVIRONMENTALIS SECTORALIS

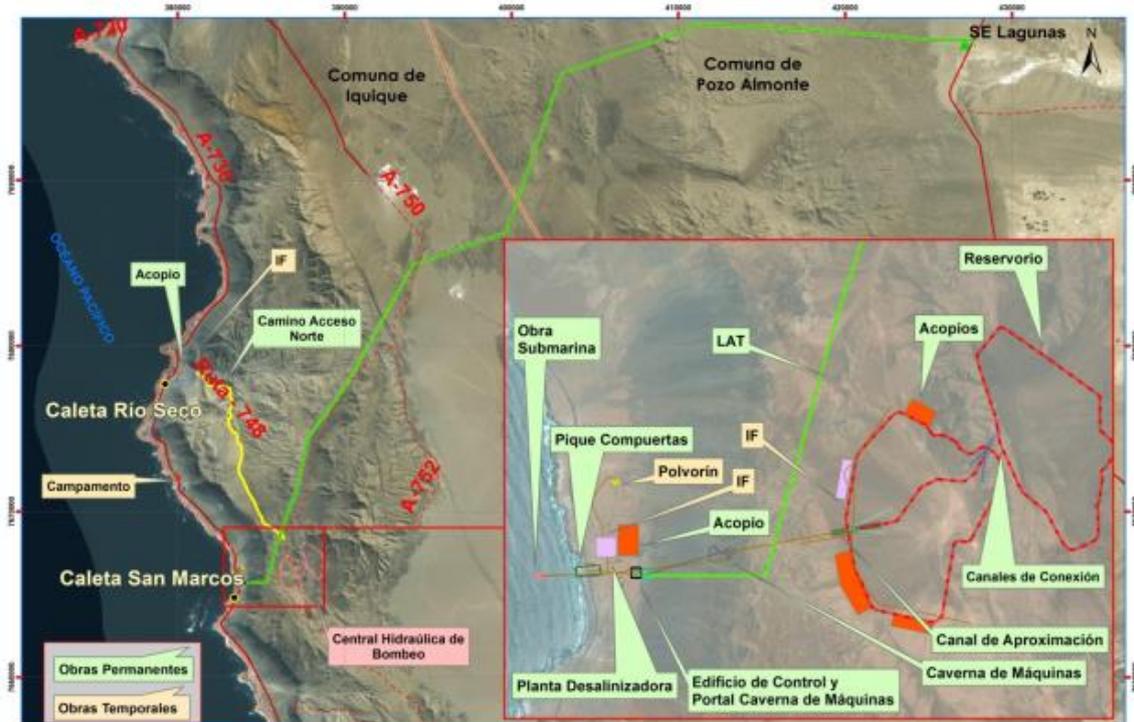
10.1. Introduction

The project of hydro-pumping plant with seawater "Espejo de Tarapacá" will be located in the communes of Iquique and Pozo Almonte, province of Iquique, Región de Tarapacá, approximately 100 km south of the city of Iquique. The nearest towns are the River Seco Cove, next to a project path and 14 km further south, Caleta San Marcos, located at 500 m from the project.

The project consists of the installation and operation of a reversible hydraulic power plant, i.e. the same machines function as pumps in a sense of water circulation or as turbines in the other direction, corresponding to the pumping modes, form of operation to Throughout the day, and generation mode, during the night, where The water accumulated in the reservoir will flow by gravity into the sea, generating energy.

An annual average generation of 1.75 is estimated Gwh/day, which will be injected to SING through the Lagunas substation, belonging to the company Transelec S.a. In the following figure you can see the location of the works of the project.

Figure 10-1. Works of the project.



Source: Self-elaboration

This chapter responds to the requirements laid down in article 18, literal L) Of the DS 40/12 MMA, regulation of the environmental impact assessment system, which indicates that within the contents of an environmental impact study, the plan of compliance with the associated environmental legislation should be indicated, including the "List of permits and sectoral environmental pronouncements applicable to the project or activity".

Based on the foregoing, and considering the activities and works associated with the implementation and operation of the project, the following sectoral environmental permissions are included:

Table 10-1: Sectoral environmental Permits To Applicable to QProject.

| Pas | Description | Request |
|---------|--|---|
| PAS 115 | Permission to introduce or unload materials, energy or harmful or dangerous substances of any kind into the waters under national jurisdiction. | The project contemplates the discharge of seawater in the energy generation process. |
| | | The project considers the installation of a desalination plant, the effluent of which will be in brine of rejection to be discharged to the sea. |
| PAS 119 | Permission to conduct research fishing | The project needs to carry out exploratory fishing for the monitoring of the condition of populations of hydrobiological species. |
| PAS 126 | Permit for the construction, repair, modification and extension of any installation designed for the handling of sludges of sewage treatment plants. | The project requires the granting of this sectoral permit as it will generate sludge from 3 plants of wastewater treatment, of the type of activated sludge. |
| PAS 132 | Permission to make excavations of archaeological, anthropological and paleontological type. | The project requires this sectoral environmental permit as it will carry out works in areas where archaeological finds exist. |
| | | The project requires this sectoral environmental permit as it will perform works in areas where there are paleontological findings. |
| Pas 138 | Permit for the construction, repair, modification and extension of any public or particular work destined for the evacuation, treatment or final disposal of drains, sewage of any kind. | The project will generate wastewater to be managed by a particular sewage system, connected to 3 modular plants of the type of activated sludge. |
| PAS 139 | Permission for the construction, repair, modification and extension of any public or particular work intended for the disposal, treatment or final disposal of industrial or mining waste. | The project considers the installation of a desalination plant, the effluent of which will be in brine of rejection to be discharged to the sea. |
| | | The project contemplates the installation of 2 concrete plants, located in the San Marcos and reservoir slaughter facilities, which will have sectors of washing of the gutters and Concrete Mixers of the trucks used. |
| PAS 140 | Permission for the construction, repair, modification and extension of any waste and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or disposal End of rubbish and waste of any kind. | The project includes temporary storage of non-hazardous domestic and industrial waste. |
| | | The project envisages the implementation of 5 stocks of excavation Material, whose main objective is to collect the waste from the extracted marine and the surplus materials of the excavations carried out. |
| PAS 142 | Permit for any site intended for the storage of hazardous waste | The project contemplates the temporary storage of hazardous waste. |
| PAS 146 | Permission for the hunting or capture of specimens of animals of protected species for research purposes, for the establishment of breeding centres or breeding grounds and for the sustainable use of the resource. | The project contemplates the capture of specimens of protected species for the implementation of the rescue Plan and relocation of individuals belonging to this group. |
| PAS 155 | Permission for the construction of certain hydraulic works | The project envisages for its operation, will implement works whose storage capacity will be greater than fifty |

| Pas | Description | Request |
|---------|--|---|
| | | thousand cubic meters and the associated aqueducts will have a flow greater than two cubic meters per second. |
| PAS 157 | Permission to carry out works of regularization or defence of natural channels | The project requires the granting of this mixed sectoral environmental permit, because it must have the approval of the Directorate General of Waters (DGA) for the impact of two natural streams by the development of a new projected path. |
| PAS 160 | Permission to subdivide and urbanize rural land or for constructions outside the urban limits. | The project considers the construction of works located outside the urban limits. |

Source: Self-elaboration

The background required for the application of each sectoral environmental permit is described below.

10.2. Sectoral environmental Permit 115

Permission to introduce or unload materials, energy or harmful or dangerous substances of any kind to the waters subject to the National jurisdiction.

Permission to introduce or unload materials, energy or harmful or dangerous substances of any Species to waters under national jurisdiction shall be that established in article 140 of DS No. 1 of 1992, of the Ministry of National Defence, regulations for the Control of aquatic pollution.

The requirement for its granting is that the introduction or unloading of substances, energy, or harmful or dangerous materials of any kind into waters subject to national jurisdiction, does not generate adverse effects on hydrobiological species or Aquatic ecosystems.

The consist projectE in a Hydraulic Pumping StationTaking advantage The Level that occurs between the coastal edge and the adjacent cliff that exceeds the 620 M of height In the area of the reservoir, making use of a sea water intake/discharge. For this reason, the discharge of seawater is the one that requires the granting of this sectoral permit.

The technical and formal contents that accredit their compliance are as follows:

10.2.1 Description of the Installation and its E systemVacuación

Although this project has been described in five environmental sectors: Submarine Sector, Sector Underground Sector Coast Plateau Sector And Pampa Sector, for the purposes of the application of PAS 115, those whose works are specifically associated with the discharge process are described, corresponding to:

- Submarine Sector
- Underground Sector
- Plateau Sector

10.2.1.1 Submarine Sector

Figure 10-2: Location REferencial of Works submarine Sector.



Source: Self-elaboration

The submarine sector aims to carry out the intake and discharge of seawater and the effluent generated, respectively, through the designed underwater intake and discharge. The Detail of the location and coordinates of each of them is indicated in the CHapter 15 Appendix, annex 1.2 Location plan with project works and annex 1.3 coordinate table.

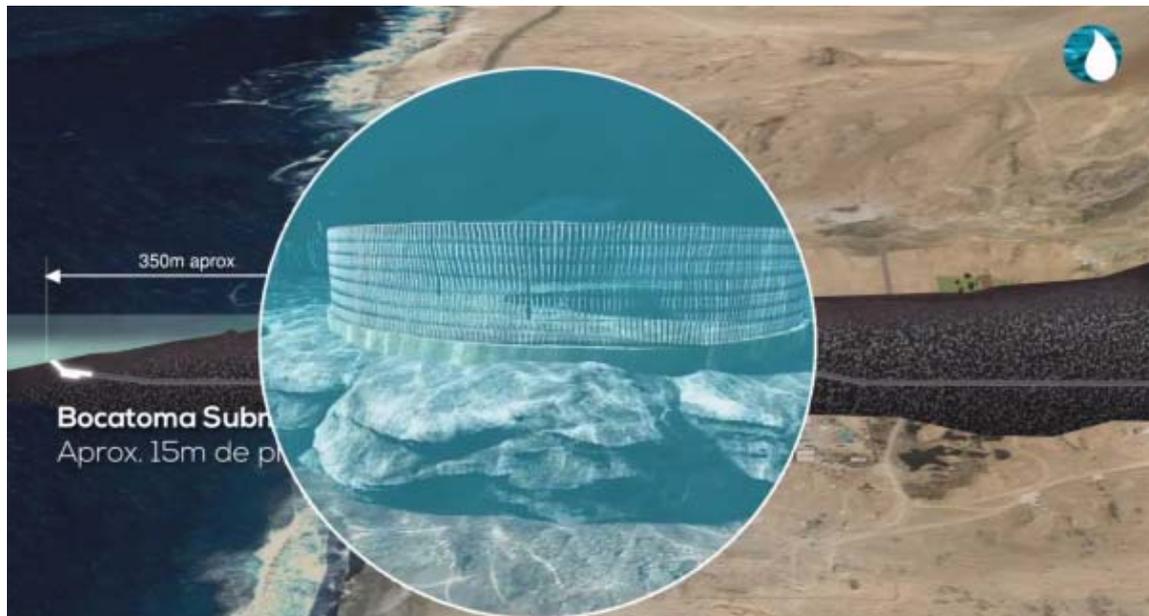
i. Underwater Take and unload

The work of taking and unloading submarine is located approximately At Cota-16 meters m. And it has two structures that surround it. Its location coincides with a sea-bottom sector that

corresponds to quite a couple of rock outcroppings. From this work the water is taken to be uploaded to the reservoir in pumping mode and from this work water is discharged into the sea in generation mode.

The diameter of the intake which will surface at the underwater bottom from the lower tunnel, approximately 343 m from the coast, shall be about 5 m and protected by the work of taking and unloading. This one considers a concrete ring of 16 m diameter and 1 m of height anchored on rock. On this ring will be installed a protection side fence of about 5 m AlturA with a 50 mm passing light and 10-plate Mm. At the top, In the center a lid Solid of 10 m in diameter and around this lid, a top protection grating of the same faceCterísticas that the side gate until reaching 16 m in diameter and thus close the entire underwater work.

Figure 10-3: Submarine takeover and discharge work.



Source: Self-elaboration

10.2.1.2 Underground Sector

Figure 10-4: Referential location of underground works.



Source: Self-elaboration

The underground sector comprises the following main works: Lower tunnel, Machine cave, pressure and Upper tunnel, whose objective is to pump the seawater during the day, to drive it through the tunnels mentioned to the reservoir Projected, and later, during the night, to redirect it by means of the same system, until its restitution to the sea, in the submarine sector (See section 10.2.1.1 Submarine Sector). Based on the above, the works that compose this sector are described below. The detail of the location and coordinates of each of them is indicated in EL Chapter 15 Appendix, annex 1.2 location plane with LAs works of the project and annex 1.3 coordinate table.

i. Inferio TunnelR

The lower tunnel is located between the sea And the Cave of machines. Part of this tunnel is below the bottom of the sea, then continues under the coastal plain and ends under the cliff.

At the beginning of the lower tunnel, under the bottom of the sea, begins with a section with inclination of 71 ° and about 15 m of length. This corresponds to a Norwegian shot, What is to

build The exit of the tunnel from the inside of this, Dynamiting the section that would be missing for digging out, to continue with Inclination 16% About 81 m long.

These correspond to The first 2 sections. There are 5 Following (7 Sections In total for tunnel INferior):

- Section 3: (0.2%; 114 M
- Section 4: (10%; 396 m)
- Section 5 (Pique Gate): (0.5%; 22 M
- Section 6: (10%; 390 M
- Section 7: (01%; 792 M

These 5 remaining sections have an approximate length of 1714 M to Cavern of machines.

In the elbow that joins the first two sections of the lower tunnel mentioned above, the stone trap will be located, consisting of a cavity that aims to receive the rock fragments from the seabed that will be detached when the connection is made Submarine by means of a controlled blasting called "Norwegian tyre", so as not to obstruct the lower tunnel and allow adequate entry and exit of water for the pumping and generation respectively.

Because Lower tunnel It is in an area of low internal pressures and that the quality of the rock allows it, In general It is contemplated not to redress this tunnel With molded concrete. The maintenance of the excavation will be of permanent action and are designed to The lifetime of the project.

From the lower tunnel are born the three branches of adduction. These tunnels lead the flow of water to each of the three generation units. The diameter of ENTTrifurcación is 3,25 m and the output diameter of each one of the branches is 2 M. The Trifurcación is Tá Steel-shielded.

ii. Cavern of Machines

The Cave of machines has as function to contain in its interior the equipment of generation (or pumping) corresponding to the turbines and generators; adduction shutoff valves and all auxiliary equipment.

Inside the cavern is the structured machine house at the following levels:

- Main floor
- Generators floor
- Turbine floor
- Valve Floor

The cross section of the cavern is of circular arches in the vault and of flat walls. The general dimensions are: 13 m wide at the level of the flat walls and 14 m in the vault area, the maximum

digging height is 29 m (between the zenith of the vault and the lowest level in the diffuser) , an approximate length of 62 m.

The turbine-pumps will be Francis reversible single-stage to privilege the efficiency of the Assembly, which is estimated at 90%, typical value for units whose operation is made to constant flow and close to the optimum flow in which efficiency is the maximum, and with Non-relevant variations in load height, as in the case of these units, in which this will not vary beyond +/-2%.

The generator motor will be of synchronous type, outgoing poles and its winding cooled by air-water exchangers, with its output in 12 KV.

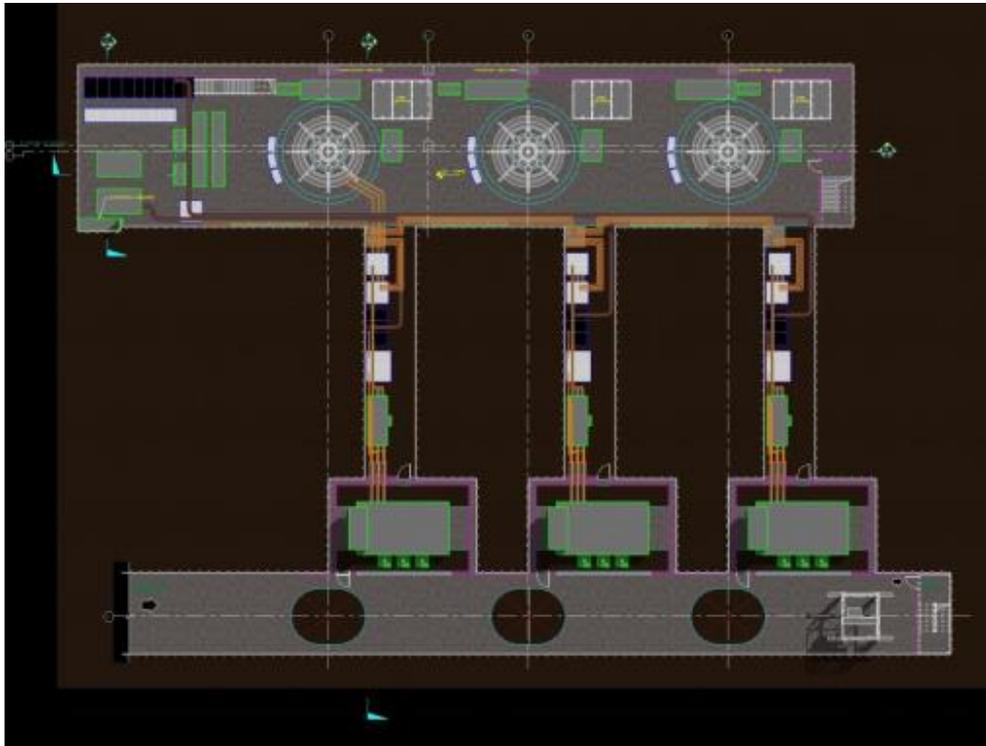
To start each unit in the pump mode, it is considered a smooth matcher to minimize its impact on the SING. This splitter will have a bypass switch so that the motor can be synchronized to the mains.

Figure 10-5: Floor Main cavern of machines.



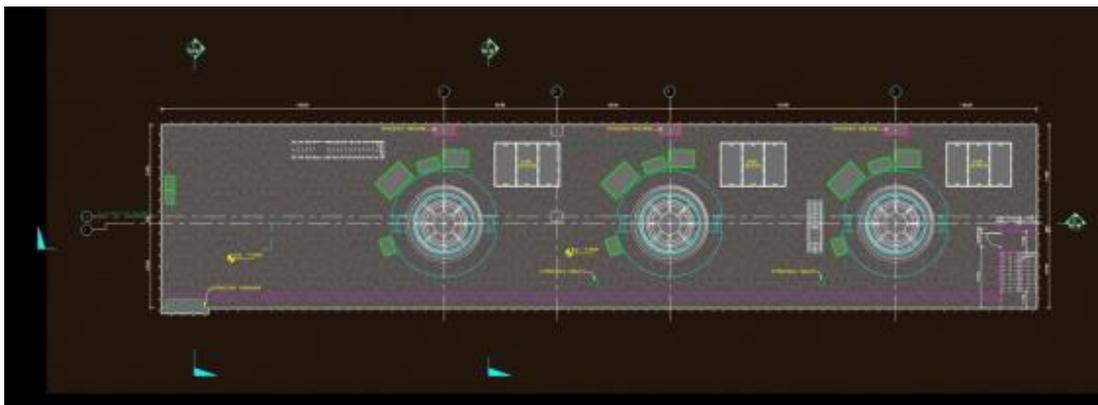
Source: Self-elaboration

Figure 10-6: Floor Generators cavern machines.



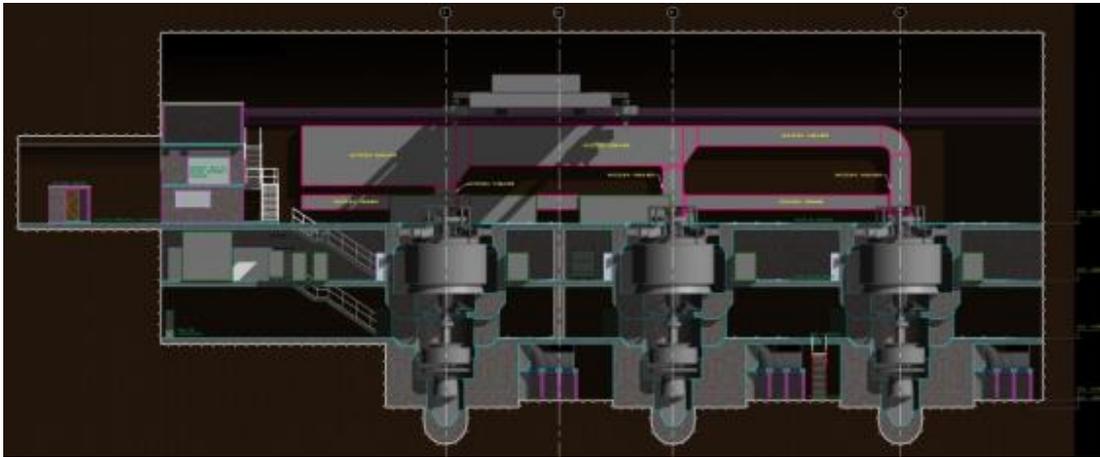
Source: Self-elaboration

Figure 10-7: Floor Turbines cavern machines.



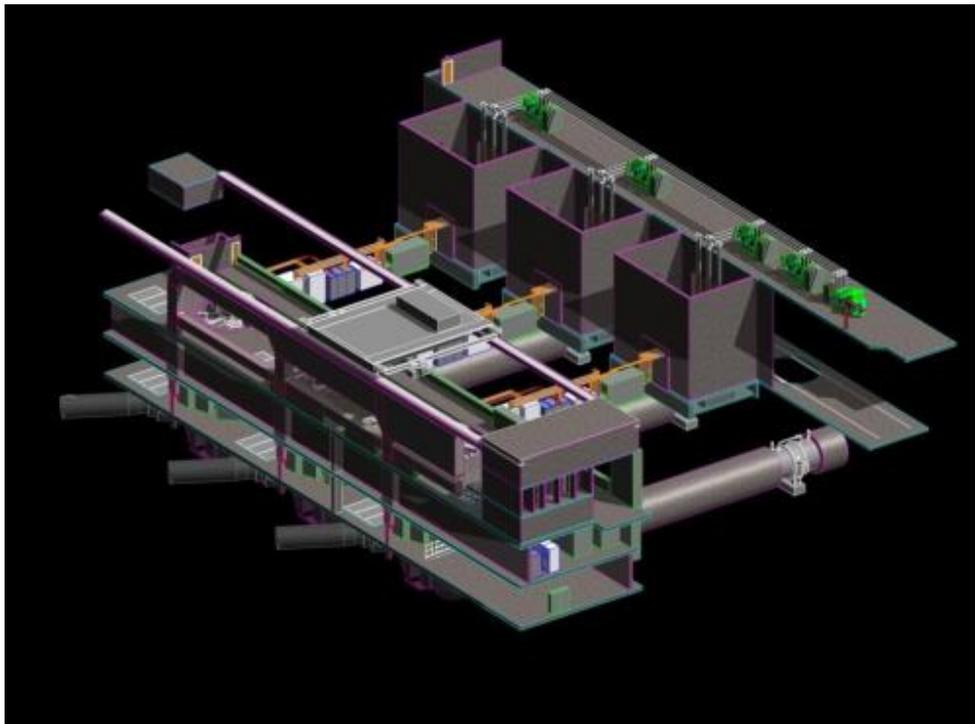
Source: Self-elaboration

Figure 10-8: Outline GEneral pump-turbine.



Source: Self-elaboration

Figure 10-9: Outline GEneral Cavern of Machines.



Source: Self-elaboration

Las Valves T Butterfly Únel Lower, allow Insulate hydraulic The generation or pumping units to the Trifurcación. Valves are located in the valve What It is located between the Transformers cavern and the tunnel Lower.

iii. Trifurcaciones

Within the works that compose the cavern of machines, are the Trifurcaciones, whose function consists in dividing In three the runoff coming from Pressure or Lower tunnel, and then continue to The Cave of Machines In three branches. They are armoured in steel with the following characteristics:

- Upper or adducting branches: There are three (3) branches of adduction, each One of them is a steel pipe of 2 M inner diameter with steel shield, start at the Trifurcación and ends when entering the Cavern of machine, the lengths of each Or of them is 36 m, 33 m and 30 M for units 1, 2 and 3 respectively.
- Lower or unloading branches: There are three (3) And Lead the waters from the CaVerna de MaQuinas to the tunnel Lower. CadOne of them is a 2 pipe, 75 M Inside diameter, in the armoured area With Steel. The length of each one of them Is 64 m, 75 m and 86 m for units 1, 2 and 3 respectively.
- Compact electrical Substation (GIS): The Cavern of machines will also house the electric Sub-season and from it starts the high-voltage line of the project.

iv. Upper Tunnel

It corresponds to the tunnel that connects the reservoir with the pressure bite with an approximate inclination of 13% and a length of Around 886 M. Its approximate section is 25 M², with 5.6 m height (Floor by Key) And 5 m wide approx.

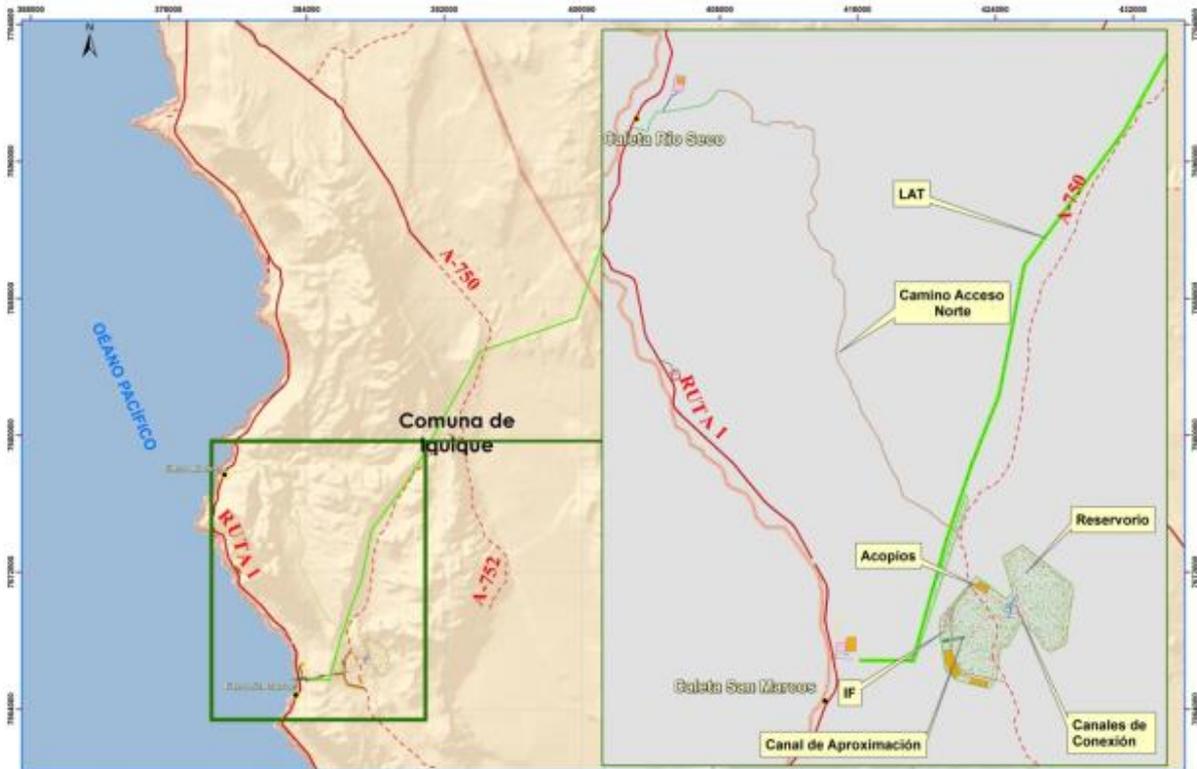
At the end pony E Before the pressure is pressed, the connection with the upper balance chimney will be located.

It is considered the deployment of mobile working fronts according to the progress of each work.

Within the works that compose it, one finds the Pique in pressure, which C Orresponde to an underground vertical work under pressure, About 505 m long and 5 m in diameter connecting the upper tunnel with the shielded tunnel. Unless the geotechnical conditions of the rock, found during excavation so advise, are not expected to be steel-shielded. If shielding is required by particular geological conditions, the space between the steel shield and the excavation will be filled with concrete.

10.2.1.3 Plateau Sector

Figure 10-10: Location REferencial of Works Plateau Sector.



Source: Self-elaboration

The main objective of the plateau Sector is the storage of the extracted water, the detail of which is indicated in the Table 10-2, which will be carried out in the reservoir sector, located from 585 M.A.S.L. (see Figure 10-12), from where it will be pumped to and from the submarine sector, to finally reinject it into the sea.

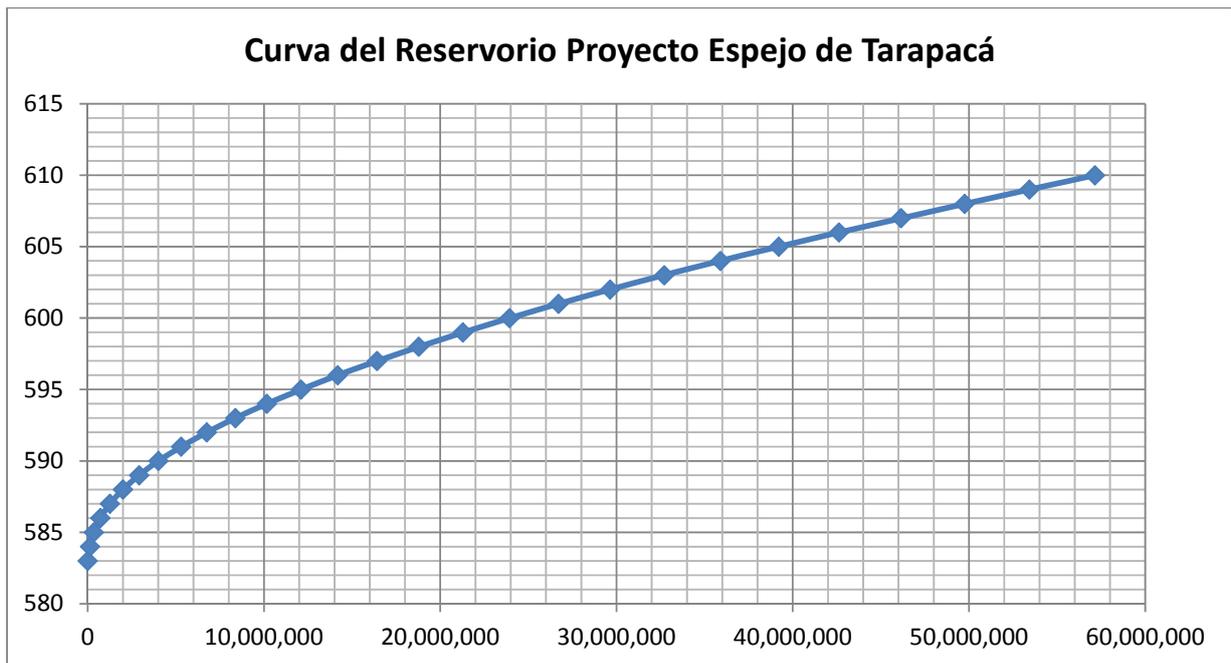
Table 10-2: Reservoir volumes.

| Description | Cota (M.A.S.L.) | Volume (M ³) | Surface (HA) |
|-------------------------|-----------------|--------------------------|--------------|
| Permanent volume | 595 | 12 million | 201 |
| Base volume | 595-601 | 15 million | 286 |
| Volume normal operation | 601 – 608.5 | 25 million | 368 |

Source: Chapter 1, Project description.

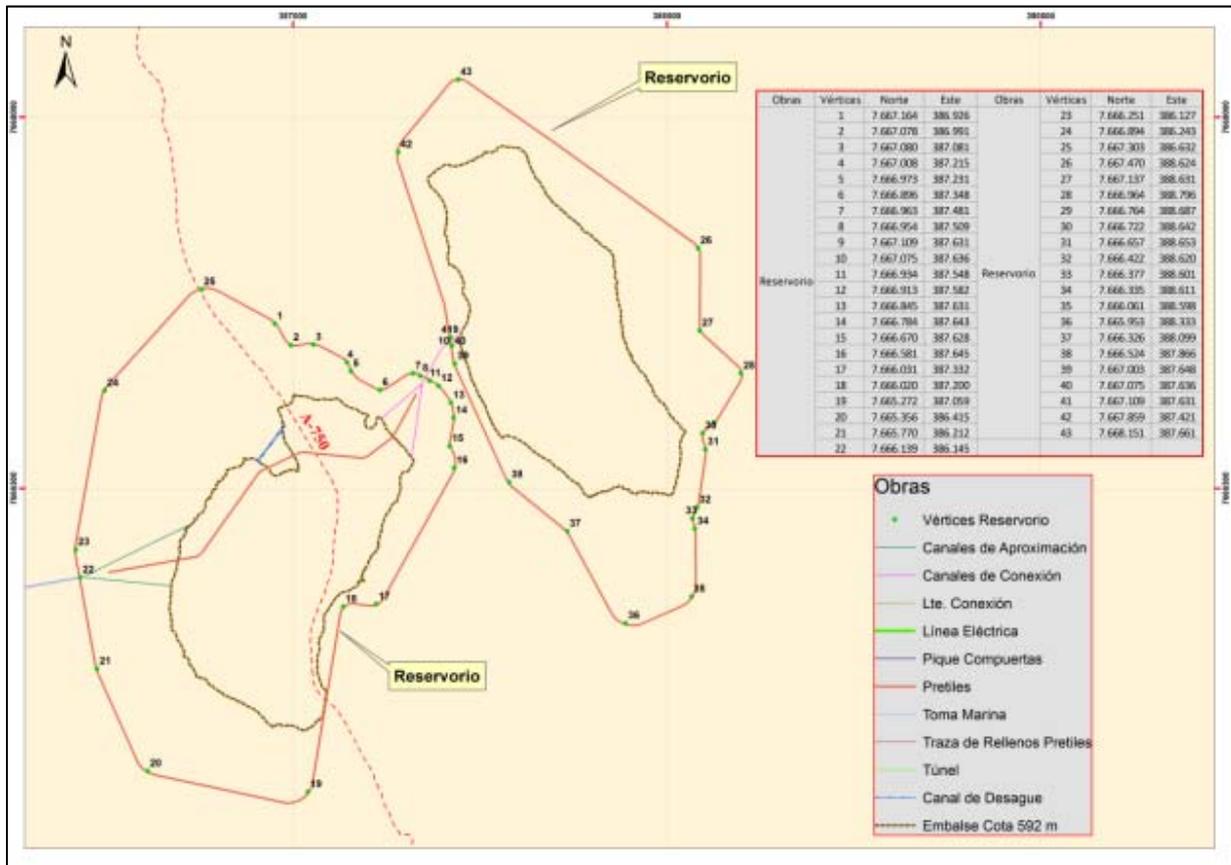
It should also be mentioned that the volume of water accumulated in the reservoir will vary during the year, according to the detail indicated in the Figure 10-11, as the activity follows the availability of solar energy. In this way, the maximum volumes are reached at the end of the summer and the minimum volumes at the end of the winter.

Figure 10-11: Curve VOlumen REservorio.



Source: Self-elaboration

Figure 10-12: Detail UReservoir. Plateau Sector.



Source: Self-elaboration

The following describes the works associated with the process Mentioned. The detail of the location and coordinates of each of them is indicated in EL Chapter 15 Appendix, annex 1.2 Location plan with project works and annex 1.3 coordinate table.

i. Work takes and DReservoir

• Works by CAnalysis of the REservorio

The work of taking and unloading coincides with the layout of the exterior parapet and consists of a structure that contains a set of 4 emergency floodgates of rectangular section of 5 m high and 3 m wide. The location of these floodgates has been envisaged in the horizontal zone of the approximation channel in order to minimize the size of the work and to allow the construction of an emergency access ramp between the work of Toma and the entrance portal of the upper tunnel.

In addition, in the direction from the portal of the upper tunnel towards the reservoir, it is envisaged the construction of a dividing wall that gives continuity to the parapet that divides in two parts the western basin of the reservoir. The purpose of this work is to be able to operate the plant with only 2 open floodgates and using only one of the parts of the West Basin when the water level is placed under the height 600 M.A.S.L. of the reservoir.

- **Approach Channel**

They are two in the Western basin of the reservoir and are connected to the work of taking and unloading the reservoir.

These works correspond to 2 channels of approximately 400 m long each one that connect the sub-reservoirs north and south of the West Reservoir with the work of Toma. The Radier Of these channels is located at elevation 592 M.A.S.L.; They have a basal width of 10 m and lateral slopes 1:2 (H: V). Downstream of the work of Toma, the channels are remelted in one only in a horizontal stretch of approximately 76 m and continues after about 56 m with a maximum slope of 13% until reaching the height 584 M.A.S.L. where the portal of Adduction is located.

10.2.2 The location of the LUgar where SWere EVacuados the EFluent

The underwater take/discharge will be 0.35 km from the coast, Outside the coastal protection zone which for that point is calculated at 0.254 km, Specifically in the coordinates presented in the following table And as shown in the Figure 10-2.

Table 10-3: Coordinates TOMaDLoad SUBmarina In Datum WGS84 H 19S.

| North | This |
|-----------|---------|
| 7,665,677 | 383,097 |
| 7,665,694 | 383,095 |
| 7,665,697 | 383,113 |
| 7,665,679 | 383,116 |

Source: Self-elaboration.

10.2.3 CaractErísticas and composition of the DScraps

The discharge effluent will correspond to seawater, idénticA in composition that suction, but with a temperature That will reach A ΔT , between the discharge and the marine environment, less than approximately 3 °c.

10.2.3.1 Quality of ToGua

LA water quality assessment Corresponds to the marine baseline, Campaign Spring 2013 and summer 2014, where We proceeded to analyze a battery of 25 parameters over a total of 10

stations distributed around the study area. The spring campaign was developed on October 25, 2013, with sea level, and in a period of wind relaxation, while in the summer of 2014 sampling took place on January 28, weak wind from SW and sea level. In each of the stations evaluated water samples were obtained at two levels of depth: a) surface level (0.2 meters approximately) and, B) bottom: Approximately 1 metre from the bottom of each station. In this way, each station is assigned with the letters S (superficial) and F (background), as corresponds to the stratum evaluated from the AG column. To. The following table presents the results obtained.

Table 10-4: Statistics Basic CDeity of ToGua. Campaign QRimavera 2013 and VWas 2014

| Professor. | Statistic n | Chlorides | Sulfate | Calcium | Behaviori. | Alkalinity | Turbidity | Sól. Sedim. | Sst | Organic M. | Bod5 | Fecal Col. | To |
|-----------------------------|----------------|-----------|------------|-----------|------------|--------------|-----------|-------------|--------|------------|--------|--------------|-----------|
| | | (Mg Cl/L) | (Mg SO4/L) | (Mg Ca/L) | (US/cm) | (Mg CaCO3/L) | UNT | (ml/L) | (Mg/L) | (Mg/L) | (Mg/L) | (NMP/100 ml) | (Mg Al/L) |
| Spring 2013 Campaign | | | | | | | | | | | | | |
| Surface | Average | 19756 | 2784 | 479 | 52085 | 119.3 | 1.87 | N.d. | N.d. | 12.1 | 2.4 | N.d. | 0.017 |
| | Stdev | 171 | 61 | 50 | 450 | 1.8 | 0.37 | N.d. | N.d. | 2.7 | 0.5 | N.d. | 0.018 |
| | Min | 19494 | 2700 | 325 | 51200 | 116 | 1.14 | N.d. | N.d. | 7.0 | < 2.0 | N.d. | < 0.010 |
| | Max | 19994 | 2889 | 532 | 52700 | 122 | 2.90 | N.d. | N.d. | 15.0 | 3.0 | N.d. | 0.087 |
| Background | Average | 19763 | 2791 | 454 | 52080 | 119.3 | 1.77 | N.d. | N.d. | 10.6 | 2.1 | N.d. | 0.011 |
| | Stdev | 178 | 52 | 65 | 275 | 1.6 | 0.40 | N.d. | N.d. | 2.2 | 0.2 | N.d. | 0.003 |
| | Min | 19494 | 2721 | 325 | 51300 | 117 | 1.16 | N.d. | N.d. | 7.0 | < 2.0 | N.d. | < 0.010 |
| | Max | 19994 | 2922 | 536 | 52500 | 122 | 2.70 | N.d. | N.d. | 15.0 | 3.0 | N.d. | 0.020 |
| Summer Campaign 2014 | | | | | | | | | | | | | |
| Surface | Average | 19774 | 2760 | 334.4 | 52275 | 125.5 | 0.62 | N.d. | N.d. | 10.5 | 2.3 | N.d. | 0.042 |
| | Stdev | 141.6 | 18 | 15.9 | 299 | 2.9 | 0.15 | N.d. | N.d. | 2.01 | 0.47 | N.d. | 0.017 |
| | Min | 19438 | 2696 | 301 | 51200 | 120 | 0.39 | N.d. | N.d. | 7.0 | < 2.0 | N.d. | 0.028 |
| | Max | 19951 | 2780 | 356 | 51700 | 131 | 0.99 | N.d. | N.d. | 13.0 | 3.0 | N.d. | 0.098 |
| Background | Average | 19778 | 2762 | 333.5 | 52220 | 122 | 1.38 | N.d. | N.d. | 2.0 | 2.25 | N.d. | 0.054 |
| | Stdev | 194 | 9 | 14.7 | 295 | 4.5 | 1.1 | N.d. | N.d. | 1.76 | 0.44 | N.d. | 0.031 |
| | Min | 19455 | 2749 | 299 | 51400 | 112 | 0.31 | N.d. | N.d. | 7.0 | < 2.0 | N.d. | 0.020 |
| | Max | 20331 | 2782 | 367 | 52500 | 131 | 4.19 | N.d. | N.d. | 13.0 | 3.0 | N.d. | 0.117 |

| Professor. | Statistician | Chlorides | Sulfate | Calcium | Behavior. | Alkalinity | Turbidity | Sól. Sedim. | Sst | Organic M. | Bod5 | Fecal Col. | To |
|-----------------------------|--------------|-----------|-----------|-----------|-----------|------------|-----------|-------------|-----------|------------|-----------|------------|-----------|
| Professor. | Statistician | As | Cd | Cr | Cu | Faith | Hg | Mn | Or | Pb | Is | V | Zn |
| | | (Mg As/L) | (Mg Cd/L) | (Mg Cr/L) | (Mg Cu/L) | (Mg Fe/L) | (Mg Hg/L) | (Mg Mn/L) | (Mg Ni/L) | (Mg Pb/L) | (Mg Se/L) | (Mg V/L) | (Mg Zn/L) |
| Spring 2013 Campaign | | | | | | | | | | | | | |
| Surface | Average | 0.002 | N.d. | 0.007 | 0.005 | N.d. | N.d. | N.d. | 0.005 | N.d. | N.d. | 0.054 | 0.022 |
| | Stdev | 0.0003 | N.d. | 0.001 | 0.001 | N.d. | N.d. | N.d. | 0.001 | N.d. | N.d. | 0.005 | 0.006 |
| | Min | < 0.001 | N.d. | < 0.005 | < 0.005 | N.d. | N.d. | N.d. | < 0.005 | N.d. | N.d. | 0.045 | 0.013 |
| | Max | 0.002 | N.d. | 0.009 | 0.010 | N.d. | N.d. | N.d. | 0.008 | N.d. | N.d. | 0.064 | 0.034 |
| Background | Average | 0.002 | N.d. | 0.006 | 0.006 | N.d. | N.d. | N.d. | 0.007 | N.d. | N.d. | 0.051 | 0.022 |
| | Stdev | 0.0006 | N.d. | 0.001 | 0.003 | N.d. | N.d. | N.d. | 0.005 | N.d. | N.d. | 0.006 | 0.004 |
| | Min | < 0.001 | N.d. | < 0.005 | < 0.005 | N.d. | N.d. | N.d. | < 0.005 | N.d. | N.d. | 0.042 | 0.014 |
| | Max | 0.003 | N.d. | 0.007 | 0.017 | N.d. | N.d. | N.d. | 0.024 | N.d. | N.d. | 0.065 | 0.031 |
| Summer Campaign 2014 | | | | | | | | | | | | | |
| Surface | Average | 0.002 | N.d. | 0.008 | 0.005 | N.d. | N.d. | N.d. | N.d. | N.d. | N.d. | 0.049 | 0.057 |
| | Stdev | 0.001 | N.d. | 0.002 | 0.001 | N.d. | N.d. | N.d. | N.d. | N.d. | N.d. | 0.008 | 0.009 |
| | Min | 0.001 | N.d. | < 0.005 | < 0.005 | N.d. | N.d. | N.d. | N.d. | N.d. | N.d. | 0.031 | 0.044 |
| | Max | 0.007 | N.d. | 0.011 | 0.009 | N.d. | N.d. | N.d. | N.d. | N.d. | N.d. | 0.071 | 0.076 |
| Background | Average | 0.002 | N.d. | 0.009 | 0.006 | N.d. | N.d. | 0.001 | 0.005 | N.d. | N.d. | 0.048 | 0.052 |
| | Stdev | 0.001 | N.d. | 0.002 | 0.001 | N.d. | N.d. | 0.0002 | 0.0 | N.d. | N.d. | 0.009 | 0.007 |
| | Min | 0.001 | N.d. | < 0.005 | < 0.005 | N.d. | N.d. | < 0.001 | < 0.005 | N.d. | N.d. | 0.030 | 0.042 |
| | Max | 0.005 | N.d. | 0.012 | 0.010 | N.d. | N.d. | 0.002 | 0.005 | N.d. | N.d. | 0.066 | 0.070 |

Note: S: superficial; Fon: Background.

N.d.: Concentration not detected in any station or depth evaluated (level or concentration under the limit of detection of the methodology used).

Aluminium (Al), arsenic (AS), cadmium (Cd), copper (Cu), chromium (CR), iron (FE), Mercury (HG), Manganese (MN), nickel (Ni), lead (Pb), Selenium (Se), vanadium (V) and zinc (Zn).
Source: Elaboration of the consultant based on what is reported by HIDROLAB Analytical Laboratory.

10.2.3.2 Quality Fluent

In order to determine whether or not there is any impact on water quality during the operation of the project, a system modelling was carried out, Depending on the weather and The Input and output flows Established, using the model DYRESM-CAEDYM (1d), which allows to simulate the behavior of the physical and chemical parameters of the system. The detail of the modelling carried out and its results is found in Chapter 15 appendix, annex 10.1 Hydrodynamic modeling and water quality: "Espejo de Tarapacá".

The analysis of the results obtained, with respect to the quality of the water discharge to the sea, indicated that, although the most sensitive parameter is the temperature, due to its high range of annual variation within the reservoirs ($> 10\text{ }^{\circ}\text{C}$), the normal operation of the system shows That in 96% of the events of discharge will have a ΔT , between the discharge and the marine environment, less than $3\text{ }^{\circ}\text{C}$ approximately, which allows the dilution of the excess of temperature modeling for the scenario of normal operation, reducing the temperature difference Of the pen below $3\text{ }^{\circ}\text{C}$, at the time of Let this one touch the surface of the sea.

The other parameters analyzed, mainly nutrients, seaweed and some metals, do not present concentrations outside the expected ranges in the marine environment. Even some of these show concentrations below what is measured at sea. Nor was there an increase in salinity in the discharge, despite the initial assumption in which the case was assessed as the most unfavourable from the point of view of the discharge analysis and the dilution capacity of the underwater discharge.

10.2.4 Characteristics Features of the Componentes of the Scraps with to NOcividad

As mentioned above, the generated effluent corresponds exclusively to sea water used as a means of Power generation, without any ModifiTo its natural composition, so That the effluent will not be toxic, It will have no adverse effects, and not cause adverse effects on the content and balance of oxygen. Regarding its temperature, The normal operation of the system shows that in 96% of the events of discharge will have a ΔT , between the discharge and the marine environment, less than $3\text{ }^{\circ}\text{C}$ approximately, which allows the dilution of the excess of temperature modeled for the scenario of normal operation , reducing the difference in The temperature of the boom below $3\text{ }^{\circ}\text{C}$, at the time it touches the surface of the sea. The detail of the modelling carried out and its results is found in Chapter 15 appendix, annex 10.1 Hydrodynamic modeling and water quality: "Espejo de Tarapacá".

10.2.5 D Place Features and the Medium Marine Receiver.

10.2.5.1 Meteorology

LA's meteorological variables obtained from the records of the Central indoor meteorological station, in the period between December 2007 and March 2010, are presented below:

Table 10-5: Meteorological Variables Central Indoor Station (12/2007 – 03/2010)

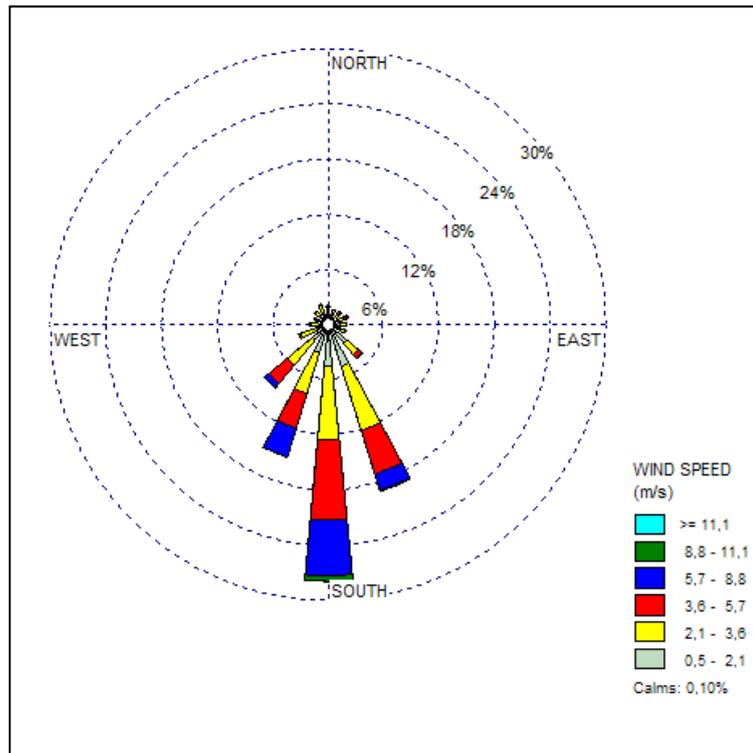
| Variable | Value |
|----------------------------------|--|
| Wind speed (m/s) | |
| Average period | 3.22 |
| Maximum Value | 11.9 |
| Minimum value | 0.4 |
| Percentage of calms ¹ | 0.10 |
| Wind Direction | |
| AddressOrNIs Predominantly S | S (23.29%), SSE (15.89%), SSW (12.63%) |

Source: Central Indoor Weather Station

The following figure Presents the Wind Rose Accumulated for the period between The months of December 2007 to March 2010.

¹ Porcentaje de calma: porcentaje del tiempo en que la velocidad del viento es menor a 0,5 m/s.

Figure 10-13: Rose of the winds inner Central station.



Source: Self-elaboration -Central station inside.

The winds show predominantly well defined direction for the period of registration, presenting average speed of 3.22 m/s and a 0.1% of calms. The fact that the percentage of calm is low, indicates that the air in the area shows dispersion capacity. The maximum hourly speed of the wind recorded for this period is 11.9 m/s.

The wind in this sector possesses components of predominant direction S, SSE, SSW, SW, ESE and WSW in 66, 1% of the time, indicating a direction of the wind very defined.

10.2.5.2 Oceanography QUímica

According to the field campaigns developed in spring 2013 and summer 2014 in the maritime and coastal area of Caleta San Marcos, site of the future project, the following results were obtained.

The hydrographic conditions of the coastal edge of interest, evaluated by vertical profiles carried out in two seasonal campaigns, revealed a dynamic behavior of the vertical structure of the water column throughout the evaluated period (Spring 2013 and summer 2014), where the presence of the mixing layer and eventual stratifications (E.g. thermocline), are modulated or

conditioned by the action of important modulating physical forces or forcing agents, since the evaluated area corresponds to a coastal sector exposed to the direct action of those modulating agents such as wind and Preferential swell, those that come predominantly from SW. Thus for example, in spring the thermal structure and saline of the water column showed no greater estatificación, however, in summer some thermal stratification was appreciated in some stations on a superficial level with the presence of a thermocline not very Arcaded and probably modulated by the higher incidence of solar radiation during this seasonal period, and which was appreciated between surface and approximately 10 meters of depth; On the other hand the dissolved oxygen (OD), presented a similar behavior between campaigns because at the superficial level, indicative values of an important oxygenation are recorded (between 90 – 100% saturation), which then record a sharp decrease depending on the Depth, approximately up to 10-15 m where minimum oxygen levels reach Ndo to 0 mlO₂/L (0% saturation).

Regarding the chemical quality of seawater, the Analytes Studied They showed concentrations below the limit of detection of the respective methodology used in all seasons and depths analyzed for both seasonal campaigns, not recording evidence of deterioration of water quality by these Parameters. The details of these concentrations are indicated in the Table 10-6. As for these parameters, the levels reported by the Analytical Laboratory for Coliforms Fecal, total suspended solids selenium and cadmium, allows classifying the body of water in category Class 1 according to the reference values given in the "Guide for the establishment of secondary standards of environmental quality for continental waters Superficial and marine ", that is to say, of very good quality and suitable for the protection of the aquatic communities and therefore, apt in turn for the described activities of the classes 2 and 3, that is, desalination of water for human consumption, water suitable for the development D (e) Aquaculture, extractive fishing activities, Suitable for port and navigation activities. Pb levels only allow classifying in Class 2, that is to say, of good quality, and the levels of Hg reported by the laboratory exceed even the Class 3 category, even though all the Hg records obtained are lower than the detection limit, which is why N Or it is possible to say with certainty about the environmental status of this element in seawater. Comparing the levels of those Analytes That presented quantifiable levels with the reference values provided in the "Guide for the establishment of secondary standards of environmental quality for shallow and marine continental waters", shows that the waters of the study area can be Preferably classified in the Class 1 quality range or "very good quality", with respect to arsenic and aluminium concentrations; In addition, it can also be classified in Class 2 quality category with respect to the levels or concentrations of the following parameters, although the vast majority of them show prefRentemente Levels in the Class 1 range, but with a few values within Class 2: zinc, nickel, copper and chromium.

Table 10-6: Chemical Quality AGua de MAR

| Analyte | Unit | Value |
|---------|------|-------|
|---------|------|-------|

| | | |
|------------------------|------------|---------|
| SólSedimentary left | ML/L H | < 0.1 |
| Total Suspended solids | mg/L | < 5.0 |
| Coliforms Fecal | NMP/100 ML | < 1.8 |
| Cadmium | MgCd/l | < 0.001 |
| Iron | MgFe/l | < 0.002 |
| Mercury | MgHg/l | < 0.001 |
| Lead | MgPb/l | < 0.01 |
| Selenium | MgSe/l | < 0.005 |

Source: Chemical Oceanography Baseline.

It stands out, that the evaluated coastal sector presents characteristics suitable for recreational activities with direct contact (which would be limited mainly to the summer time on the beach of Caleta San Marcos), those parameters evaluated in this study and That presented reference values in the primary water quality standard (ds No. 144/08), comply with limits imposed by this normative body, such is the case of arsenic cadmium, chromium, mercury, lead, and PH.

With respect to vertical variability in the distribution of concentrations of different Analytes Evaluated chemicals, it is possible to establish that only alkalinity and BOD5 showed statistically significant differences between strata, and throughout the rest of the Analytes The concentrations did not record significant differences, which leaves in evidence a body of water without greater variability between the strata evaluated (surface and bottom). However, by analyzing variability between seasonal campaigns (Spring 2013 – Summer 2014), the trend shows that some Analytes They showed variation, such is the case of sulfate, calcium, vanadium and turbidity that recorded statistically superior concentrations in the Spring 2013 campaign, and chromium-zinc aluminum that showed significantly higher levels in the campaign Summer 2014; Arsenic, Bod5 chlorides, copper, manganese and organic matter in seawater showed no statistical differences between campaigns.

The subtidal sedimentary matrix evaluated in this baseline, showed an almost exclusive prevalence of the sand fraction, with little representativeness of the clay slime fraction (maximum of 2.4% in ASP2 during summer) and null presence of the gravel fraction in both Seasonal campaigns. The textural classification of the sand fraction showed a wide variability between Campaigns and between seasons, fluctuating between very fine sand and very thick sand. With regard to total organic matter, most stations in both campaigns exceeded the lower limit established by the Government of Ontario in Canada by 1% as a standard of sediment quality, but none surpassed the limit of effects on biota Established in 10% in that regulation; At the same time, the 9% limit established by the Under-Secretary for Fisheries and aquaculture (sub-PESCA) for aquaculture activities in marine sediments was not exceeded (only national regulations available for EFEFor which the organic matter values obtained can be considered

normal. In the same way, the underfishing established a limit of acceptability for the potential of oxide reduction corrected to the Normal hydrogen electrode (NHE) of 50 Mv. The results indicate that of the total evaluated points of the subtidal environment in both seasonal campaigns, only three seasons in spring are under this threshold limit, specifically ASP3, ASP4 and ASP7 which also recorded the largest Concentration of organic matter during this campaign, and all other stations present acceptable conditions of oxide-reduction under this criterion.

The vast majority of the chemical parameters evaluated, showed concentrations lower than the limits established by the international standards consulted, and defined as suitable for the protection of marine aquatic life, such is the case of zinc, Vanadium, lead, nickel, iron, total chromium and copper. For the case of arsenic and cadmium several stations of both campaigns recorded levels above the threshold limit established by the Government of Canada ISQG/TEL (Interim Marine Sediment Quality Guidelines: Threshold level of effects on aquatic biota), and in the case of Mercury only 1 station showed this condition, however, none of the levels of these three elements was higher than the PEL boundary (probable Effect Levels) or probable effects on aquatic biota. The analysis of the variability of the concentrations of the Analytes By sampling station, it warns a pattern or tendency to group the highest concentrations in the stations ASP2 and ASP3 in the vast majority of parameters evaluated during both baseline campaigns, for example, such is the case of Zn, sulfates, Pb, NOR, Mn, Fe, Cr, Cd, V, Cu. This condition could be associated with the higher percentage of finer grains in these seasons, which have a greater surface/volume ratio that allow them to have greater adsorption capacity of Contaminants compared to the most grues sedimentss, for example, ASP2 as ASP3 presented a medium grain size corresponding to very fine sand in the summer campaign, and especially ASP2 recorded the highest percentage of the mud fraction in both campaigns. On the other hand, the analysis between seasonal campaigns reveals that of the totality of Analytes evaluated only nickel and sulfates showed significantly different concentrations between spring 2013 and summer 2014, so the subtidal sedimentary environment did not show significant changes between campaigns.

Regarding the chemical characterization of sediments Intertidal evaluated during The Summer campaign, it is possible to establish that of all the elements or metals evaluated ($n = 8$), only the arsenic recorded a punctual value on the Regulation ISQG/TEL but inferior to the limit of probable effects on the biota, all the rest of heavy metals Evaluated showed levels below the limits established by the consulted regulations. The analysis of the variability of the concentrations of heavy metals in sediments Intertidal, shows a tendency to group the highest concentrations preferably in the Transects 6 and 7 of the area of study (such is the case of Zn, Pb, As, Cd, Cu, located at the ends of the coastal sector evaluated.

10.3. Sectoral environmental Permit 115 Desalination plant

Permission to introduce or unload materials, energy or harmful or dangerous substances of any kind into the waters under national jurisdiction.

The permit to introduce or unload substances, energy or harmful or dangerous substances of any kind to the waters subject to national jurisdiction shall be that established in article 140 of DS No. 1 of 1992, of the Ministry of National Defence, regulation For the Control of water pollution.

The requirement for its granting is that the introduction or unloading of substances, energy, or harmful or dangerous materials of any kind into waters subject to national jurisdiction, does not generate adverse effects on hydrobiological species or Aquatic ecosystems.

The project considers the installation of A desalination plant, the effluent of which Will consist of Rec Brine Definitely should to be discharged to the sea, for which this permission is requested.

The technical and formal contents that accredit their compliance are as follows:

10.3.1 Description of Installation and its SSystem EVacuación

The potable water supply system will be constituted or by a desalination plant, which is It will be located next to the work of floodgates of the Sector Costa de la Caleta San Marcos.

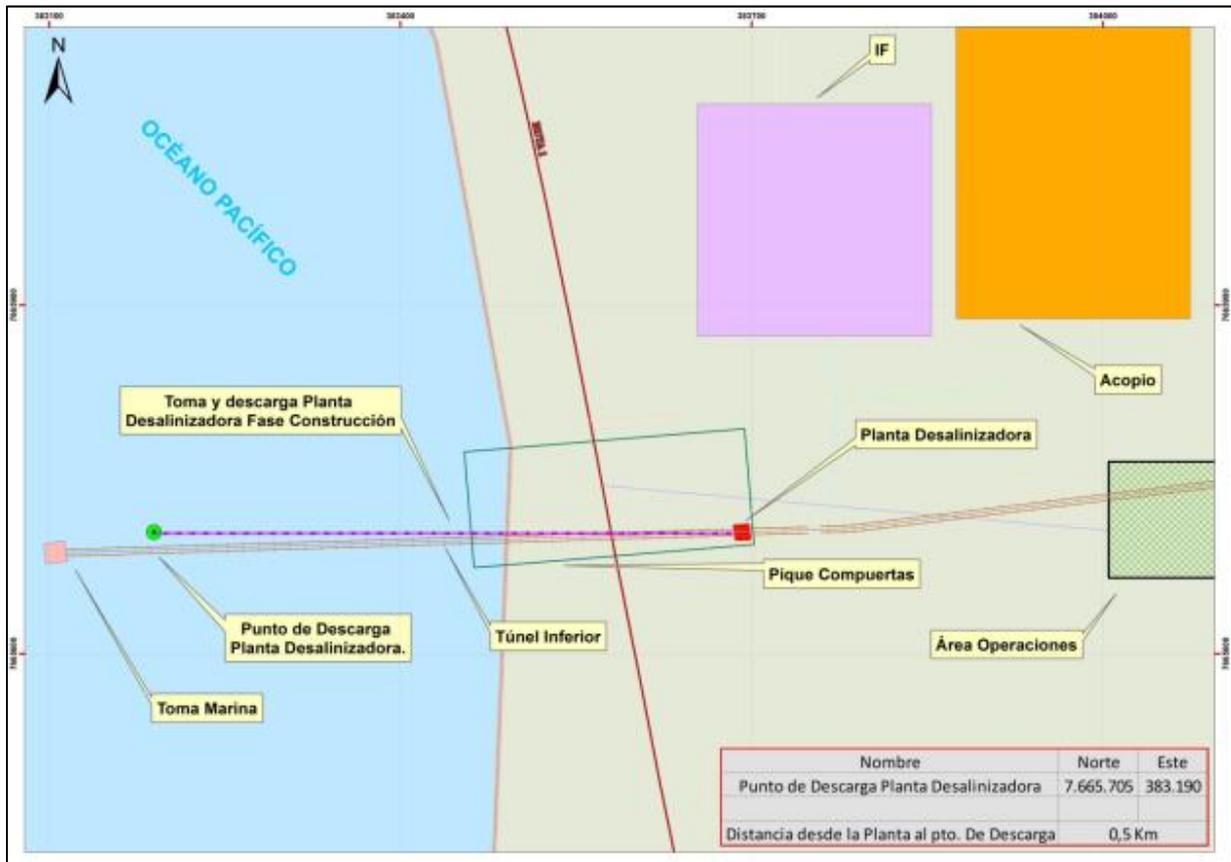
The plant InTregará water in a growing way, with an efficiency of 45%, En function of the requirements, adjusting their size according to the demand. For the construction stage you will reach a Maximum of generation of 5, 5 L/S of drinking water, for a Peak Of 500 Workers, considering a 150 L/person/day. During the operation, sand esteem A Production of 2, 75 L/S of drinking water, associated with a manOr work of 30 workers in Average, with a maximum of 50 people contemplated for Preventive maintenance of the plant.

The PLanta Considered Will cover approximately 120 m² and will be Composed of 3 Metallic containersS of the maritime type and 2 filters, which Iran anchored to the slab of concreten by anchors and will consider Ground wire for protection. FUncionará continuously during the construction and operation stages, contemplating for the first, a sea water intake/discharge point located 0.5 km from the coast, As detailed in the Figure 10-14. It should be noted that while the lower tunnel and the take-up work are not implemented, the plant will function by capturing water throughis a flexible 3-hose Inch Diameter from the sea, and returning the reject water by another hose of similar characteristics.

On the other hand, during the operation stage, the sea water intake/discharge will be carried out through the lower tunnel, associated with the work of taking and unloading, belonging to the underground sector of the project.

The Location of the plant is observed In the next figure.

Figure 10-14: Location desalination plant.



Source: Self-elaboration

10.3.2 The location of the LUgar DOnde SWere EVacuados the EFluent

Effluents from the desalination plant will be downloaded to TRavés discharge DuctsBmarina, outside the Coastal Protection Zone (ZPL). During the construction stage, The intake/discharge of the plant will be by temporary ducts parallel to the lower tunnel And for the Operation stage Both the Take/ Sea water discharge will be carried out ThroughL Lower Tunnel. For each case, thes coordinates of Location of discharge Is PresentsN In the following table:

Table 10-7: coordinates T Oma DLoad Submarina In Datum WGS84 H19S.

| Stage | North | This |
|--------------|-----------|---------|
| Construction | 7,665,705 | 383.190 |
| Operation | 7,665,677 | 383,097 |
| | 7,665,694 | 383,095 |
| | 7,665,697 | 383,113 |
| | 7,665,679 | 383,116 |

Source: Self-elaboration.

10.3.3 Features and COmposición of the DScraps

The salt water of discharge will originate from the desalination plant, considering a catchment of approximately 10 Sea water L/s For the construction stage of the project, and 5 L/s during the operation stage, will undergo pre-treatment, filtering and reverse osmosis processes. Whereas the plant will operate with an efficiency of 45%, sE will generate a maximum flow rate of approximately 5.5 Salt water L/s discharge In construction stage and 2.75 L/s in The Operation Stage. During the construction stage, the salt water will be discharged by underwater pipes, Located To 500 M of the coast. For the Operation stage, The discharge will be through a pipe connected to the TLower Únel, approximately to 900 M of the take/discharge of this tunnel, Being Incorporated into the Reservoir discharge flow.

EL Salt water discharge will comply with The DS 90/01 table N ° 5, which establishes the quality of the effluents discharged to a marine environment outside the ZPL. The detail of its composition is indicated in the Table 10-8.

QOr another part, considering that seawater enters the desalination plant with approximately 36,000 ppm (salinity unit) and that the efficiency of the process is Around 45%, It is estimated that the salinity of the salt water of discharge will reachApproximately 65,455 ppm.

Regarding the salt water temperature of discharge, it can be noted that this will be similar to that of seawater, since desalination does not consider proThermal events.

Table 10-8: Brine Features.

| Contaminant | Unit | Expression | Maximum permissible limit | Adduction | Backwash | desalinated water | Salt water | Discharge to the Sea |
|------------------------|--------|------------|---------------------------|-----------|----------|-------------------|------------|----------------------|
| | | | | | | | | PTOI |
| Oils and Fats | mg/L | A and G | 150 | 0 | 0 | 0 | 0 | 0.00 |
| Aluminum | mg/L | To | 10 | < 0.5 | < 0.5 | 0 | < 1 | < 0.5 |
| Arsenic | mg/L | As | 0.5 | 0.004 | 0.004 | 0 | 0.00664 | 0.007 |
| Cadmium | mg/L | Cd | 0.5 | 0.046 | 0.046 | 0 | 0.07636 | 0.075 |
| Cyanide | mg/L | Cn- | 1 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Copper | mg/L | Cu | 3 | 0.03 | 0.03 | 0 | 0.0525 | 0.05 |
| Index of phenol | mg/L | Phenols | 1 | < 0.001 | < 0.001 | 0 | | < 0.001 |
| Chrome Hexavalent | mg/L | Cr + 6 | 0.5 | < 0.006 | < 0.006 | 0 | | < 0.006 |
| Chrome | mg/L | Cr | 10 | < 0.5 | < 0.5 | 0 | | < 0.5 |
| Tin | mg/L | Sn | 1 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Fluoride | mg/L | F | 6 | 0.89 | 0.89 | 0.01 | 1.5575 | 1.55 |
| Total hydrocarbons | mg/L | Hct | 20 | 0 | 0 | 0 | 0 | 0.00 |
| Hydrocarbons Volatile | mg/L | Hc | 2 | 0 | 0 | 0 | 0 | 0.000 |
| Manganese | mg/L | Mn | 4 | 0.03 | 0.03 | 0 | 0.0525 | 0.05 |
| Mercury | mg/L | Hg | 0.02 | < 0.0001 | < 0.0001 | 0 | | < 0.0001 |
| Molybdenum | mg/L | Mo | 0.5 | < 0.01 | < 0.01 | 0 | | < 0.01 |
| Nickel | mg/L | Or | 4 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Ph | | | 5.5-9.0 | 7.5-8.0 | 7.5-8.0 | 6.0-7.0 | 7.7-8.2 | 7.7-8.2 |
| Lead | mg/L | Pb | 1 | 0.2 | 0.2 | 0 | 0.35 | 0.35 |
| Saam | mg/L | Saam | 15 | 0 | 0 | 0 | 0 | 0 |
| Selenium | mg/L | Is | 0.03 | < 0.001 | < 0.001 | 0 | < 0.001 | < 0.001 |
| Sedimentary solids | mg/L/h | S. Sed. | 20 | 0 | 0 | 0 | 0 | 0 |
| Total Suspended solids | mg/L | S.s. | 300 | 25 | 1500 | 0 | 1 | 75 |
| Total solids Dissolved | mg/L | Std | Na | 35154 | 35154 | 240 | 58369 | 58369 |

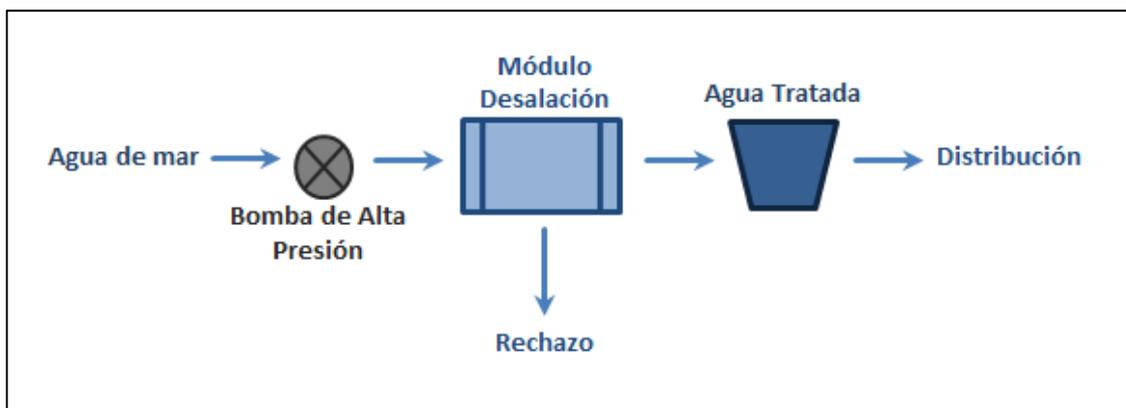
| Contaminant | Unit | Expression | Maximum permissible limit | Adduction | Backwash | desalinated water | Salt water | Discharge to the Sea |
|--------------|-------|------------|---------------------------|-----------|----------|-------------------|------------|----------------------|
| | | | | | | | | PTOI |
| Conductivity | US/cm | Cond | Na | 51670 | 51670 | 495 | 79869 | 79869 |
| Temperature | ' C | T | Na | 17 | 17 | 17 | 17 | 17 |
| Sulfur | mg/L | S2 | 5 | < 0.05 | < 0.05 | 0 | < 0.05 | < 0.05 |
| Zinc | mg/L | Zn | 5 | < 0.01 | < 0.01 | 0 | < 0.01 | < 0.01 |

Source: Self-elaboration

10.3.4 Characteristics of the COmponentes of the DScraps with Rto your NOcividad

The desalination process contemplates the purification of seawater through the reverse osmosis process, Which considers the use is semipermeable membranes for the separation of the salts present. This process does not consider the addition of any chemical substance in the process, so EL Saltwater discharge will not contain Physical, chemical and biological elements or agents that may remain in time in the marine environment. The Figure 10-15 Shows the process described above.

Figure 10-15: Diagram of FLuxury QRubbing of DEsalinización by reverse Osmosis.



Source: Self-elaboration.

10.3.4.1 Persistence

The Salt water of Download will not contain Physical, chemical and biological elements or agents that may remain in time in the marine environment, since it consists of a liquid effluent Which is basically sea water concentrated in salts (approximately 65,455 ppm). This Effluent Is Diluted Almost instantly In its download Reaching Quickly the characteristics of seawater.

10.3.4.2 Toxicity and ORTros Effects

As noted, The reverse osmosis process does not consider the addition of chemical or physical agents that may remain in the marine environment, so The Salt water Discharge It will basically be seawater concentrated in salts and contains no toxic substances, nor does it produce harmful effects.

10.3.4.3 Accumulation in MMaterials Biológicos or in SEdimentos

The Salt water Download will not have Accumulation characteristics or biological materials Nor in sediments, since it is basically seawater concentrated in salts. Once the effluent is discharged it will be diluted, Reaching The characteristics of the sea, there is no accumulation in biological materials or in sediments.

10.3.4.4 Transformation Bloquímica that QRoduzca Effects NOcivos

By the physical-chemical composition that will present the salt water of discharge will not be presented biochemical transformations that produce harmful compounds in the marine environment.

10.3.4.5 Effects DESfAvorables about the content andQuilibrio OrXígeno

The effluent from the desalination plant will not affect the oxygen content of seawater, mainly because it is not organic.

10.3.4.6 Sensitivity to the TRansformaciones Físicas, QUímicas and Bloquímicas and INTERacción in the MEdio ToCuático with OrTros Componentes of the ToGua de MAr that QUedan TEner Effects NOcivos, BloLÓgicos or of OrTro Tipo

DEcause to the physical-chemical composition that will have the salt water of Discharge and its rapid dilution in the marine environment, no physical, chemical and biochemical transformations or interactions with components of the aquatic environment will be generated.

EL Salt water discharge will comply with The DS 90/01 Table No. 5, which establishes the quality of Effluents discharged to a marine environment outside the ZPL zone, a standard whose objective is Environmental protection to prevent contamination of surface marine and continental

waters, by means of the control of pollutants associated with liquid waste that are discharged to these receiving bodies.

10.3.5 Characteristics of the Lugar Dand the MEDio MARino RReceiver.

10.3.5.1 Meteorology

Las meteorological variables obtained from the records of the Central internal meteorological station, in the period between Diciembre 2007 and March 2010, are presented below:

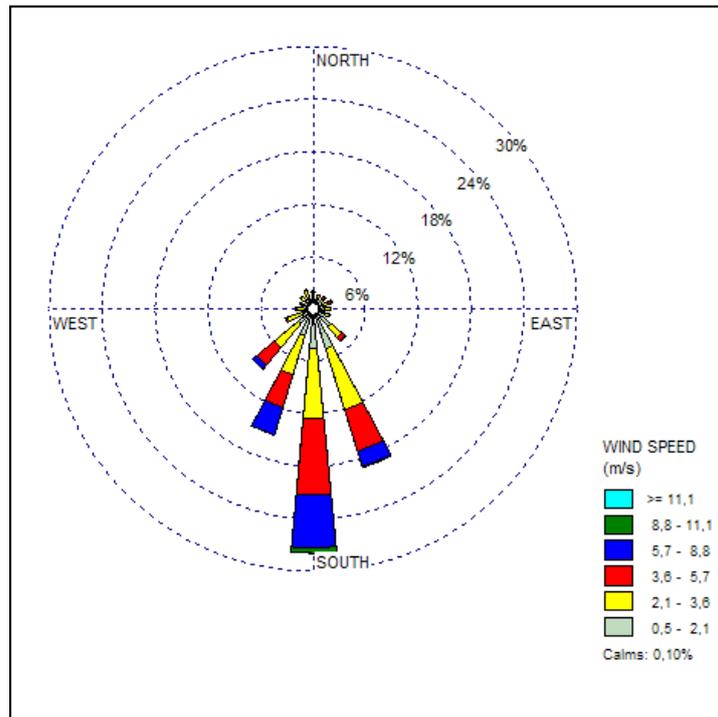
Table 10-9: Meteorological Variables Central Indoor Station (12/2007 – 03/2010)

| Variable | Value |
|----------------------------------|--|
| Wind speed (m/s) | |
| Average period | 3.22 |
| Maximum Value | 11.9 |
| Minimum value | 0.4 |
| Percentage of calms ² | 0.10 |
| Wind Direction | |
| AddressOrNIs PredominantlyS | S (23.29%), SSE (15.89%), SSW (12.63%) |

Source: Central Indoor Weather Station.

The Following figure Presents the Wind Rose Accumulated for the period between The months of December 2007 to March 2010.

² Porcentaje de calma: porcentaje del tiempo en que la velocidad del viento es menor a 0,5 m/s.

Figure 10-16: Rosa de los Vientos Interior Central Station


Source: Self-elaboration -Central station inside.

The winds show predominantly well defined direction for the period of registration, presenting average speed of 3.22 m/s and a 0.1% of calms. The fact that the percentage of calm is low, indicates that the air in the area shows dispersion capacity. The maximum hourly speed of the wind recorded for this period is 11.9 m/s.

The wind in this sector possesses components of predominant direction S, SSE, SSW, SW, ESE and WSW in 66, 1% of the time, indicating a direction of the wind very defined.

10.3.5.2 Oceanography QUímica

According to the field campaigns developed in spring 2013 and summer 2014 in the maritime and coastal area of Caleta San Marcos, place of EMO of the Future project, the following results were obtained.

The hydrographic conditions of the coastal edge of interest, evaluated by vertical profiles made in Cs seasonal campaigns, revealed A dynamic behavior of the vertical structure of the water column throughout the period assessed (Spring 2013 and Summer 2014), where the presence of the mixing layer and eventual stratifications (E.g. thermocline), are modulated or conditioned

by the action of important modulating physical forces or forcing agents, since the evaluated area corresponds to a coastal sector exposed to the direct action of those modulating agents such as wind and Preferential swell, those that come predominantly from SW. So for example, in spring the thermal structure and saline of the water column showed no greater ESTRAtificación, however, in summer there was a certain thermal stratification in some stations on a superficial level with the presence of a thermocline not very marked and probably modulated by the higher incidence of solar radiation during this period Seasonal, and which was appreciated between surface and approximately 10 meters of depth; On the other hand the dissolved oxygen (OD), presented a similar behavior between campaigns because at the superficial level, indicative values of an important oxygenation are recorded (between 90 – 100% saturation), which then register a BrusA decrease depending on the depth, approximately to 10-15 m where levels of minimum oxygen are reached reaching 0 mlO₂/L (0% saturation),

Regarding the chemical quality of seawater, the following Analytes They showed concentrations below the limit of detection of the respective methodology used in all seasons and depths analyzed for both seasonal campaigns, not recording evidence of deterioration of water quality by these Parameters. The details of these concentrations are indicated in the Table 10-10. As for these parameters, the levels reported by the Analytical Laboratory for Coliforms Fecal, total suspended solids selenium and cadmium, allows classifying the body of water in category Class 1 according to the reference values given in the "Guide for the establishment of secondary standards of environmental quality for continental waters Superficial and marine ", that is to say, of very good quality and suitable for the protection of the aquatic communities and therefore, apt in turn for the described activities of the classes 2 and 3, that is, desalination of water for human consumption, water suitable for the development D (e) Aquaculture, extractive fishing activities, Suitable for port and navigation activities. Pb levels only allow classifying in Class 2, that is to say, of good quality, and the levels of Hg reported by the laboratory exceed even the Class 3 category, even though all the Hg records obtained are lower than the detection limit, which is why N Or it is possible to say with certainty about the environmental status of this element in seawater. Comparing the levels of those Analytes That presented quantifiable levels with the reference values provided in the "Guide for the establishment of secondary standards of environmental quality for shallow and marine continental waters", shows that the waters of the study area can be Preferably classified in the Class 1 quality range or "very good quality", with respect to arsenic and aluminium concentrations; In addition, it can also be classified in Class 2 quality category with respect to the levels or concentrations of the following parameters, although the vast majority of them show prefRentemente Levels in the Class 1 range, but with a few values within Class 2: zinc, nickel, copper and chromium.

Table 10-10: Quality QUímica ToGua de MAr

| Analyte | Unit | Value |
|------------------------|------------|---------|
| Sedimentary solids | ML/L H | < 0.1 |
| Total Suspended solids | mg/L | < 5.0 |
| Coliforms Fecal | NMP/100 ML | < 1.8 |
| Cadmium | MgCd/l | < 0.001 |
| Iron | MgFe/l | < 0.002 |
| Mercury | MgHg/l | < 0.001 |
| Lead | MgPb/l | < 0.01 |
| Selenium | MgSe/l | < 0.005 |

Source: Chemical Oceanography Baseline.

Stands out, that the evaluated coastal sector presents characteristics suitable for recreational activities with direct contact (which would be limited mainly to the summer time on the beach of Caleta San Marcos), those parameters evaluated in this study and that They presented reference values in the primary water quality standard (ds No. 144/08), complying with limits imposed by this normative body, such is the case of arsenic cadmium, chromium, mercury, lead, and PH.

With respect to vertical variability in the distribution of concentrations of different Analytes Evaluated chemicals, it is possible to establish that only alkalinity and BOD5 showed statistically significant differences between strata, and throughout the rest of the Analytes The concentrations did not record significant differences, which leaves in evidence a body of water without greater variability between the strata evaluated (surface and bottom). However, by analyzing variability between seasonal campaigns (Spring 2013 – Summer 2014), the trend shows that some Analytes They showed variation, such is the case of sulfate, calcium, vanadium and turbidity that recorded statistically superior concentrations in the Spring 2013 campaign, and chromium-zinc aluminum that showed significantly higher levels in the campaign Summer 2014; Arsenic, Bod5 chlorides, copper, manganese and organic matter in seawater showed no statistical differences between campaigns.

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but none surpassed the limit of effects on biota Established in 10% in that regulation; At the same time, the 9% limit established by the Under-Secretary for Fisheries and aquaculture (sub-PESCA) for aquaculture activities in marine sediments was not exceeded (only national regulations available for EFEFor which the organic matter values obtained can be considered normal. In the same way, the underfishing established a limit of acceptability for the potential of oxide reduction corrected to the Normal hydrogen electrode (NHE) of 50 Mv. The results indicate that of the total evaluated points of the subtidal environment in both seasonal campaigns, only three seasons in spring are under this threshold limit, specifically ASP3, ASP4 and ASP7 which also recorded the largest Concentration of organic matter during this campaign, and all other stations present acceptable conditions of oxide-reduction under this criterion.

The vast majority of the chemical parameters evaluated, showed concentrations lower than the limits established by the international standards consulted, and defined as suitable for the protection of marine aquatic life, such is the case of zinc, Vanadium, lead, nickel, iron, total chromium and copper. For the case of arsenic and cadmium several stations of both campaigns recorded levels above the threshold limit established by the Government of Canada ISQG/TEL (Interim Marine Sediment Quality Guidelines: Threshold level of effects on aquatic biota), and in the case of Mercury only 1 station showed this condition, however, none of the levels of these three elements was higher than the PEL boundary (probable Effect Levels) or probable effects on aquatic biota. The analysis of the variability of the concentrations of the Analytes By sampling station, it warns a pattern or tendency to group the highest concentrations in the stations ASP2 and ASP3 in the vast majority of parameters evaluated during both baseline campaigns, for example, such is the case of Zn, sulfates, Pb, NOR, Mn , Fe, Cr, Cd, V, Cu. This condition could be associated with the higher percentage of finer grains in these seasons, which have a greater surface/volume ratio that allow them to have greater adsorption capacity of Contaminants compared to the most grues sedimentss, for example, ASP2 as ASP3 presented a medium grain size corresponding to very fine sand in the summer campaign, and especially ASP2 recorded the highest percentage of the mud fraction in both campaigns. On the other hand, the analysis between seasonal campaigns reveals that of the totality of Analytes evaluated only nickel and sulfates showed significantly different concentrations between spring 2013 and summer 2014, so the subtidal sedimentary environment did not show significant changes between campaigns.

Regarding the chemical characterization of sediments Intertidal evaluated during The Summer campaign, it is possible to establish that of all the elements or metals evaluated (n = 8), only the arsenic recorded a punctual value on the Regulation ISQG/TEL but inferior to the limit of probable effects on the biota, all the rest of heavy metals Evaluated showed levels below the limits set by The Regulations consulted. The analysis of the variability of the concentrations of heavy metals in sediments Intertidal, shows a tendency to group the highest concentrations

preferably in the Transects 6 and 7 of the area of study (such is the case of Zn, Pb, As, Cd, Cu, located at the ends of the coastal sector evaluated.

10.4. Sectoral environmental Permit 119

Permission to conduct research fishing

The permit to carry out research fishing necessary for the monitoring of the populations of hydrobiological species, will be the established OJ in article 99 of the DS N ° 430, of 1991, of the Ministry for the Economy, promotion and reconstruction, which fixes the recast, coordinated and systematized text of the Law n ° 18,892, of 1989 and its modifications, General law of fisheries and aquaculture.

The requirement for its granting is to preserve the hydro-biological resources for the realization of research fishing.

The motive PO for which this permission is requested It corresponds to the requirement to carry out exploratory type research fishing necessary for the monitoring of the condition of populations of hydrobiological species.

The technical and formal contents that accredit their compliance are as follows:

10.4.1 Identification Species Hidrobiológicas to be QRetende EXtraer, ESpecies QRincipales and SEcundarias

The hydrobiological species identified corresponds to plankton. This is defined as the set of organisms, whether of animal origin (zooplankton) or vegetal (phytoplankton), which inhabit the water column and possess, in many cases a limited capacity to move, so that their movements are restricted to the Action of marine currents, constituting the basal trophic levels of marine ecosystems (Avaria & Muñoz 1983).

The phytoplankton that are present in the oceans are limited in the superficial layers of the water column (Herrera & Labbé 1990), performing primary production through photosynthesis using jointly the radiant energy of the sun, the dioxide of Carbon and the nutrients that are dissolved in seawater, highlighting two major functional groups: Diatoms and Dinoflagellates (Herrera & Merino 1992).

In the case of zooplankton there are also functional divisions, where we find the Holoplancton, which includes organisms that spend their entire lifecycle in the water column, while Meroplancton, includes organisms that pass only a part of their life cycle in the water column, and then settle in different benthic substrates. Within the Meroplancton stands out for its economic importance the Ichthyoplankton, which includes the eggs and larvae of fish that are

part of the planktonic community until they develop in juveniles that then recruit the adult population. For its part, zooplankton is composed of animals, both herbivores that feed on phytoplankton, as well as omnivores and carnivores.

Although Zooplankton plays a fundamental role in the transfer of energy among primary producers Fitoplanctónicos Towards higher trophic levels in marine ecosystems, the understanding exerted by the influence of environmental forcing on the dynamics of these communities is far from being appropriate for diagnostic and modeling purposes (Banse 1995, Hays et al. 2005).

Studies on the ecology of plankton carried out in the central and northern part of Chile (E.g. Palma et al. 2006, Henríquez et al. 2007, Escribano et al. 2012) are coincidental in pointing out that the dynamics of the community, from the point of view of their abundances, are dominated by the component Fitoplanctónico (i.e. diatoms and dinoflagellates that mainly measure between 2 and 20 μm) and the Mesozooplanctónico (i.e. individuals of zooplankton having a size between 20 and 200 μm) (Palma et al. 2006, Pavez et al. 2006, Pavez et al. 2010). It has been described that the main forcing forces that act on planktonic communities in regions of Upwelling They are of physical nature (i.e. wind), which in terms of comparison with regions of low frequency and intensity of these events, promote a scenario characterized by high levels of primary production (Santander et al. 2003, Montero et al. 2007), Associated with a decrease in the specific diversity of the community (Margalef 1978).

The antecedents compiled in the aforementioned works characterize the planktonic communities in the central and northern part of Chile, depending on the dominant oceanographic conditions, where the main effort has been focused on understanding those Patterns observable to Macro and Mesoscale Both in the spatial and temporal dimension (Thiel et al. 2007). However at local scales (i.e. hundreds of meters a few kilometres) studies have focused on changes in the community structure occurring at short time scales (i.e. daily), and which would be directly related to the Fluctuations in magnitude, Address and wind intensity (Henríquez et al. 2007, Palma et al. 2009, Kuznar et al. 2009).

Hutchings et al. (1995) Have pointed out that even in localities characterized by a Upwelling Permanent changes in wind forcing occur at temporary scales That vary from days to weeks, which translate into irregular pulses of nutrients into the area Euphotic, Promoting flowering Fitoplanctónicos That are observed in different seasons of the year (Avaria et al. 1982, Avaria & Muñoz 1983, Herrera & Merino 1992). Another important aspect of mentioning is the vertical migration diurnal-nocturnal that the individuals of larger size and possessing greater swimming capacity present in the zooplankton and that change the structure of the planktonic community in temporal scales of Short term. In fact, it has been proposed that vertical migration of zooplankton could be considered as a mechanism that can affect the size spectrum of that community (Manríquez et al. 2009, Manríquez et al. 2012, Riquelme-Bugueño's et al. 2012,

2013) in addition to representing a behavior that favors survival, return and subsequent settlement to the coast from oceanic waters of invertebrate larvae of commercial importance (Poulin et al. 2002, Palma et al. 2011).

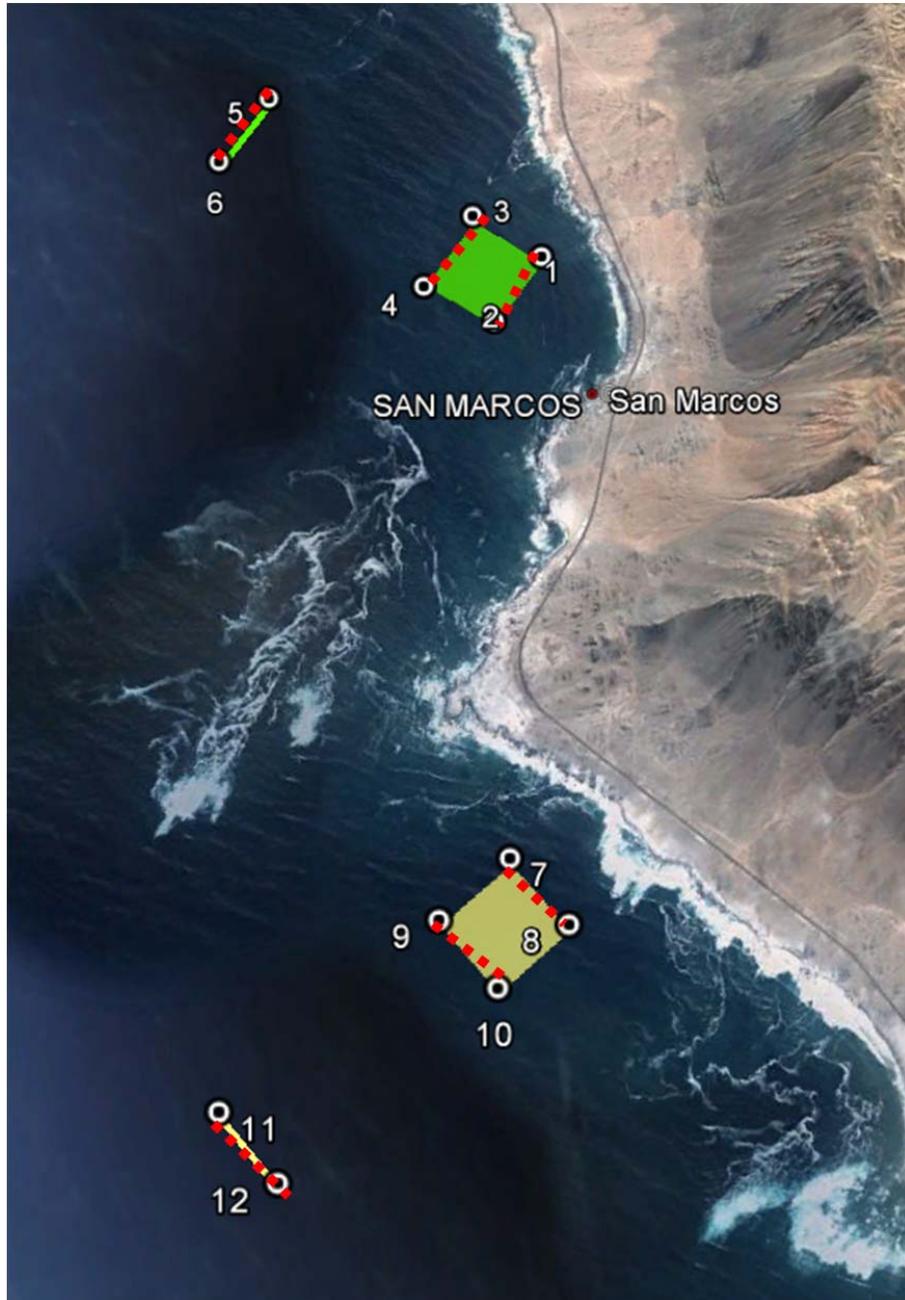
In the last decades, studies aimed at identifying and understanding the mechanisms or processes involved in the planktonic dynamics, receive special emphasis when one wants to answer an applied question and focused to solve and to identify the Potential effects that some human activity would have on these communities. In this case, the main problem of this type of project is the capture of important daily volumes seawater. This activity will possibly lead to the loss of some individuals of the various components of zooplankton, so TAlt is also important to quantify the mortality occurring naturally in these communities, thus eliminating the possible overestimation of the effect of industrial activity on the abundance of zooplankton.

The previous antecedents emphasize the importance of carrying out studies of coastal plankton and to be able to establish the possible physical forcings that determine their patterns of distribution, abundance and renovation at short timescales on a local scale.

10.4.2 Indication Área On that Is QRetende DWind up ToCtivities Investigación

The study area comprises a zone of direct influence (points 1 to 6) and one without influence of the project as Control zone (points 7 to 12; Figure 10-17; Table 10-11). In each of these points, vertical surveys of phytoplankton and zooplankton were carried out in addition to measurements of temperature, salinity, PH, turbidity, fluorescence, depth Secchi and water samples were taken for nutrient analysis, Clo-A and Feopigmentos. The coordinates of each point are shown in the Table 10-11. The Transects Of sampling are represented by the parallel route to the coast, which is made from one point to another. (E.g. From point 1 to 2 is the Transect 1, from 3 to 4 the TransectOr 2 and 5 to 6 the Transect 3, Etc.).

Figure 10-17: Location of the Sltios MUestreo.



Source: Self-elaboration

Table 10-11: Coordinates of the QPoints Muestreo (WGS84 H19S).

| Station | UTM coordinates |
|---------|-----------------|
|---------|-----------------|

| | This | North |
|-------------------------------------|--------|---------|
| Site with direct influence | 383128 | 7665683 |
| 1 (Start Transect 1 | 382792 | 7665327 |
| 2 (end Transect 1 | 382767 | 7666027 |
| 3 (Start Transect 2 | 382418 | 7665630 |
| 4 (end Transect 2 | 381673 | 7667046 |
| 5 (Start Transect 3 | 381328 | 7666681 |
| 6 (end Transect 3 | 382405 | 7662157 |
| Control site or no influence | | |
| 7 (Start Transect 4 | 382663 | 7661736 |
| 8 (end Transect 4 | 381977 | 7661898 |
| 9 (Start Transect 5 | 382235 | 7661472 |
| 10 (end Transect 5 | 380695 | 7661118 |
| 11 (Start Transect 6 | 380955 | 7660693 |
| 12 (end Transect 6 | 383128 | 7665683 |

Source: Self-elaboration of the consultant.

10.4.3 Specification of OBjectives GEnerales and ESpecific As the QProject QScan of INvestigación QErsegue

The main objective of this study is to obtain the first record of base information of the diversity and structure of the planktonic community (phytoplankton and zooplankton) in front of the area of influence of the project Espejo de Tarapacá And a more south control sector without this influence, recorded intensively (for three days and two nights, interspersed) during the spring campaign in November 2013.

Specific objectives:

- To determine the specific richness and abundance of plankton obtained in the study area.
- Determine the biomass Phytoplankton (Chlorophyll-a) and an estimation of degraded chlorophyll (Feopigmentos) into the water column.
- To determine the concentration of nutrients important for the primary and secondary productivity of the study area.
- Characterize phytoplankton and zooplankton through the quantification of community descriptors derived from taxonomic identity and abundance of organisms. specifically to determine the diversity Zooplankton By the Shannon-Wiener Diversity index (H') and its uniformity through the index of Pielou (J').

- To evaluate the natural mortality of zooplankton in the study site, using the neutral red technique.

10.4.4 Identification and Characteristics Specific of the Trawl Rigging or System Used in the Execution of the Investigation

Zooplankton samples and Ichthyoplankton They will be obtained by means of a conical cylindrical network type Hansen, with mesh draught of 120 μm . The carried out trawls will be of the vertical stratified type, covering from the vicinity of the seabed of each sampling station up to half water (depending on the depth of each station), and between water and surface of the sea. In order to carry out a comparable analysis between the different samplings and similar studies, fishing Zooplanktonics will be standardized to a water volume of 100 m^3 .

10.4.5 Specification of the Methodology Employed, Indicating to Other his Correspondent Mollusks Port wine Estadístico Ebidamente Fundamentado

The characterization of the community Intermediate Area Soft bottom will be done In sandy beaches located in front of the area where you want to build the project, Figure 10-17. In addition will be made A Transect As control north and the other as southern control. The sampling NA is characterized By the presence of small sandy beaches between gravel and bowling sectors. In each Transect will be made 9 stations distributed on three levels Intertidal; High, medium and low, distributed in the area Mediollitoral, between the line of Drift and the lower limit of the area Intertidal.

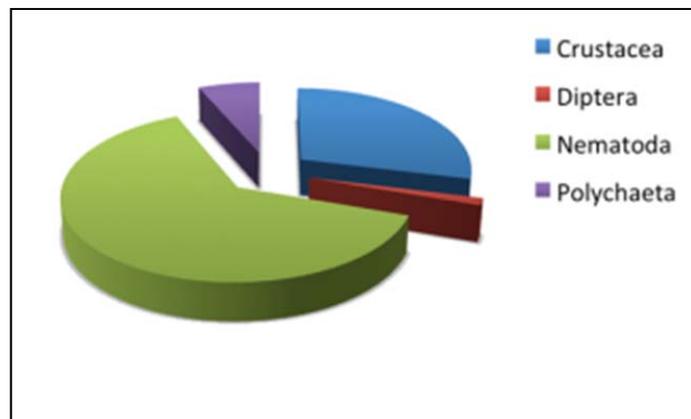
At each level you will get Samples with a Core of 0.01 m^2 . The samples will be Sieved *In situ* To be stored in polyethylene bags duly labeled and fixed in alcohol diluted in water of Sea at 70%. The samples will be Transported to Laboratory where it will be classified at the lowest possible taxonomic level as well as being counted and weighed with a balance Semi-Analytical with a sensitivity of 0.001 g.

With the Data obtained will be made A matrix of Taxa Per station. It will be calculated the following ecological descriptors for each Taxa And season: Abundance, biomass, species richness, species diversity (Shannon-Wiener index) and uniformity (index of Pielou). The differences between levels of Intertidal and between Transects will be assessed With the ANOV statistical test A one-way. It will also be done A Hierarchical classification analysis Based on a similarity matrix (using the index Bray-Curtis) in order to evaluate the similarity in between Transects.

10.4.6 Results ESperados

With reference to the campaign carried out in October 2013, a total of 12 species of invertebrates are expected to be registered, among which five would be from the group Crustacea And Polychaeta. In terms of abundance, the community would be dominated by Nematoda And Crustacea With 63% and 29% of the total number of species recorded, respectively (Figure 10-18).

Figure 10-18: Analysis QOrcentual of the ToBundancia by GGroups FAuna ENcontrados in the COMunidades INfauna Of INtermareal Of ToRena from San Marcos. Campaign October 2013.

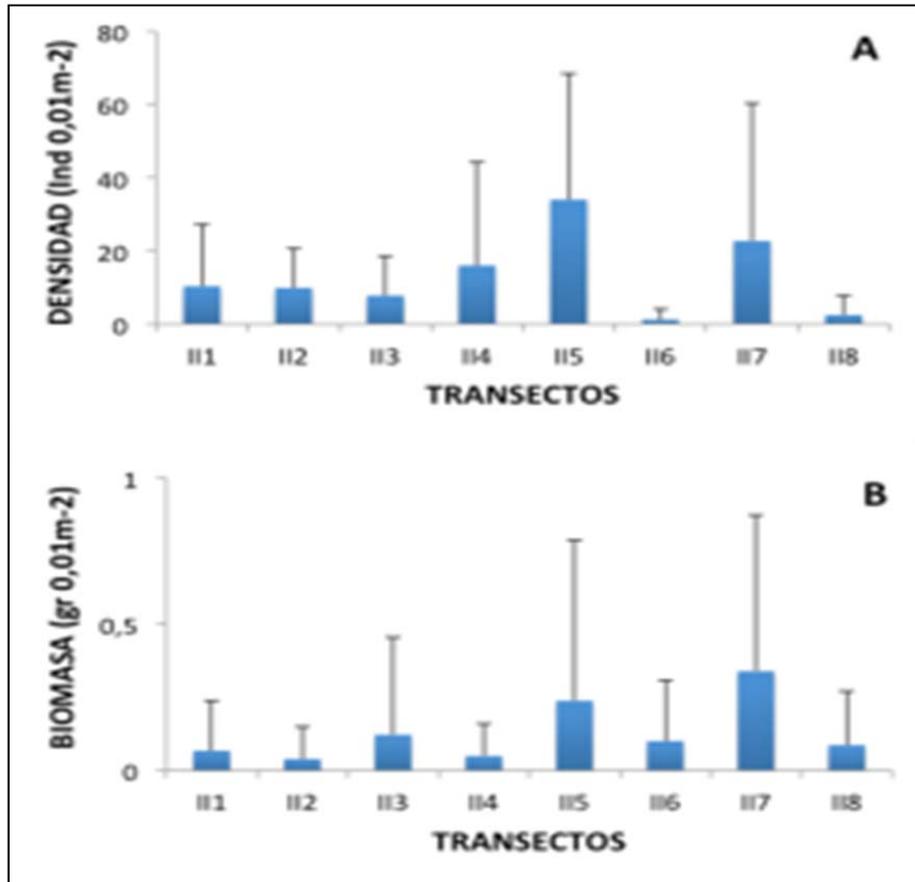


Source: Self-elaboration

The analysis of the Macroinfauna Total is expected to find that the greatest abundance is in the Transects II5 and II7 (southern Control), with a total average abundance close to 34 and 26 ind • 0, 01m-2, most of this abundance would be represented by the nematode Adenophorea In the Transect II5 and Crustacean Emeritus Analog In the Transect Control sur II7 (A). The highest biomasses would be found in the same Transects Above.

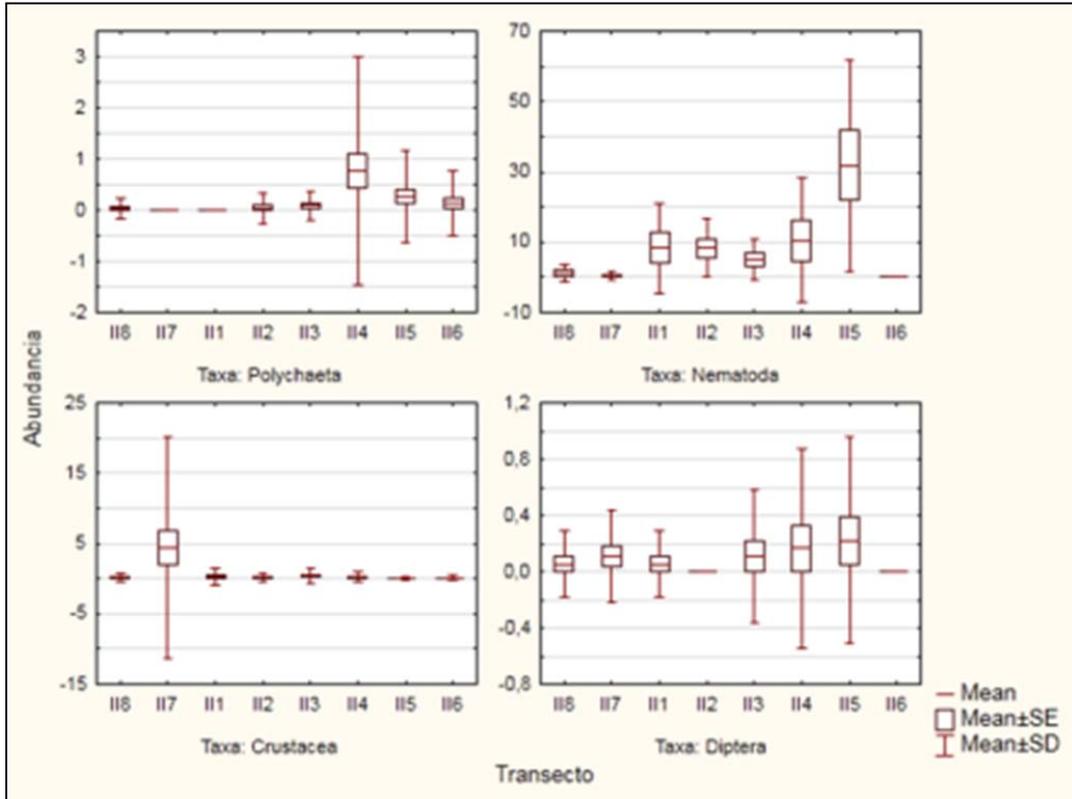
Crustacea Would be the only taxonomic group with representatives in all Transects Sampled(Figure 10-19). However, it is the group Nematoda It would present the highest density among the analyzed groups.

Figure 10-19: Abundance (A) and Total Biomass (B) of the Macroinfauna Present in the Intermareal Of ToRena from San Marcos. Campaign October 2013.



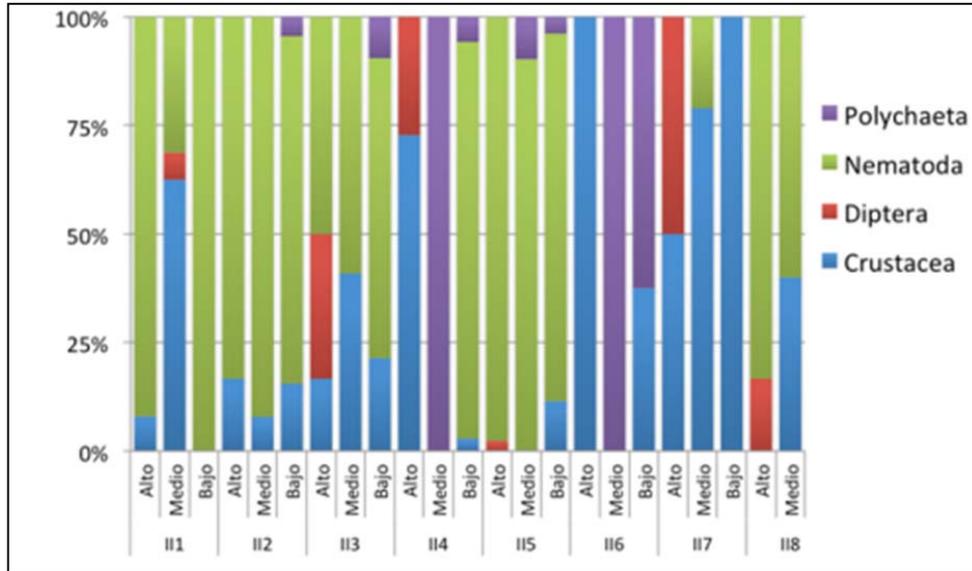
Source: Self-elaboration

Figure 10-20: Abundance of the MACroinfauna (Individuals • 0, 01m²), Torumped by GGroups TAXonómicos MARKET. QResent in the INtermareal Of ToRena from San Marcos. October campaign. 2013.



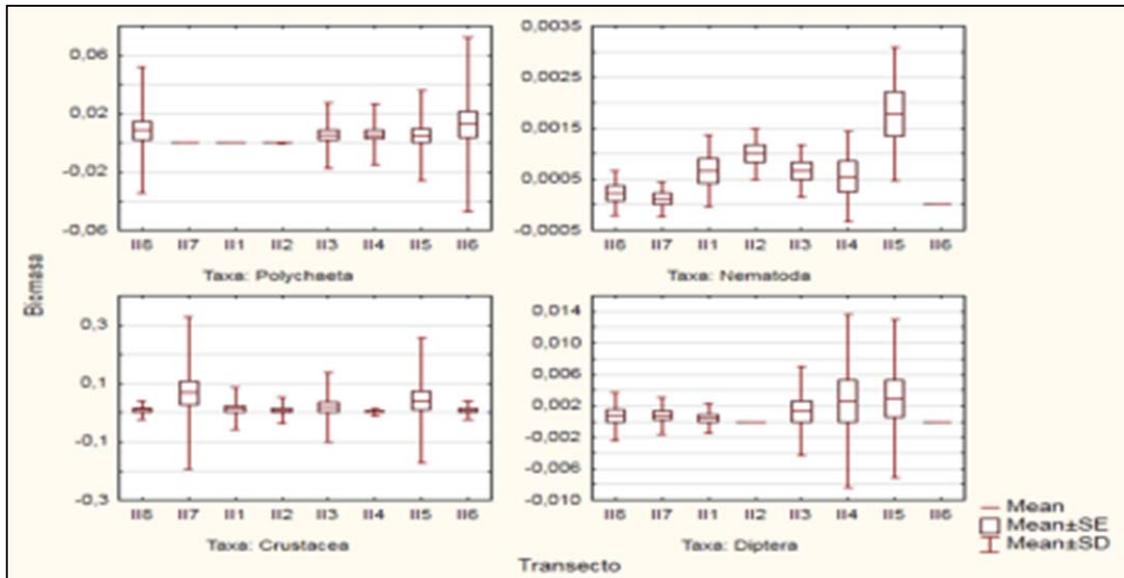
Source: Self-elaboration

Figure 10-21: Abundance RELativa of the MACroinfauna (QRoporción CAdA GRupo by Nivel RSpecies to TOTAL CAdA TRANsecto), Torumped by GGroups TAXonómicos MARKET QResent in the INTermareal Of ToRena from San Marcos. Campaign October 2013.



Source: Self-elaboration

Figure 10-22: Biomass of the MACroinfauna (g • 0, 01m-2) QResent in the INTermareal Of ToRena from San Marcos. Campaign October 2013.



Source: Self-elaboration

10.4.7 Duration of the EStudio and CRonograma ToCtivities

A Six-monthly monitoring of the abundance and diversity of Planktonic community (phytoplankton and zooplankton) In the area of influence, for three years, from the beginning of the operation of the plant. Follow-up will take place at the designated stations Previously. The report associated with each follow-up will be generated After 45 days after each field campaign. (see Table 10-12).

will be delivered to the Sernapesca An annual report during the initial three years of the plant's operation, i.e. three reports, plus a fourth consolidated report. This consolidated will be delivered at the end of the third year, containing all the antecedents and analyses carried out.

At the same time, the results of each semester follow-up will be given to the undersecretary of fisheries in an Excel spreadsheet.

Table 10-12: Schedule ToCtivities QScan of INvestigación

| Activity | Days | | | | | |
|---|------|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 45 |
| Notice start of activities | | | | | | |
| Field Campaign preparation/coordination | | | | | | |
| Prospecting tracking Area | | | | | | |
| Sampling | | | | | | |
| Elaboration of the report | | | | | | |

Source: Self-elaboration.

10.5. Sectoral environmental Permit 126

Permission for the ConstructionRepair, modification and extension of any installation designed for the handling of sludges of sewage treatment plants.

The permit for the construction, repair, modification and extension of any installation designed for the handling of sludge generated from wastewater treatment plants shall be that laid down in article 9 of DS No. 4 of 2009, of the Ministry Secretariat General of the Presidency, regulations for the management of sludge generated in wastewater treatment plants.

The requirements for its granting are to ensure that there will be no risk to the health of the population and/or quality of air, water and soil.

The project CTO requires the granting of This sectoral permit as it will generate sludge from 3 plants of treatment How many underground of sewage, the type of sludge activated:

- Pesetas Stage construction Control and administration building (it will also supply to the facility of slaughter located at the side of this building). QOsteriormente will be permanent for the Stage of Operation, Coast area
- PTAS Stage Construction Camp, Coast area
- PTAS CONSTRUCC Stagelon installation of slaughter, area MEseta

The technical and formal contents that accredit their compliance are as follows:

10.5.1 Description of the QROcesos in which GThey LOdos CUantificación and CAracterización of the LOdos GGenerados and CLasificación SANita of the LOdos TRatas

10.5.1.1 Description of the QROcesos in which GThey were LOdos

The sludge will be generated In the Modular Wastewater Treatment Plants Similarls To Those of the type Ecojet, which will treat the water served by means of a biological process of activated sludge. This type of plants abate dissolved solids, which implies a high efficiency of elimination of organic matter; CoN Aerobic performance, do not generate bad smells; They are small-sized plants; and generate a reduced volume of sludge.

Basically, PTAS are composed of a pre-treatment stage, to separate large and non-degradable solids; Aeration stage in which organic matter is degraded; Sedimentation stage for the production of a crystalline and odorless effluent; Phase of disinfection, usually chlorine-based, for the elimination of pathogenic elements; and stage of DeclOrRation In which the residual chlorine is eliminated by means of sodium sulfite tablets, thus obtaining a harmless effluent for the environment.

The capacity of PTAS It will be designed for periods of maximum concentration of labor, (see Table 10-13), which will make it possible to meet the requirements of each phase of the project.

As for the sludge generated in the PTAS, they will comply with the provisions of the D.S. n ° 4/2009 of the Ministry of Health, regulations for the management of sludge generated in wastewater treatment plants, and will be removed by a clean pit company authorized to be taken to final disposition.

10.5.1.2 Quantification and CAracterización of the LOrTwo GGenerados

The estimation of Quantity of sludge generated, is based on the Generation factor corresponding to A wastewater treatment plant of the type of active sludge, corresponding to 0.88 kg of sludge

by 1.0 m³ of treated water³, Considering the equipmentStaff for each stage, you have the following generation:

Table 10-13: Generation of LOdos per ELid of the QProject

| Stage | Pesetas | Max Staff | Amount of sludge (ton/month) |
|--------------|--|-----------|------------------------------|
| Construction | PtaS Control Building, Costa area. Pesetas Camp, Coast area. Pesetas Installation of slaughter, plateau area. | 500 | 1.98 |
| Operation | Pesetas Building of Control, Coast area. | 50 | 0.198 |

Source: Self-elaboration

It is important to point out that these sludges will not possess reactive or toxic substances or present dangerous characteristics.

In relation to the characterization of the Sludge Generated in The Wastewater Treatment PlantThis Is Presented in the Table 10-14. It's important RememberWhat DADO that the sewage shall correspond to domestic effluents, the sludge generated by the treatment of these will not contain reactive or toxic substances, nor will they present dangerous characteristics.

Table 10-14: Parameters of the LOdos in FASE CConstruction.

| Parameter | Expression | Value | Unit |
|---|------------|-----------|---------------|
| Total Suspended solids | Sst | 1000-3000 | mg/L |
| Volatile suspended solids | Ssv | 80 | % |
| Non-volatile (inorganic) suspended solids | SSNV | 20 | % |
| Ph | Ph | 6.5-7.0 | Ad |
| Sedimentation rate | VL30 | 300-600 | ML/30 minutes |

SSV: They correspond to solids of the organic and biological type
VL30: Volume of cone-shaped sludge Inhof 1 liter for 30 minutes.

Source: Self-elaboration

³ Nch 1105/2008 Ingeniería Sanitaria- Alcantarillado de aguas residuales- Diseño y cálculo de redes, indica en capítulo 6 "Calculo Hidráulicos", capítulo 6.4 Coeficiente y factores, punto 6.4.1 "Coeficientes de recuperación".

10.5.1.3 Classification SANita of the LOdos TRatas

Based on the treatment system provided for wastewater generated during the construction of the project and described in the previous sections, it is possible to determine that the sludge generated will correspond to a stabilized sludge, which according to title II, Article 6, numeral 6, of DS N° 4/2009, is generated from a time of residence equal to or more than 25 days, provided that they are sludges from sewage treatment plants, in which the stabilization of sludge is carried out in the same unit in which the biological oxidation of the organic matter occurs.

10.5.2 Design of the UClutches and Equipamiento NEcesario for CONducir, TRatar and/or DAr Disposiclon Flnal to the LOdos GEnrados

As mentioned in the section 10.5.1, the sludge will be generated from the modular wastewater treatment plants, similar to the type Ecojet, which will treat the water served by means of a biological process of activated sludge. Once generated, they will be collected in HDPE bags or PVC containers, duly labelled; Collected within the PTAS, in a sector specially authorized for this purpose; Removed by a clean pit company and finally arranged in a place enabled for it. In relation to the transport and final disposition, both services must have a valid authorisation granted by the corresponding health authority, According to the Regulations on sanitary and basic safety conditions in landfills, DS N° 189/2007 of the Ministry of Health. For the foregoing, the following shall be kept in record:

- Contract with authorized company for the removal of sludge.
- Waste collection record identifying withdrawal date, quantity and Company
- Stamped document of entry to authorized place.

The holder agrees to perform in This phase, records of the procedure withdrawal and disposition to the authorized company, which show that they comply fully with the current regulations.

10.5.3 Program of COntrol QArámetros CRíticos OrPeration Of SSystem MAnnex of LOdos

The Operation control program of the sludge management system includes the measurement of the following critical parameters:

- Observe Weekly The correct operation of electromechanical ejectors, which injects air into the plant.
- Weekly PH Measurement
- Weekly temperature measurement
- Weekly review of Electric board and good performance
- Monthly sludge volume check in Accumulation pond

- Semi-annual revision of the volume of sludge in the chambers of the modular system.

10.5.4 Contingency Plan

The aim of the Contingency Plan, is to have an administrative, organizational and operational tool that allows to respond to eventualities of natural or operative order, by means of the application of Guides of organization and response to optimize the efficiency and efficiency of the actions of Control of the emergency, in order to protect the environment, the infrastructure, the equipment and the human resource involved, finally ensuring the normal functioning of the wastewater Treatment Plant (PTAS)

10.5.4.1 Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external.

10.5.4.2 Responsibilities

The main responsible actors within the Contingency Plan They are the general manager, the Chief of Land (emergency coordinator), the Emergency Brigade and finally all the workers hired directly by the titular company or by contractors or external companies.

General Manager: He is responsible for delivering the means for the prevention and Control of emergencies.

Head of Turn Ground: is responsible for the control of situations that may generate an emergency, must conduct inspections of areas, materials and equipment that may be the source of an emergency and take the appropriate preventive measures. The head of the field will also assume responsibility for the Office of Technical Inspection of works (ITO) and of the emergency coordinator.

Emergency Brigade: Group Formed by minimum 3 and maximum 6 workers that together with having Willingness to collaborate, you must tKnowledge of first aid, evacuation, rescue, control of spills and fires, etc., and actively participate in the control of the prevention and contingency plan. These people should tGood physical and psychological conditions to participate in operations, emergencies and drills.

Workers: Must Actively participate in reporting situations that could generate an emergency, as well as abide by instructions given by your Supervisor whenever an emergency occurs.

10.5.4.3 Development

Personnel who develop activities within the treatment plant must comply with the provisions of this contingency Plan and proceed in accordance with the stipulations.

i. General functioning of the PTAS

- For Avoid The emission of smells the treatment system will provide the appropriate mechanisms, so that they obtain an adequate degree of stabilization and sanitization, by means of the use of lime.
- For the vectors, the project does not contemplate sludge-drying fields, it is unlikely that insect proliferation events will occur. If it occurs in any area, the areas that may contain sludge remains will be washed, the affected sites will be treated with lime and immediate fumigation (12 to 36 hours) will be available, from the sector affected by insecticides of the pyrethroid type.
- In the case of spills of the sludge on the road, product of an accident, another truck will be sent immediately, with system AmpLroll, allowing the cargo to be transvesselled from one truck to another. The spill area will be washed at the same time.
- If an increase in the values of the control parameters is detected (see section 10.5.3), the manager shall give notice to administration and immediately stop the operation of the PTAS and the technical service must be given notice. As long as the pesetas are being reworked the waters will be accumulated in a temporary storage pond of wastewater whose volume of 115 M³ It allows to store a total of one day of operation of the PTAS when it is operating at its maximum capacity.

ii. Contingency to break ToLcantarillado, EStanques or FUGas

In case of evidence of Sewer or leaks, you must give immediate notice to administration:

- The manager must give an immediate order to stop the operation of the PTAS
- The attendant will contact the technical service and ensure that the affected part is reposed as soon as possible.
- As long as the pesetas are being reworked the waters will be accumulated in a temporary storage pond of wastewater whose volume of 115 M³ It allows to store a total of one day of operation of the PTAS when it is operating at its maximum capacity.
- In case the contingency persists for a period greater than one day of operation at maximum capacity, the waters will be removed by a clean truck pits, and will be Arranged in a sewer system as permitted by the regulations, and prior agreement with the sanitary enterprise.
- Once the plant operates normally, it will be the responsibility of the Commission to authorize its operation again.

iii. Contingency ToNTE Power cuts

- In the event of evidence of electrical power failures or interruptions, the administration must be given notice.

- The manager must give the immediate order to connect the generator that will allow to maintain the autonomy of the plant giving the energy requirements to those units that need it, in particular the aeration units which will allow the Treatment is never devoid of aeration, and therefore unpleasant odours are disarmed.
- Once the contingency is the responsibility of the administrator to authorize the normal operation of the PTAS again.

10.5.5 Emergency Plan

In emergencies, the most important thing is the timely communication according to the established organization chart and the evacuation of the exposed workers and/or that may interfere in the performance of the chief of the shift and emergency brigade.

The aim of the Emergency Plan, is to have an administrative, organizational and operational tool that allows responding to emergencies, natural or operational order, through the application of organization and response guides to optimize the efficiency and efficiency of the Control actions, in order to protect the environment, infrastructure, equipment and the human resource involved.

10.5.5.1 Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external.

10.5.5.2 Responsibilities

The main responsible actors within the Contingency Plan They are the general manager, the Chief of Land (emergency coordinator), the Emergency Brigade and finally all the workers hired directly by the titular company or by contractors or external companies.

General Manager: He is responsible for delivering the means for the prevention and Control of emergencies.

Head of Turn Ground: is responsible for the control of situations that may generate an emergency, must conduct inspections of areas, materials and equipment that may be the source of an emergency and take the appropriate preventive measures. The head of the field will also assume responsibility for the Office of Technical Inspection of works (ITO) and of the emergency coordinator.

Emergency Brigade: Group Formed by minimum 3 and maximum 6 workers that together with having Willingness to collaborate, you must tKnowledge of first aid, evacuation, rescue, control of spills and fires, etc., and actively participate in the control of the prevention and contingency plan. These people should tGood physical and psychological conditions to participate in operations, emergencies and drills.

Workers: Must Actively participate in reporting situations that could generate an emergency, as well as abide by instructions given by your Supervisor whenever an emergency occurs.

10.5.5.3 Development

The measures considered for emergencies correspond to:

- Suspension of the power supply of PTAS
- Personal evacuation
- Activation of the communications Plan, which specifies, depending on the magnitude of the accident, to whom to report.
- Delimitation of a restriction area, where only trained personnel can enter.
- Trained personnel, inspect the site of the accident, verifying that there are no injuries in the area.
- In case of registering injured by this accident, they will be taken to a care center.
- A specialist in risk prevention, will inspect the area, demarcating the areas of risk. The professional will determine if it is advisable to relocate the facilities. If this is the case, the relevant authorities will be informed.

10.6. Mixed sectoral environmental Permit 132.

Permission to make excavations of archaeological, anthropological and paleontological type.

The permit To make excavations of archaeological, anthropological and paleontological type, it will be the established in articles 22 and 23 of Law n ° 17,288, on national monuments.

The requirement for its granting is to protect and/or ConservThe cultural heritage of the CAtegoría Archaeological Monument, including those with anthropological or paleontological value.

The project requires this sectoral environmental permit as Works will be carried out in areas where archaeological finds exist.

The technical and formal contents that accredit their compliance are as follows:

10.6.1 Identification and DDescription GEneral of the Sltios ToRqueológicos

For the identification and description of the existing cultural heritage in the study area of the project (see Next figure), two field campaigns were carried out, Between 11 and 15 November and 16 to 19 December 2013, which consisted of a Archaeological prospecting Pedestrian, through visual inspection, whose central objective is to locate and register archaeological sites and finds located inside this area.

The baseline made identified A total of 23 archaeological findings, corresponding to three indeterminate inscribed fingerprints lacking diagnostic material ASOFited, probably historical; A lithic set of medium density Identified as pre-Hispanic; Four structures/milestones of Data Subcurrent or indeterminate; A historical cemetery of nitrate period and platforms and imprints of the old railway. The remaining points correspond to landfills or accumulations of historical material-Subcurrent, including the discovery of historic bottles and a buildup of mineral. The detail of these findings is indicated in the Table 10-15 and sample in the Figure 10-24.

Figure 10-23: Cultural Heritage Study area.



is observed in Red The route of the projected transmission line, in blue the areas of the reservoir and the access road.
[Satellite image. Source: Google Earth 2013.]

10.6.2 Description of QArts OrBras and Tolnstructions that Quedan ToFectar Sltios or AndAcimientos

The archaeological points of interest identified What Is Could see Affected By the site of the project, during its construction stage, correspond to those located in the sector of the projected camp – Find n ° 19, Table 10-15 -, which will be collected from the surface layer or Subsurface, Once you have obtained the Permission Corresponding Of the Council of National Monuments, the detail of the Mitigation, repair and/or compensation measures Associated, are detailed in Chapter 7 of this EIA. In relation to the stages of operation and closure, these will not generate new effects on the archaeological points identified, so that they do not have impacts on the archaeological heritage.

10.6.3 Characterization Superficial and EStratigrafía Sltios or of AndToFoundations

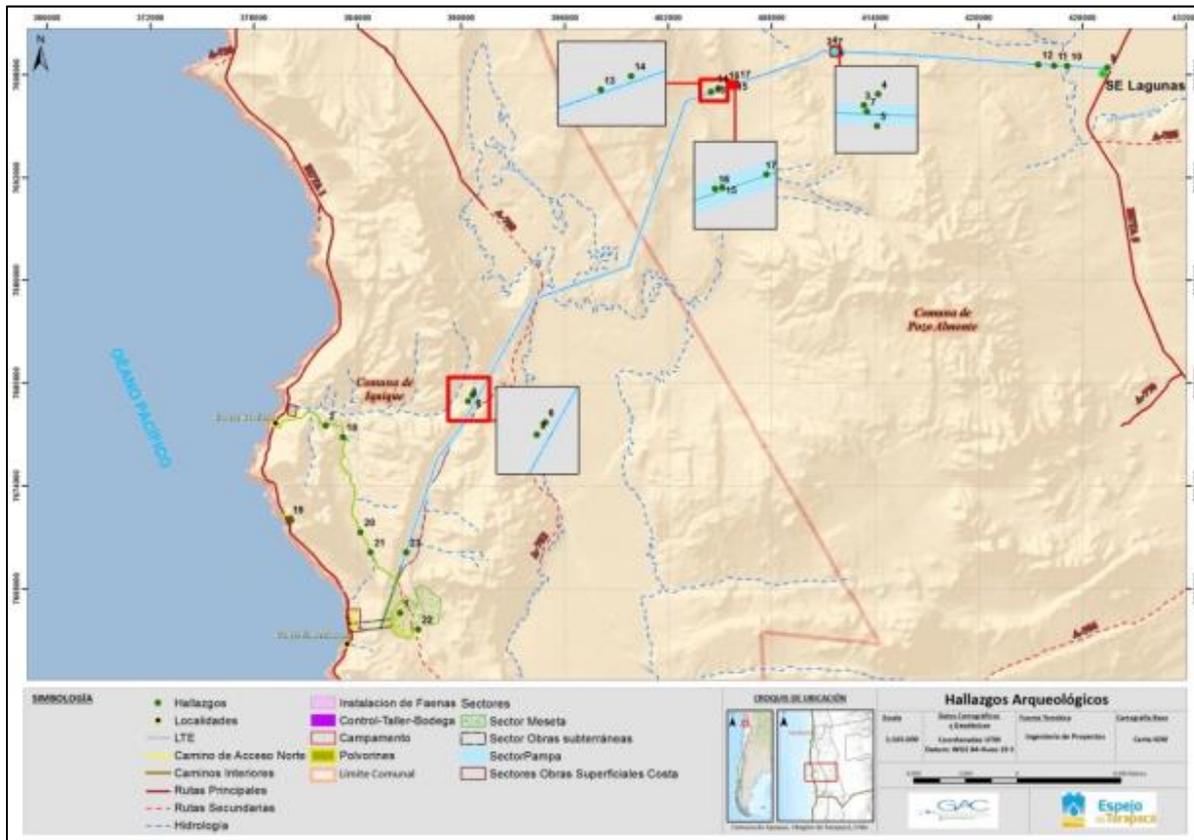
As a result of the archaeological survey implemented, it was recorded The following Archaeological finds.

Table 10-15: Points of Hallazgos ToRqueológicos. WGS84 H19S.

| Site | Description | Coordinates | | Adscription |
|------|-------------|-------------|---------|----------------------|
| Find | | E | S | |
| 001 | Bottle | 386470 | 7666591 | Historical |
| 002 | Bottle | 382152 | 7677526 | Historical |
| 003 | Dump | 411611 | 7699415 | Historical |
| 004 | Dump | 411693 | 7699480 | Historical |
| 005 | Dump | 411688 | 7699294 | Historical |
| 006 | Dump | 390665 | 767931 | Historical |
| 007 | Dump | 411629 | 7699378 | Historical |
| 008 | Site | 411611 | 7699415 | HistoricalSubcurrent |
| 009 | Nail | 427448 | 7698436 | Historical |
| 010 | Cemetery | 425134 | 7698522 | Historical |
| 011 | Platform | 424381 | 7698541 | Historical |
| 012 | Platform | 423462 | 7698602 | Historical |
| 013 | Structure | 404485 | 7697015 | Indeterminate |
| 014 | Milestone | 404929 | 7697219 | Subcurrent |
| 015 | Milestone | 405762 | 7697424 | Subcurrent |
| 016 | Footprint | 405732 | 7697419 | Historical |
| 017 | Footprint | 405946 | 7697479 | Historical |
| 018 | Mineral | 383158 | 7676859 | Historical |
| 019 | Site | 380031 | 7672063 | Prehispanic |
| 020 | Bottle | 384168 | 7671305 | Historical |
| 021 | Dump | 384754 | 7670123 | Indeterminate |
| 022 | Footprint | 387518 | 766562 | Historical |
| 023 | Structure | 392606 | 7681227 | Indeterminate |

Source: Baseline Q Cultural Atrimonio

Figure 10-24: Archaeological finds.



Source: Archaeology Baseline.

Among the points of archaeological interest found are three segments of troop traces of indeterminate temporal affiliation, probably historical; These are multiple traces of general characteristics of Camino Tropero, which are all interrupted by current vehicular footprints and intensive alterations, so it is difficult to follow their extension; It should be noted that none of the traces were recorded superficial archaeological material associated.

Other points of archaeological interest correspond to circular structures or parapets; The lack of associated superficial material hinders its chronological attachment. There are also superficial milestones, accumulations of rocks, also lacking in diagnostic material, which are catalogued as Subcurrent.

The recorded historical findings include a cemetery, near Route 5 N, which is of historical data and probably corresponds to the nearby saltpeter; In addition, in the segment called "Pampa" of projected laying, footprints and platforms are recorded Corresponding to the old train line. These are the most visible findings within the portion corresponding to the transmission line.

The only clearly pre-Hispanic material identified within the study area corresponds to a site with superficial lithic material that is located within the projected camp sector. Only lithic material was recorded not Formatizado, dispersed, which presents potential stratigraphic in those areas not disturbed, especially those adjacent to erratic blocks on the coastal terrace.

10.6.4 Description General TIPOs ToNálisis RCompulsory MMaterials REcuperados

Materials recovered Of the camp site, the only point where the works could alter the findings, (collected from the surface layer or Subsurface, with the permission of the Council of National Monuments) will be classified according to type of materiality, characterised by its main and quantified attributes. In each case, according to the CMN, specialized analyses may be implemented (typological, morph-functional or others).

10.6.5 Proposal for CONservación of the MMaterials at TERreno, LOratory and DEpósito

It is proposed to prepare the recovered archaeological materials From the camp sector For delivery to a specialized warehouse, including cleaning of materials, classification, labeling of bags and boxes and appropriate packaging according to the criteria requested by the depositary institution (in this case, the Regional Museum of Iquique).

For LOther findings Identified will be implemented a signaling system, highlighting those located less than 30 meters from a work, for which will include the fencing of the location area, maintaining the necessary precautions to avoid alteration.

In Relationship to the cemetery Identified, although the project activities do not directly affect it, considering The proximity of this one to the high voltage transmission line projected, is contemplated its signaling, in a way To direct the traffic associated with the project and prevent Possible deviations that could alter their state of conservation.

10.6.6 Plan of Transfer and DEpósito Final of the MMaterials REcuperados

It is necessary to identify an institution authorized by the CMN, in this case, the Regional Museum of Iquique, who agrees to serve as permanent deposit for any materials recovered in this project, as long as it complies with the conditions stipulated by them. For packing. When you deliver the collected material to the selected deposit, it will issue a Letter of receipt, which will be sent to the CMN together with a report of the packing and transfer activities.

10.6.7 C measures Observación of the Sites or And Acimientos, if Corresponds.

It is recommended to install informative signage in the troop footprints, to contribute to its preservation, considering its current deterioration. The findings of structures and milestones have no clear affiliation and will not be directly intervened by the Project, therefore no specific recommendations are indicated for them.

With regard to the nitrate cemetery and the evidences of the passage of the old railway, it is recommended its signposting and protection by means of the instructions to be requested to the Council of National Monuments, in order to assure its preservation because of its interest Historical.

To find the set of pre-Hispanic lithic material in the camp the project proposes, perform an archaeological intervention to lift this material and have an archaeologist during the installation of the same, so as to monitor the work and To manage the lifting of eventual findings in coordination with the authorities.

For isolated findings, consisting of litters and fragments of historical bottles, no particular safeguard measures are recommended.

10.7. Mixed sectoral Environmental Permit 132 Reservoir and ancillary works.

Permission to make excavations of archaeological, anthropological and paleontological type.

The permit To make excavations of archaeological, anthropological and paleontological type, it will be the established in articles 22 and 23 of Law n ° 17,288, on national monuments.

The requirement for its granting is to protect and/or preserve the cultural heritage of the archeological monument category, including those with anthropological or paleontological value.

The project requires this sectoral environmental permit as it will perform works in areas where there are paleontological findings.

The technical and formal contents that accredit their compliance are as follows:

10.7.1 Identification and Description General of the Sites of the AndAcimientos QAleontológicos

The methodology and results of the Levantamiento Baseline paleontological are delivered in detail in The Section 3.5.3, Chapter 3 Baseline, of this EIA, According to the sectors of the Figure 10-25.

Figure 10-25: Area of Estudio Paleontology.



Source: Self-elaboration

In Sector Reservorio were individualized 28 Main checkpoints, of which 2 were identified Remains of Quaternary-age terrestrial invertebrates from high hospice gravels. Similarly And in 3 the Presence of coquina levels with remnants of bivalve molluscs and Gastropods Pleistocena old seamen.

In the T sector Raced from the line of Electric transmission High Voltage, Access roads and Servicing Area of the camp, 47 checkpoints were individualized, of which 3 verified Presence of invertebrates of continental origin of presumed age quaternary. Adicionalmente, in Other 3 Points were identified Remains of various marine invertebrates such as bivalve molluscs and Gastropods of Pleistocena age.

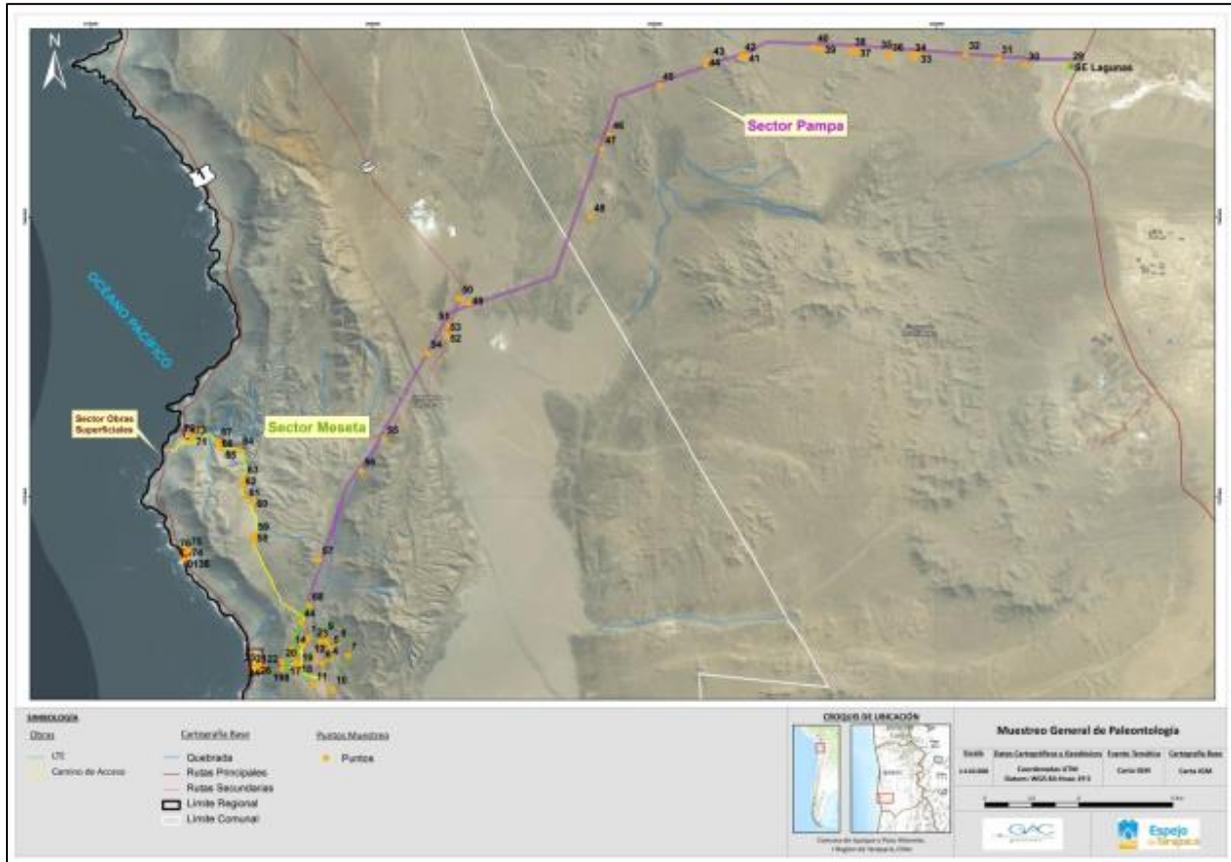
10.7.2 Description of the PArts Works and toInstructions that Can toFectar the Sltios or AndAcimientos

The location of the levels with marine and continental invertebrates in The areas Of the project represents risk to the integrity of the fossils present in the area, both of collection and direct damage by the Transit of civil servants such as excavation and land removal works, During the construction stage. It is not expected to generate new effects on The Points Paleontological So that the stages of operations and closure do not have any impact on the assets of the Paleontological, except for(l) eventual transit of vehicles and persons outside the permitted routes.

10.7.3 Characterization Superficial and EStratigrafía of the Sltios or the AndAcimientos

LControl points Evaluated andN Terrain are presented in the Figure below, and the analysis is made for the reservoir sector and annexed works, and Sector of the line of Electric transmission High Voltage, access roads and service and camp area, With the respective relevant observations To the control points under analysis.

Figure 10-26: Scheme that Mur the QPoints Control REALizados



Source: Self-elaboration

10.7.3.1 Sector REservorio and OrBras ToNexas

In the reservoir Sector, they were individualized 28 Checkpoints, of which, in points 17 and 19, the presence of Quaternary-age terrestrial invertebrates from the high hospice gravels was identified. Similarly, in points 23, 24 and 25, the presence of coquina levels was determined with the remains of bivalve molluscs and Gastropods Pleistocena old seamen. Below is the detail of the points with The Respective Relevant comments:

Table 10-16: Points of Control in the 'sRea REservorio and OrBras ToNexas

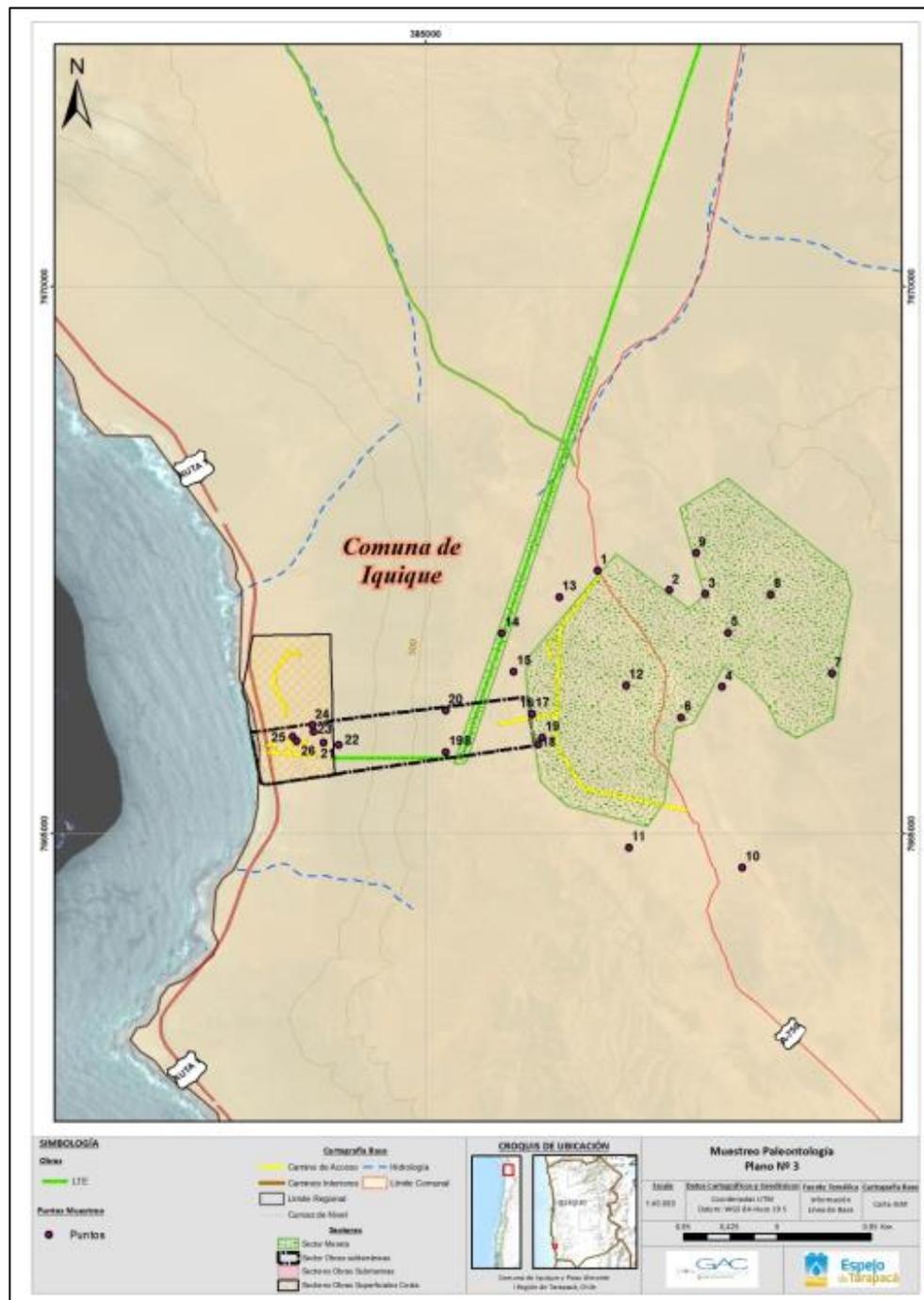
| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|---|--|
| 1 | 386555.00 m E 7667406.00 m S | Project boundary, La Negra formation, alluvial plain view, no nearby rocky outcroppings. No findings of paleontological remains were made. |
| 2 | 387206.00 m E 7667226.00 m S | Outcrop of lavas Meteorizadas of formation the black. No findings of paleontological remains were made. |
| 3 | 387533.00 m E 7667190.00 m S | Outcrop of lavas Meteorizadas of formation the black. No findings of paleontological remains were made. |
| 4 | 387687.00 m E 7666342.00 m S | Outcrop of lavas Meteorizadas of formation the black. No findings of paleontological remains were made. |
| 5 | 387739.00 m E 7666838.00 m S | Outcrop of lavas and rocks igneous of formation the black. Laminar levels without sandstone with crystals and Amphibole. No findings of paleontological remains were made. |
| 6 | 387315.00 m E 7666060.00 m S | Volcanic rock outcropping, including Volcanoclásticas, sandstone and carbonate. No findings of paleontological remains were made. |
| 7 | 388679.00 m E 7666463.00 m S | Outcrop of volcanic rocks forming the black. No findings of paleontological remains were made. |
| 8 | 388129.00 m E 7667189.00 m S | Soil with presence of sandstones, salt, deposits Brechosos and conglomerates, no fossils |
| 9 | 387451.00 m E 7667567.00 m S | La Negra formation outcrop. No findings of paleontological remains were made. |
| 10 | 387870.00 m E 7664687.00 m S | High weathered hospice gravel outcrop. No findings of paleontological remains were made. |
| 11 | 386840.00 m E 7664871.00 m S | High weathered hospice gravel outcrop. Presence of lava blocks, interspersed with volcanic ash. No findings of paleontological remains were made. |
| 12 | 386815.00 m E 7666355.00 m S | Alluvial plain without rocky outcrops. No findings of paleontological remains were made. |
| 13 | 386210.00 m E 7667162.00 m S | La Negra formation outcrop. No findings of paleontological remains were made. |
| 14 | 385689.00 m E 7666833.00 m S | Outcropping of altered lavas with Epidota belonging to La Negra formation. No findings of paleontological remains were made. |
| 15 | 385796.00 m E 7666483.00 m S | Quaternary levels Outcrop semiconsolidated Materials. No fossils |
| 16 | 385965.00 m E 7666091.00 m S | High hospice gravel outcrop. No findings of paleontological remains were made. |

| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|--|---|
| 17 | 385964.00 m E 7666096.00 m S | High hospice gravel outcrop. Presence of remains of invertebrates, (molluscs Gastropods Terrestrial) Quaternary. |
| 18 | 386021.00 m E 7665813.00 m S | High hospice gravel outcrop. No findings of paleontological remains were made. |
| 19 | 386055.00 m E 7665878.00 m S | High hospice gravel outcrop. Presence of remains of invertebrates (molluscs Gastropods Terrestrial) quaternary on two levels. |
| 20 | 385179.00 m E 7666126.00 m S | La Negra formation outcrop. View of Caleta San Marcos. No findings of paleontological remains were made. |
| 21 | 384075.00 m E 7665828.00 m S | unconsolidated alluvial deposits, highly altered by human activity. No findings of paleontological remains were made. |
| 22 | 384212.00 m E 7665810.00 m S | Intrusive rock outcrop with granite, biotite and Amphibole. No findings of paleontological remains were made. |
| 23 | 383980.00 m E 7665930.00 m S | Outcroppings of levels of Coquina Quaternary with the presence of bivalves and Gastropods Quaternary. |
| 24 | 383971.00 m E 7665991.00 m S | Outcroppings of levels of Coquina Quaternary with the presence of bivalves and Gastropods Quaternary. |
| 25 | 383793.00 m E 7665886.00 m S | Outcroppings of levels of Coquina Quaternary with the presence of bivalves and Gastropods Quaternary in contact with intrusive rocks. |
| 26 | 383828.00 m E 7665844.00 m S | Outcroppings of levels of Coquina Quaternary with the presence of bivalves and Gastropods Quaternary contact with intrusive basement |
| 27 | 385182.00 m E 7665744.00 m S | La Negra formation outcrop. View of Caleta San Marcos |
| 28 | 380081.96 m E 7671933.59 m S | Recent alluvial deposits without outcrops. |

Source: Self-elaboration

The following figure shows the location of the points described above.

Figure 10-27: Points of Control in the 'sRea REservorio and OrBras ToNexas



Source: Self-elaboration

10.7.3.2 Path High voltage electric transmission line, access road and camp area

Of The main control points carried out in the Sector of the route of the electric transmission line, access roads and Service and area of the camp, were individualized 47 checkpoints (from 29 to 76) of which, in points 66, 67 and 70, the presence of invertebrates of continental origin of presumed age Quaternary was verified. In addition, points 71, 73 and 75 identified remnants of various marine invertebrates such as bivalve molluscs and Gastropods of Pleistocena age. Below is the detail of the points with The Respective Relevant comments:

Table 10-17: Points of corresponding Control To LTo line De Electric transmission, road Dand access And Campa AreaMento

| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|--|---|
| 29 | 427082.00 m E 7698148.00 m S | Home electrical transmission plotting. No findings of paleontological remains were made |
| 30 | 424722.00 m E 7698140.00 m S | Point belonging to the Electrical transmission Path. Alluvial plain without rocky outcrops |
| 31 | 423298.00 m E 7698493.00 m S | Point belonging to the Electrical transmission Path. High Hospice gravel outcropping. No paleontological findings |
| 32 | 421552.00 m E 7698715.00 m S | Point pertaining to the electrical transmission path. High-Hospice gravel outcrop No findings of paleontological remains were made |
| 33 | 418979.00 m E 7698729.00 m S | Point belonging to the Electrical transmission Path. Boulder Blocks Andesitic, attributable to formation Punta Barranco. No rocks of sedimentary origin are observed |
| 34 | 418683.00 m E 7698608.00 m S | Point belonging to the Electrical transmission Path. Outcrop of reddish and purple volcanic rocks attributable to Punta Barranco formation |
| 35 | 417559.00 m E 7698777.00 m S | Point belonging to the Electrical transmission Path. Rock Outcrop Andesitic Assignable to the training office Viz. No paleontological remains were found |
| 36 | 417477.00 m E 7698621.00 m S | Point belonging to the Electrical transmission Path. Alluvial plain without rocky outcrops |
| 37 | 415749.00 m E 7698825.00 m S | Point belonging to the Electrical transmission Path. Emergence of rocks of volcanic origin assignable to the training office Viz. No paleontological remains were found |
| 38 | 415483.00 m E 7698826.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks, assignable to the training office Viz, without paleontological remains |
| 39 | 413873.00 m E 7699022.00 m S | Point belonging to the Electrical transmission Path. Volcanic rock Outcrop Andesitic, possibly of formation Punta Barranco |

| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|---|---|
| 40 | 413490.00 m E 7699103.00 m S | Point belonging to the Electrical transmission Path. Calicata with high hospice gravel outcrop, without paleontological remains |
| 41 | 409845.00 m E 7698679.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks assignable to the training office Viz, without paleontological remains |
| 42 | 409630.00 m E 7698637.00 m S | Point belonging to the Electrical transmission Path. Rolled blocks of training office Viz, without paleontological remains |
| 43 | 385796.00 m E 7666483.00 m S | Point belonging to the Electrical transmission Path. Unidentified volcanic rock outcrop, without paleontological remains |
| 44 | 407718.00 m E 7698180.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks assignable to Punta Barranco formation |
| 45 | 405265.00 m E 7697061.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks assignable to Punta Barranco formation |
| 46 | 407718.00 m E 7698180.00 m S | Point belonging to the Electrical transmission Path. Saline deposits |
| 47 | 402197.00 m E 7693639.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks assignable to Punta Barranco formation |
| 48 | 401600.00 m E 7690000.00 m S | Point belonging to the Electrical transmission Path. Rock Outcrop Volcanoclásticas Attributable to the formation Punta Barranco, without paleontological remains |
| 49 | 395122.00 m E 7685376.00 m S | Point belonging to the Electrical transmission Path. Deposits Evaporitic Overlying To volcanic rocks presumably of formation Punta Barranco |
| 50 | 394580.00 m E 7685636.00 m S | Point belonging to the Electrical transmission Path. Outcrop of volcanic rocks assignable to formation Punta Barranco, without paleontological findings |
| 51 | 394038.00 m E 7684191.00 m S | Point belonging to the Electrical transmission Path. Volcanic rock outcrop forming ravine with deposits Evaporitic, without paleontological remains |
| 52 | 393938.00 m E 7683576.00 m S | Point belonging to the Electrical transmission Path. Volcanic rock Outcrop |
| 53 | 393938.00 m E 7683613.00 m S | Point belonging to the Electrical transmission Path. Bioclástica Limestone Block Brechosa. Remains of corals, Gastropods And fossil bivalve molluscs from formation El Godo |
| 54 | 392905.00 m E 7682683.00 m S | Point belonging to the Electrical transmission Path. High Hospice gravels, without paleontological remains |
| 55 | 390598.00 m E 7678080.00 m S | Point belonging to the Electrical transmission Path. High hospice gravel outcrop, without paleontological remains |

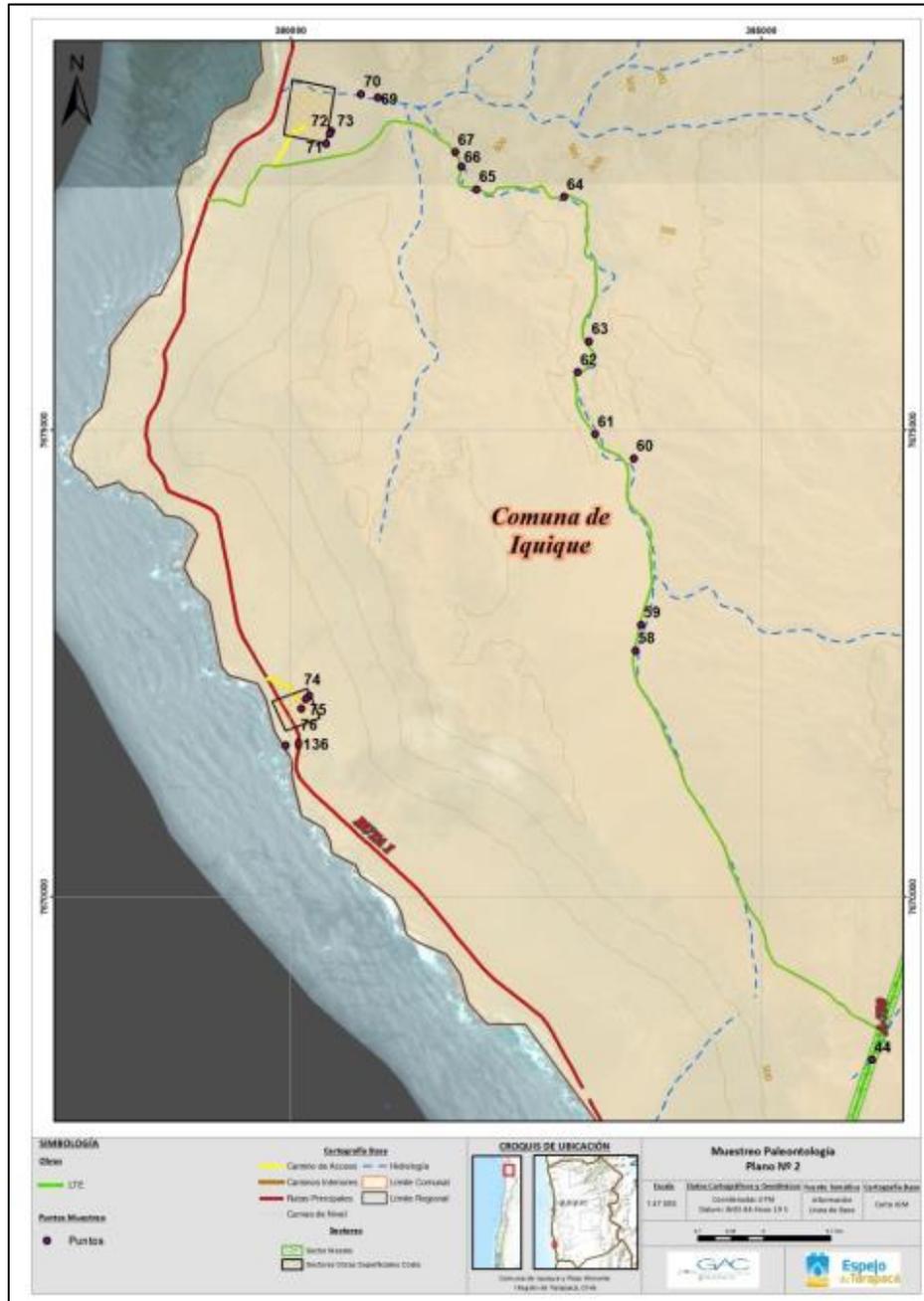
| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|---|--|
| 56 | 389377.00 m E 7676368.00 m S | Point belonging to the Electrical transmission Path. Alluvial plain with rolling blocks assignable to the formation of the black |
| 57 | 387131.00 m E 7671622.00 m S | Point belonging to the Electrical transmission Path. Rock outcrop from intrusive group Cerro Carrasco |
| 58 | 383663.00 m E 7672639.00 m S | Point pertaining to the path of access road. High hospice gravel outcrop, without paleontological remains |
| 59 | 383720.00 m E 7672912.00 m S | Point pertaining to the path of access road. High Hospice gravels, without paleontological remains |
| 60 | 383648.00 m E 7674699.00 m S | Point pertaining to the path of access road. High hospice gravel outcrop with presence of clasts angled assignable to the black formation, without paleontological remains |
| 61 | 383234.00 m E 7674959.00 m S | Point pertaining to the path of access road. Outcropping of intrusive complex Cerro Carrasco |
| 62 | 383051.00 m E 7675621.00 m S | Point pertaining to the path of access road. Outcropping of intrusive complex Cerro Carrasco |
| 63 | 383169.00 m E 7675953.00 m S | Point pertaining to the path of access road. Outcrop of the intrusive complex of Cerro Carrasco |
| 64 | 382906.00 m E 7677501.00 m S | Point pertaining to the path of access road. Outcrop of the intrusive complex of Cerro Carrasco |
| 65 | 381974.00 m E 7677583.00 m S | Point pertaining to the path of access road. Outcrop of the intrusive complex of Cerro Carrasco |
| 66 | 381810.00 m E 7677825.00 m S | Point pertaining to the path of access road. Level with molluscs Gastropods Land belonging to High hospice gravel |
| 67 | 381749.00 m E 7677978.00 m S | Point pertaining to the path of access road. Level with molluscs Gastropods Land belonging to High hospice gravel |
| 68 | 386612.00 m E 7669148.00 m S | Point belonging to the Electrical transmission Path. High hospice gravel outcrop without fossil remains |
| 69 | 380926.00 m E 7678567.00 m S | Point pertaining to the path of access road. Outcrop of volcanic rocks attributable to the intrusive complex Cerro Castillo |
| 70 | 380747.00 m E 7678601.00 m S | Point pertaining to the path of access road. High hospice gravel outcrop with the presence of fossil remains of Gastropods Continental in situ and rolled old Quaternary |
| 71 | 380425.00 m E 7678207.00 m S | Point pertaining to the path of access road. Compacted coquina levels with traces of Turritelas, FissurellaOlive Nasella, Picorocos, Argopecten In situ and rolled with variable preservation status |
| 72 | 380416.00 m E 7678180.00 m S | Point pertaining to the path of access road. Outcropping of intrusive rocks attributable to the intrusive complex Cerro Carrasco |

| Point of control | Geographical coordinates (WGS 84; spindle 19K) | Observations |
|------------------|---|--|
| 73 | 380376.00 m E 7678067.00 m S | Point pertaining to the path of access road. Compacted coquina levels with traces of Turritelas and other Gastropods indeterminate, in situ and rolled with variable preservation states |
| 74 | 380193.00 m E 7672155.00 m S | Point pertaining to the camp area. Intrusive rock outcrop belonging to the intrusive complex Cerro Carrasco |
| 75 | 380159.00 m E 7672120.00 m S | Point pertaining to the camp area. Compacted coquina levels with traces of Turritelas and other Gastropods indeterminate, in situ and rolled with variable preservation states |
| 76 | 380113.00 m E 7672014.00 m S | Point pertaining to the camp area. Alluvial plain with rolled blocks from the intrusive complex of Cerro Carrasco |

Source: Self-elaboration

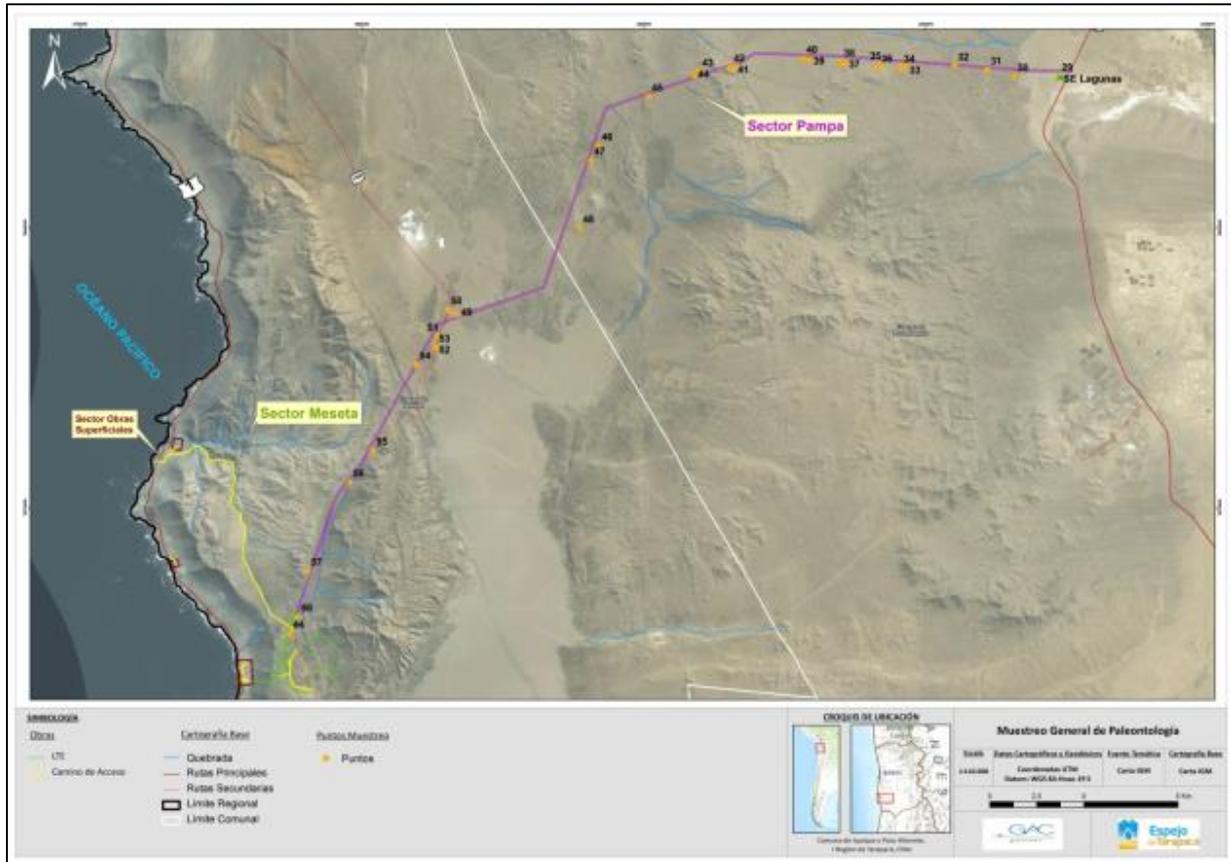
The following figure shows the location of the points described above.

Figure 10-28: Points of Control CAMino of ToCceso and 'sArea of the CAMPamento.



Source: Self-elaboration

Figure 10-29: Points of Control LOnline TRansmisión ELéctrica ToLta TEnsi3n.



Source: Self-elaboration

10.7.3.3 Conclusion

The Visual inspection work and review of available bibliographic information concluded in the identification of the geological units present in the project area (Training office Viz, Cerro Barranco Formation, La Negra Formation, Cerro Carrasco Complex, High hospice gravels, deposits Colluvial and ancient alluvial deposits) in which DialedArOn Findings of paleontological remains.

Additionally it was detected Presence of coastal deposits in the area of the camp, on the coastal end of the access road and the reservoir sector, which are characterized by presenting, in all areas, levels with Coquina quaternary (very abundant remains of invertebrates Fossils With different qualities of preservation).

These levels are not mapped by the bibliographic literature available in the camp area or the coastal end of the reservoir area (E.g. Quezada et al., 2012) since are partially covered by the deposits Colluvial. During the field inspection of these levels, the presence of remains of

bivalves was found and Gastropods, of Quaternary age, which is consistent with specimens reported by Rivadeneira and Carmona (2008). However, because part of the points described here are not mapped or mentioned in the literature, it increases the relative importance of the finding as it increases the possibility of extending the levels reported by Rivadeneira and Carmona (2008) and also the possibility of making new records for science.

In the same way, there were found remains of Gastropods Quaternary terrestrial gravels of high hospice at two levels at points 17 and 19 (reservoir area) and at a level of checkpoint 67 and 71 (access road). These fossils are also not mapped or previously mentioned in the literature.

Additionally, the presence of fossil remains of Mesozoic marine invertebrates attributable to the formation of the Godo was detected (Bajociano-Oxfordiano). This unit is defined as a marine sedimentary sequence, fosilífera. In this unit were found remains of corals (presumably assignable to the order Tabulata And Escleractínea) and various indeterminate bivalve molluscs with a state of preservation from regular to bad. In the particular case of the remains of coral, these have a special relevance due to scarce fossil record of this type of animals in Chile. In the context of the project, this Fosilífera unit extends tangentially in a sector of the route of the electric transmission line, there being high probability that during the construction activities, new fossil remains are discovered, due (a) that other nearby outcroppings of this unit are mapped with a non-S orientation, suggesting that this unit (Fm. The Godo) would underlie the Fm. Punta Barranco, being able to be reached during the excavations in this sector of the LTE.

10.7.4 Description General of the TIPOs ToNálisis RCompulsory to the MMaterials REcuperados

The purpose of generating a reference collection that considers the diversity variables of Taxa As well as preservation, in each one of the sectors Individualized The materials will be recovered with authorization from the Council of National Monuments and deposited in an institution that it determines. These They will be classified according to type of materiality, characterized by their main and quantified attributes. In each case, according to the CMN, specialized analyses may be implemented (typological, morph-functional or others).

10.7.5 C proposalOnservación of the MMaterials at TERreno, LOratory and DEpósito

is proposed, before starting construction in the relevant sector, PrepaRAR the paleontological materials Rescued For delivery to a specialized warehouse, including cleaning of materials, classification, labelling of bags and boxes and appropriate packaging according to the criteria requested by the depositary institution defined by the Council of National Monuments.

10.7.6 Plan of TTransfer and DEpósito Final of the MMaterials REcuperados

The plan of transfer and final deposit of the paleontological materials recovered includes:

- Rescue Plan Generation.
- Rescue plan approval management with the CONsejo MONumentos N(CMN).
- Collection of significant samples by specialists, with the respective geographical positioning and stratigraphic.
- Cure of paleontological samples collected in the laboratory, preparation of a Catalog of samples and their inclusion in the collection or museum indicated by the CMN.
- Elaboration of a rescue report including the treatment and specific management of objects of paleontological character, in consideration of all the environmental regulations in force in Chile. The contextualisation of the findings in the taxonomic and stratigraphic field.
- Monitoring of excavation/land removal activities, during the works, in areas close to the fossil points.
- REalización of talks to the community in order to promote the valuation of the paleontological heritage existing in the region.

10.7.7 Measures of COnservación of the Sites OR andAcimientos, SI CORresponde.

does not apply, since sites with paleontological findings will be rescued and not necessary to take Conservation measures of these sites.

10.8. Mixed sectoral environmental Permit 138

Permit for the construction, repair, modification and extension of any public or particular work destined for the evacuation, treatment or final disposal of drains, sewage of any kind.

The permit for the construction, repair, modification and extension of any public or particular work intended for the evacuation, treatment or final disposal of drains, sewage of any kind, shall be that laid down in article 71 (b)) first part, of D.F.L. N ° 725, of 1967, of the Ministry of Public Health, sanitary code.

The requirement for its granting is that the disposition of sewage does not threaten the health of the population.

The project will generate wastewater to be managed by a particular sewer system, ConeCtados 3 Plants Modular Of the type of activated sludge:

- PTAS Stage construction Control and administration building (it will also supply to the slaughter plant located on the side of this building). It will then be permanent for the operation stage, coastal area
- PTAS Stage Construction Camp, Coast area
- PTAS Stage construction facility for slaughter, plateau area.

The following are the technical and formal contents to certify compliance:

10.8.1 Description of the SSystem REcolesson and/or TAerosol treatment

The liquid waste to be generated Both in the construction and Operation stage, CorrespondsN to household type waste Associated Mainly The operation of the slaughter facilities and camps, during construction, and administrative and control facilities, throughout the operation. For its treatment it is envisaged the implementation of modular wastewater treatment plants (PTAS), of the type Ecojet, which shall be designed for a provision of 150 l/person/day, considering Periods of maximum concentration of labour (see following table), which will make it possible to meet the requirements of each phase of the project.

Table 10-18: 's Hand OrBra for Each ELid of the QProject.

| Stage | Pesetas | Max Staff |
|--------------|---|-----------|
| Construction | PTAS Control Building, Coast area. PTAS Camp, Coast area. PTAS installation of slaughter, plateau area. | 500 |
| Operation | PTAS Control Building, Coast area. | 50 |

own elaboration

The Particular sewer system Considered For the collection of wastewater, Consist In a network of pipes intended for the conduction of sanitary effluents, elaborated on the basis of the standards and procedures indicated, both in DS No. 236/26, General regulations for particular sewers, septic pits, filtering chambers, chambers of Contact, absorbent chambers and home latrines, as in EL Regulation of Home water installations PoTable and Sewerage (RIDDA).

These systems will be implemented For the installation of operations near the Control building, the camp Of the Costa area and the InStalación Reservoir.

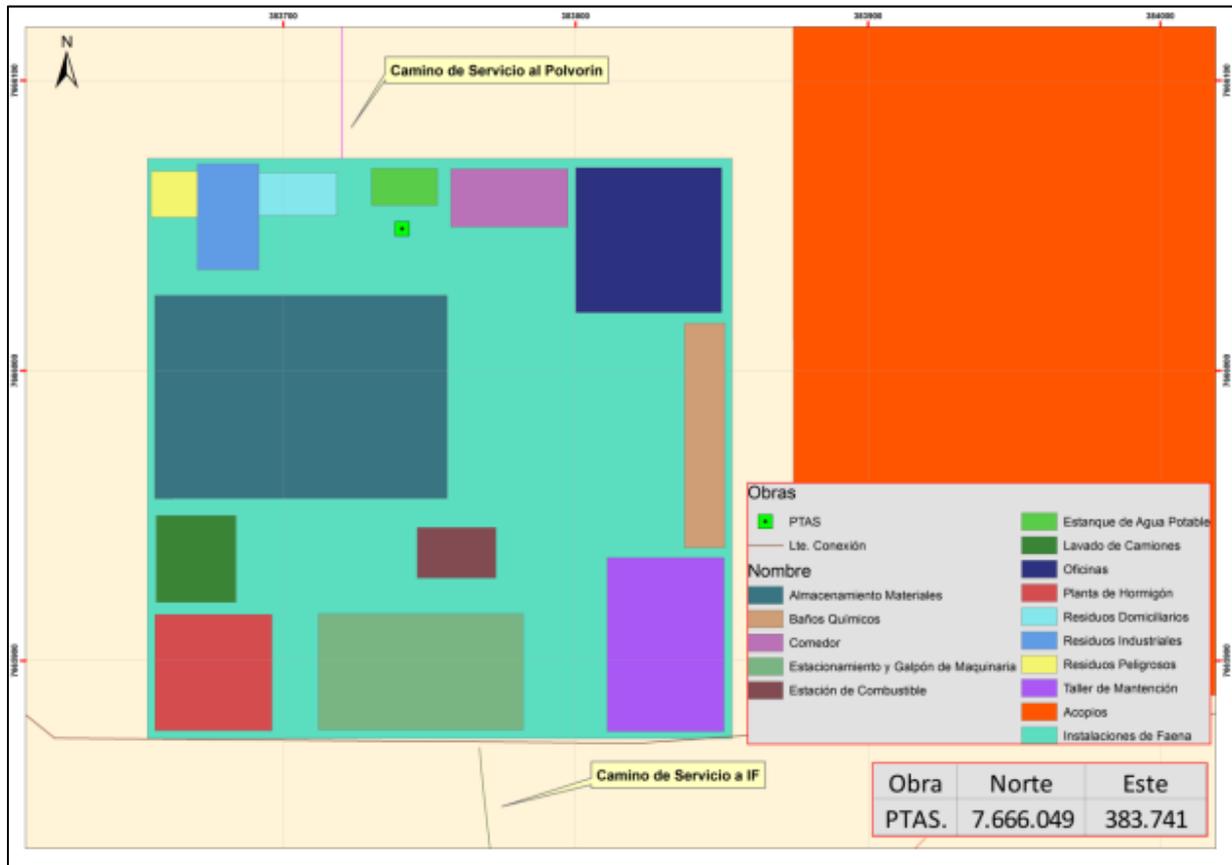
10.8.2 Localización of the R AreaEcolesson and the QLanta de TRata de ToGuas SErvidas

The Proyecto includes installation of 3 PlantS Water TreatmentRvidas (PTAS), which will be located in:

- PTAS Stage construction Control and administration building (it will also supply to the slaughter plant located on the side of this building). It will then be permanent for the operation stage, coastal area. (IF San Marcos)
- PTAS Stage Construction Camp, Coast area
- PTAS CONSTRUCC Stagelon installation of slaughter, area MEseta (IF Reservoir)

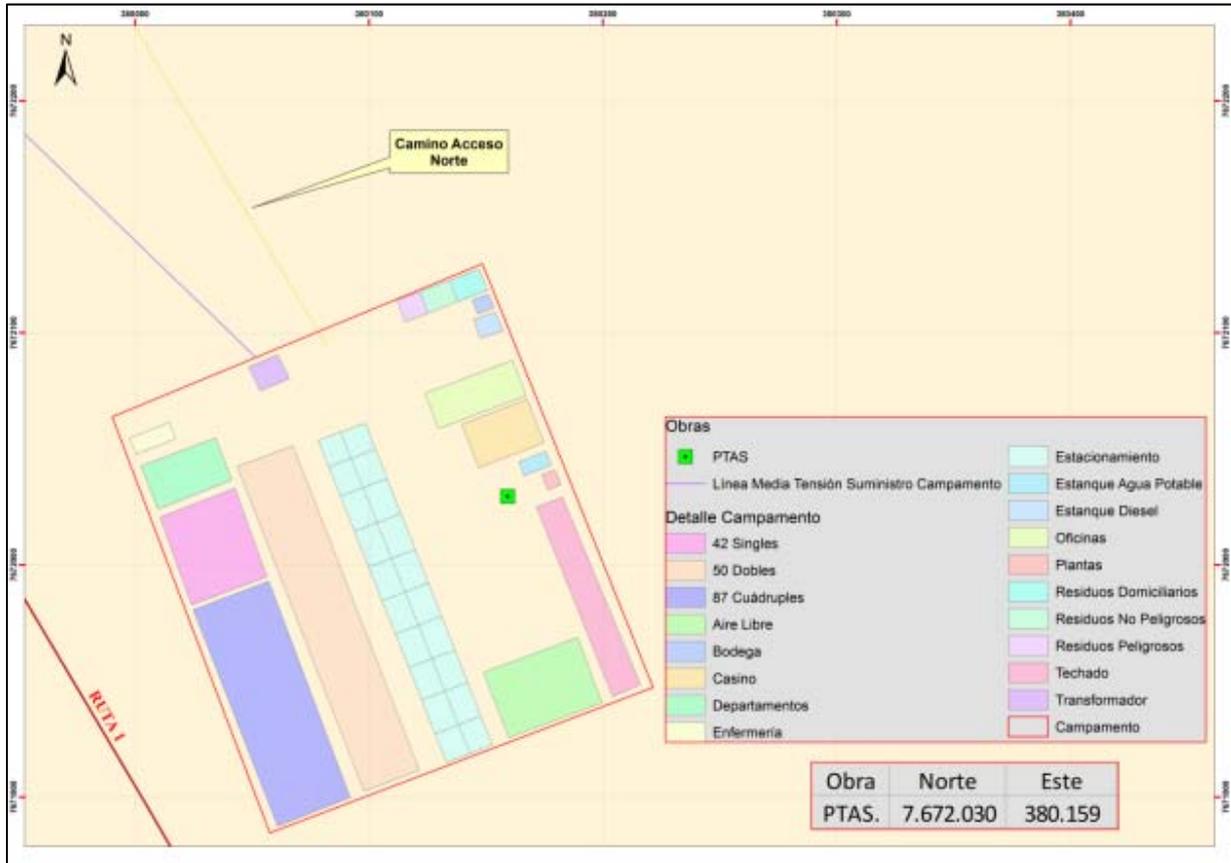
The location of the PTAS is Muestra in the following figures.

Figure 10-30: PTAS installation of San Marcos slaughter.



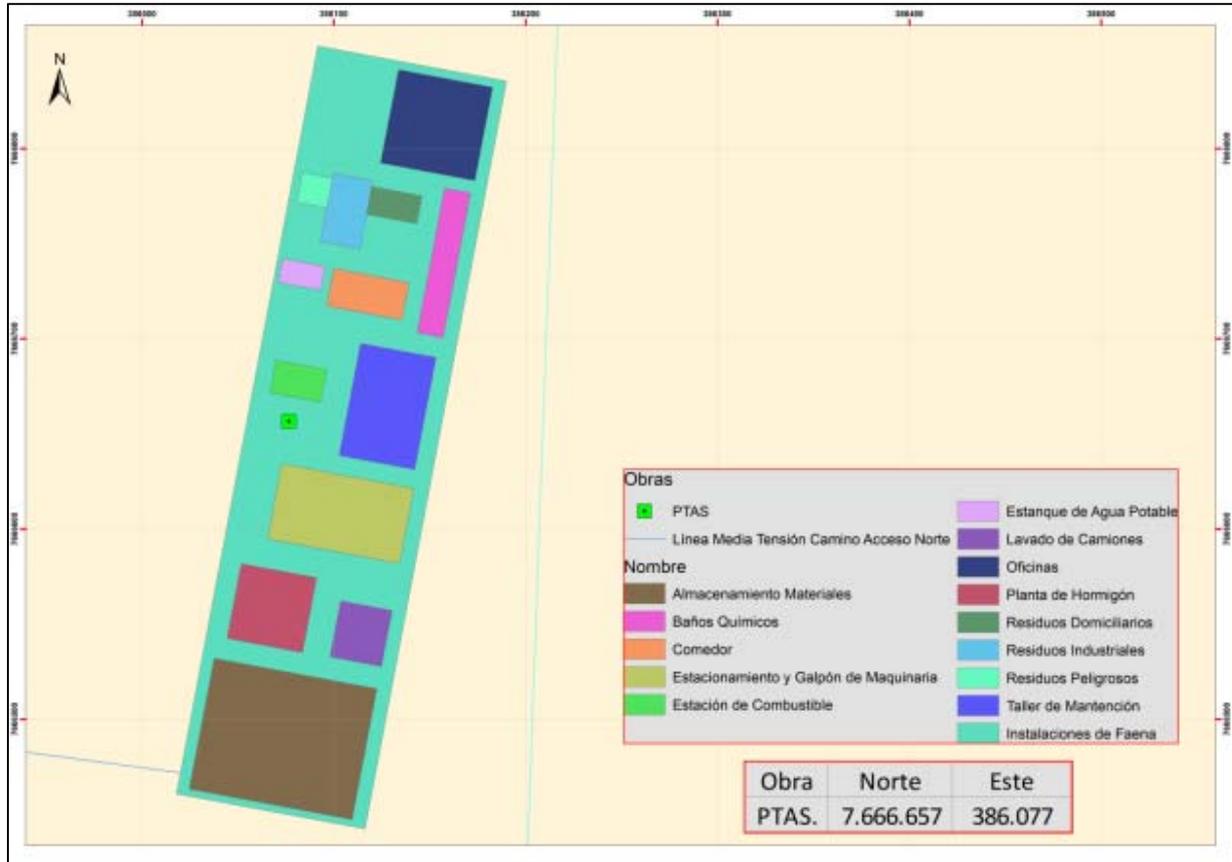
Source: Self-elaboration

Figure 10-31: PTAS Camp.



Source: Self-elaboration

Figure 10-32: PTAS installation of the reservoir.



Source: Self-elaboration

10.8.3 Generation of ToGuas SErvidas

10.8.3.1 Construction stage

The liquid waste that will be generated during the construction stage corresponds(n) Domestic waste, mainly from the human activity of the slaughter facilities and camps. For the latter, particular sewage systems are contemplated for the collection of wastewater, Connected to treatment plants Designed To meet the maximum monthly work staff, estimated in 500 People, Considering a water endowment of 150 L/person/day.

In relation to the sewage system, this consists of a network of pipes destined to the conduction of the sanitary effluents, which will be elaborated according to the standards and procedures indicated, both in DS N ° 236/26, General regulations of sewers Individuals, septic tank, filter chambers, contact Chambers, absorbent chambers and home latrines, as in EL Regulation of Home water installations PoTable and Sewerage (RIDDA).

With respect to PTAS, sand consider plants Similar to the type of Ecojet, Wastewater Treatment, which will operate through of activated Sludge, under the Extended aeration Modality.

Considering a water consumption rate of 150 L/person/day, with a Peak Of 500 Workers, with a residual rate of 100% of the water consumed, is estimated a generation of 2,250 M³/month of Sewage.

In working fronts, intermediate wineries and slaughter facilities for constructionThe LAT and roads will have chemical baths.

The number of chemical baths That will be installed will give birthdayConstipation to the established D.s. No 594/99 of the Ministry of Health, "Regulation on basic sanitary and environmental conditions in the workplace". Two chemical bath maintenances are made a week. The service of the installation and maintenanceBe Contracted to authorized companiesS Po(a) The corresponding health care, they will be in charge of both the supply And Operation of the baths, as well as the waste generated by them, product of their cleaning. To ensure compliance with these requirements, The headline It will require the delivery of the resolution proving the authorization to operate and the current contract with the local health company for disposal of the waste. In addition to the foregoing, a system of registration and control of the maintenance and final disposition of the waste generated by them will be carried out in order to demonstrate that the final disposition will be carried out in an authorized place.

10.8.3.2 Operation Stage

Liquid waste During the operation phase corresponds to the wastewater generated in the Control building. Considering a water consumption rate of 150 L/person/day, with A Peak of 50 TProduction workers, with a residual rate of 100% of the water consumed, An estimated generation of 225 M³/month of Sewage.

10.8.4 Features FBESEEC Suoond QUímicas of the Aguas SErvidas

The quality of the sanitary effluent generated in the wastewater treatment plants Shown in the table below.

Table 10-19: Quality EFluent SAnita's.

| Parameter | Unit | Value |
|---------------------|------------|-----------|
| Oils and Fats | mg/L | 60 |
| Bod5 | MgO2/L | 250 |
| Total phosphorus | mg/L | 5 |
| Ammoniacal nitrogen | mg/L | 50 |
| Ph | - | 6 – 8 |
| Power Foam | Mm | 5 |
| Sedimentary solids | mg/L | 220 |
| Coliforms Fecal | NMP/100 MI | 1.6 x 105 |

Characteristic values of domestic wastewater corresponding to 100 inhabitants, DS 609/1998, "Establishes emission standard for the regulation of pollutants associated with waste discharges Industrial liquid to sewage systems".

10.8.5 Description of the T system Rata de To Guas SErvidas.

The wastewater treatment system shall consist of the habilitation of modular treatment plants similar to the type Ecojet With sufficient capacity, which will treat the water served by means of a biological process of activated sludge. This type of plants abate dissolved solids, which implies a high efficiency of elimination of organic matter; Are aerobic performance, do not generate bad smells; They are small-sized plants; and generate a reduced volume of sludge.

Basically, PTAS are composed of a pre-treatment stage, to separate large and non-degradable solids; Aeration stage in which organic matter is degraded; Sedimentation stage for the production of a crystalline and odorless effluent; Phase of disinfection, usually chlorine-based, for the elimination of pathogenic elements; and a declaration stage in which the residual chlorine is eliminated by means of sodium sulfite tablets, thus obtaining an environmentally harmless effluent.

The capacity of PTAS will be variable, which will allow to adjust to the variation in the staffing of workers during the stages.

10.8.6 D Shape Description Isposición Final of the EFluent TRata, SEgun CORresponda.

The sanitary effluent will be treated in such a way that it complies with the biological parameters of water quality for irrigation (Nch 1,333/1987), which will be stored in pond of 40 m³, To be used in The concrete activities and moistening of roads during the Construction stage. The treated water, in the operation stage, will also be used to moisten roads.

10.8.7 Indication of the Return period Considerado for the DLayout of the DEsagües ToGuas LLuvia.

does not apply.

10.8.8 S descriptionSystem TRata de ToGuas SErvidas and Disposición, from TRat on a FBear SÉptica.

does not apply.

10.8.9 Description GGeneral of the GGeneración and MAnnex of LOdos

Sludges are generated in the modular wastewater treatment plants of the type Ecojet, Will comply with the provisions of DS N ° 4/2009 Minsal of sludge, and will be removed by a clean pit company authorized to be taken to final disposition.

A generation rate of 0.8 is estimated 8 KG mud for 1 M³ Of Treated water, considering the maximum staffing for each phase, the following generation is provided:

Table 10-20: Generation of LOdos per ELid of the QProject

| Stage | Max Staff | Amount of sludge (ton/month) |
|--------------|-----------|------------------------------|
| Construction | 500 | 1.98 |
| Operation | 50 | 0.198 |

Source: Chapter 1 Project description.

10.8.10 Program of MOnitoreo

The monitoring program has the objective of qualitatively and quantitatively characterize the liquid discharge emitted from the wastewater treatment plant, so for control purposes, the parameters that must be fulfilled are those established in the Nch 1333/1978.

The minimum number of monitoring of 12 annual surveys is estimated.

Semiannually, a report will be sent to monitor effluents from the treatment plants to health care and be from the Tarapacá region.

Samples shall be taken as specified in the Nch 411/Of. 96, water quality – INN sampling, in easily accessible chambers designed for this purpose.

Sampling will be carried out by an authorized external company with adequate infrastructure and experience Verifiable in the area.

The laboratory results obtained will be recorded systematically and will be available in case the health authority requires them.

Finally, it should be noted that-as already indicated above-since Sewage shall correspond to domestic effluents, No Check Hazard characteristics and once treated, they will be used only in the humidification of roads.

10.8.11 Contingency Plan.

The contingency plan aims to To have an administrative, organizational and operational tool that allows to respond to eventualities of natural or operative order, decreasing The impact it would generate A failure in the Operation of the wastewater treatment system and giving fulfillment to The emission standard for the regulation of pollutants associated with the discharges of liquid waste to marine and continental waters as a result of their activity.

10.8.11.1 Contingencito present

In the event of a failure to alter the normal functioning of the PTAS, the personnel in charge will be notified, who will determine the actions to be followed.

10.8.11.2 Cause of contingency

Once the responsible personnel are alerted, it is doneRá A follow-up to the contingency Generated, in order to determine the root cause. The most common contingencies or emergencies that may occur within this system are:

- Obstruction or electrical failure
- Mechanical failure

10.8.11.3 Inform The contingency management

The staff responsible for shift will inform by telephone or e-mail of the situation or contingency present, interpreting the cause of the emergency, which was detected after the analysis carried out.

10.8.11.4 Measures COorrectivas

i. Obstruction or electrical failure:

- In the event of an eventual failure at the wastewater treatment plant, the maintenance chief will be advised to coordinate with the Chief of operations for the repair.
- The head of operations shall coordinate the repair of the treatment plant, reporting the time it was detained before restarting its operation.

- If there is a General power outage in the fish farming and therefore in the wastewater treatment plant, the operator must ensure that the maintenance personnel has started up the backup generator.

ii. Mechanical failure:

- If the fault implies a total change of a replacement, the chief of operations will be requested. If the fault persists, the sewage will be diverted to the company Aguas Magallanes. This transfer will be carried out by a duly authorized company, this while the repairs are made.

10.8.12 Emergency Plan.

- The risk prevention and emergency Brigade will be immediately notified.
- The procedure will be activated, including the presence of the emergency brigade, who will be trained in the use of the equipment and try to mitigate the event.
- If it is not possible to control the situation, firefighters or other relevant persons will be immediately notified and workers will be evacuated to the safety zones.
- The area will be inspected to verify the presence of affected persons. If this is the case, it will be transferred immediately to an assistance centre.
- The causes of the event should be investigated.
- Activities can only be reactivated once the event is controlled.

10.9. Mixed sectoral environmental Permit 139 Desalination plant

Permission for the construction, repair, modification and extension of any public or particular work intended for evacuation, treatment Or Final disposal of industrial or mining waste

The permit for the construction, repair, modification and extension of any public or particular work intended for the evacuation, treatment or final disposal of industrial or mining waste shall be that laid down in article 71 (b), second part, D.F. L N ° 725/1967, of the Ministry of Public Health, sanitary code.

Article 71 indicates that it is the responsibility of the Regional health authority to approve projects relating to the construction, repair, modification and extension of any public or private work intended for the evacuation, treatment or final disposition of Industrial or mining waste.

The requirement for its granting is that the water quality of the receiving body does not jeopardize the health of the population.

The project requires the granting of This sectoral permit Because it must have the approval of the Regional Health Authority (ASR) for the treatment of liquid industrial waste (RILES). In particular it is considered The evacuation and disposition of the brine generated in the plant ofSalination.

The following are the technical and formal contents to certify compliance:

10.9.1 Description of the PRocesos in which GThey RESiduos Líquidos INDUSTRIALES or MTools, Estimation of the CAudales and CARacterización.

The desalination plant will have the objective of generating potable water from the capture of seawater, which is potabilizará by the reverse osmosis process.; Will cover approximately 120 m² and will be Composed of 3 metallic containers of the maritime type and 2 filters, which will be anchored to the slab of concreten by anchors and will consider Ground wire for protection.

Reverse osmosis is based on the natural process of osmosis, but unlike this, a higher pressure is applied to the osmotic pressure of the concentrated solution (seawater), reversal the natural process and generating a permeate (pure water) and a rejection (water Concentrated in salts). This technique is based on three main stages: pre-treatment, desalination and Aftercare.

Pretreatment basically consists of a filtration and adaptation of the water collected, processes that contemplate: Chlorination, to prevent possible bacteriological development; Coagulation, to remove colloidal particles; Double filtration, to prevent the clogging of processed water in reverse osmosis membranes; Acidification, to reduce the pH of water; Addition of a Fouling, so

that the substances dissolved in the water do not become insoluble and form incrustations in the membranes; and a Dechlorination, to prevent damage to the membrane system.

The desalination It consists of two essential phases, high pressure pumping and energy recovery, and reverse osmosis membrane frames. It also includes a membrane cleaning system. High pressure pumping has the fundamental mission of providing the necessary pressure to overcome the osmotic pressure of seawater and the loss of load of the system. For energy recovery, the rejection brine and the implementation of pressure Exchange systems (SIP) are used.

Reverse osmosis membrane frames have as function to collect the water driven by the pumping system described above and filter it for purification. The Type Amount and disposition of membranes to use It will be done in order to guarantee the maintenance and control of the process. The water obtained will be collected and transported through a collector, That will allow to monitor the salinity and functioning of each membrane. Finally, the Aftercare, whose objective is to purify the filtered water, and whose process includes a degassing, to seek to eliminate CO₂ containing permeated water; Alkalinization, in order to increase pH; A Passivation, to eliminate the corrosive action against the metals and a final chlorination, to comply with the current regulations.

For the rejection water, this corresponds to the brine from the described process, whose characterization is presented in the following table:

Table 10-21: Characterization FBESEEC SuondQUímica of the SAIdie.

| Contaminant | Unit | Expression | Maximum permissible limit | Adduction | Backwash | desalinated water | Salt water | Discharge to the Sea |
|------------------------|--------|------------|---------------------------|-----------|----------|-------------------|------------|----------------------|
| | | | | | | | | PTOI |
| Oils and Fats | mg/L | A and G | 150 | 0 | 0 | 0 | 0 | 0.00 |
| Aluminum | mg/L | To | 10 | < 0.5 | < 0.5 | 0 | < 1 | < 0.5 |
| Arsenic | mg/L | As | 0.5 | 0.004 | 0.004 | 0 | 0.00664 | 0.007 |
| Cadmium | mg/L | Cd | 0.5 | 0.046 | 0.046 | 0 | 0.07636 | 0.075 |
| Cyanide | mg/L | Cn- | 1 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Copper | mg/L | Cu | 3 | 0.03 | 0.03 | 0 | 0.0525 | 0.05 |
| Index of phenol | mg/L | Phenols | 1 | < 0.001 | < 0.001 | 0 | | < 0.001 |
| Chrome Hexavalent | mg/L | Cr + 6 | 0.5 | < 0.006 | < 0.006 | 0 | | < 0.006 |
| Chrome | mg/L | Cr | 10 | < 0.5 | < 0.5 | 0 | | < 0.5 |
| Tin | mg/L | Sn | 1 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Fluoride | mg/L | F | 6 | 0.89 | 0.89 | 0.01 | 1.5575 | 1.55 |
| Total hydrocarbons | mg/L | Hct | 20 | 0 | 0 | 0 | 0 | 0.00 |
| Hydrocarbons Volatile | mg/L | Hc | 2 | 0 | 0 | 0 | 0 | 0.000 |
| Manganese | mg/L | Mn | 4 | 0.03 | 0.03 | 0 | 0.0525 | 0.05 |
| Mercury | mg/L | Hg | 0.02 | < 0.0001 | < 0.0001 | 0 | | < 0.0001 |
| Molybdenum | mg/L | Mo | 0.5 | < 0.01 | < 0.01 | 0 | | < 0.01 |
| Nickel | mg/L | Or | 4 | < 0.05 | < 0.05 | 0 | | < 0.05 |
| Ph | | | 5.5-9.0 | 7.5-8.0 | 7.5-8.0 | 6.0-7.0 | 7.7-8.2 | 7.7-8.2 |
| Lead | mg/L | Pb | 1 | 0.2 | 0.2 | 0 | 0.35 | 0.35 |
| Saam | mg/L | Saam | 15 | 0 | 0 | 0 | 0 | 0 |
| Selenium | mg/L | Is | 0.03 | < 0.001 | < 0.001 | 0 | < 0.001 | < 0.001 |
| Sedimentary solids | mg/L/h | S. Sed. | 20 | 0 | 0 | 0 | 0 | 0 |
| Total Suspended solids | mg/L | S.s. | 300 | 25 | 1500 | 0 | 1 | 75 |

| Contaminant | Unit | Expression | Maximum permissible limit | Adduction | Backwash | desalinated water | Salt water | Discharge to the Sea |
|------------------------|-------|------------|---------------------------|-----------|----------|-------------------|------------|----------------------|
| | | | | | | | | PTOI |
| Total solids Dissolved | mg/L | Std | Na | 35154 | 35154 | 240 | 58369 | 58369 |
| Conductivity | US/cm | Cond | Na | 51670 | 51670 | 495 | 79869 | 79869 |
| Temperature | ' C | T | Na | 17 | 17 | 17 | 17 | 17 |
| Sulfur | mg/L | S2 | 5 | < 0.05 | < 0.05 | 0 | < 0.05 | < 0.05 |
| Zinc | mg/L | Zn | 5 | < 0.01 | < 0.01 | 0 | < 0.01 | < 0.01 |

Source: Self-elaboration

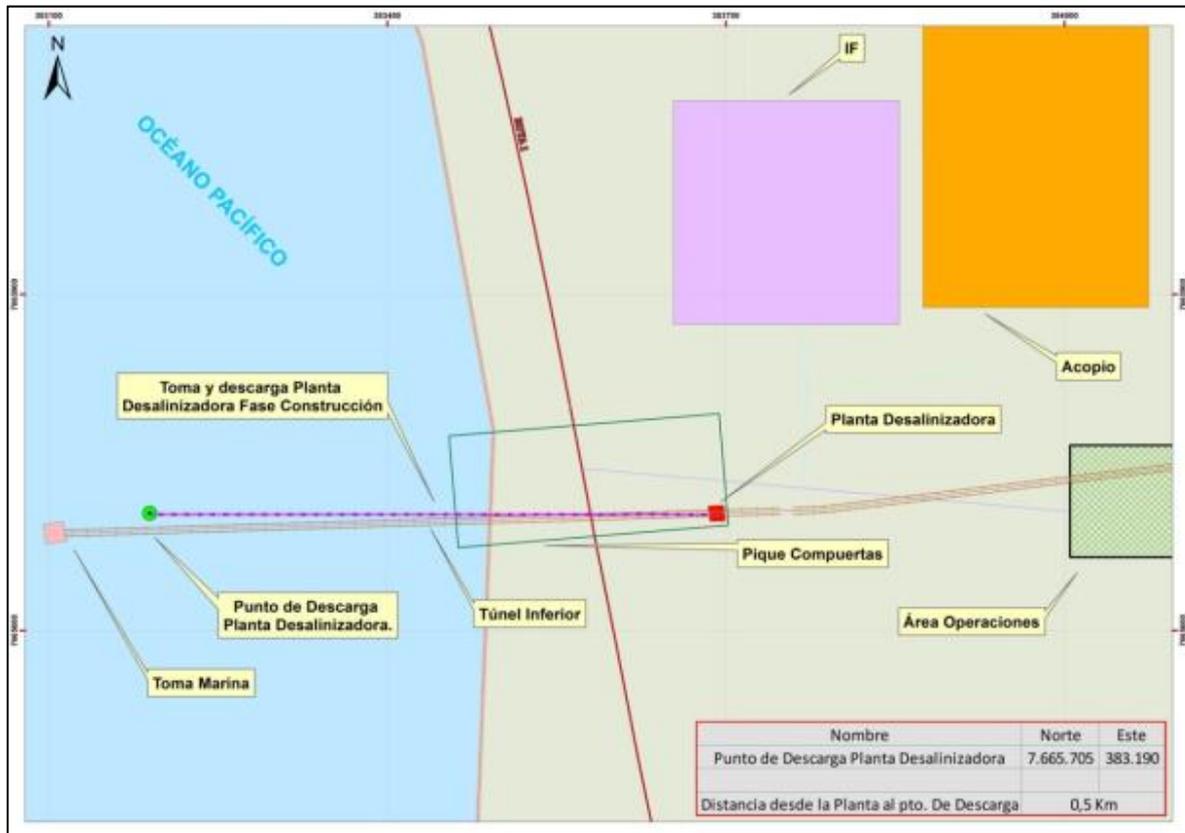
The plant will deliver water in a growing manner, with an efficiency of 45%, depending on the requirements, adjusting its size according to the demand. With Sidering a catchment of approximately 10 L/s of seawater for the construction stage of the project and 5 L/s during the operation stage, which will be subjected to pre-treatment processes, filtering and reverse osmosis, A maximum flow rate of approximately 5.5 l/s of salt water of discharge in construction stage and of 2.75 L/s in Operation stage will be generated.

On the other hand, considering that seawater enters the desalination plant with approximately 36,000 ppm (salinity unit) and that the efficiency of the process is around 45%, it is estimated that the salinity of the salt water of discharge will reach approximately 65,455 ppm.

10.9.2 Plane of EMplazamiento of the T systemAerosol treatment

The Potable water supply system shall consist of a desalination plant Located Close to the work of floodgates of the Sector Costa de la Caleta San Marcos, as shown by the Following figure.

Figure 10-33: Location desalination plant.

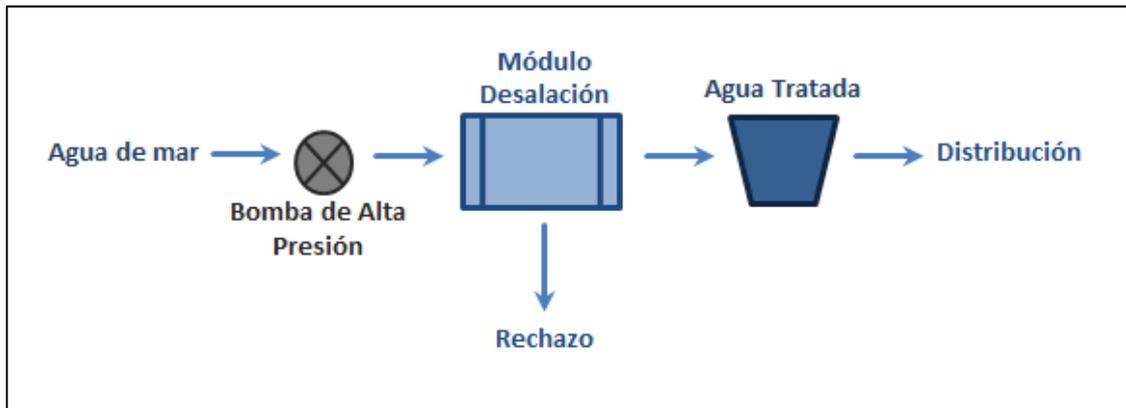


Source: Self-elaboration.

10.9.3 Design of the System Dand treatment QEU include UN Diagram DE Flow and DE LAs units And Equipment needed to drive, treat And Download EL Efluenta.

The desalination process contemplates the purification of seawater through the reverse osmosis process, which considers the use of semi-permeable membranes for the separation of the salts present. This process does not consider the addition of any chemical substance in the process, soL Saltwater discharge will not contain Physical, chemical and biological elements or agents that may remain in time in the marine environment. The Figure 10-34 Shows the process described above.

Figure 10-34: Diagram of FLuxury QRubbing of DEsalinización by reverse Osmosis.



Source: Self-elaboration.

As already mentioned, the process of desalination does not contemplate the treatment of the effluent generated, since it corresponds to the brine from the described process, whose characterization is presented in the Table 10-21, not including compounds that represent risk to the discharge medium.

In relation to its conduction and discharge, during the construction stage, the salt water will be discharged by means of underwater pipes, Located To 500 M from the coast. For the operation stage, the discharge will be through a pipe connected to the lower tunnel, approximately 900 M of the intake/discharge of this tunnel, being diluted with the discharge flow of the reservoir.

10.9.4 Program of MONitoreo and CONTROL QARámetros ORperacionales, INcluyendo QARámetros CRíticos

In order to monitor compliance with the concentrations established in DS No. 90/01, a chamber will be located to allow sampling of the brine generated, according to the frequency and parameters established in DS No. 90/01.

The monitoring program is Establish Based on the final design of the desalination plant and will have as its central objective Comply with the DS 90/01 Table No. 5, which establishes the quality of the effluents discharged to a marine environment outside the ZPL. The final approval shall also be conditional on the health authority and the corresponding RCA.

10.9.5 Description and GEorreferenciación of the OrBras o INfraestructura DBurden of the RESiduos TRatas, SI CORresponde

It is specified that the treatment of waste is not considered, the evacuation of the brine will be directly from the desalination plant, made to TRavés submarine discharge ducts. During this

phase, the intake and discharge of seawater will be carried out by the lower tunnel, whose location coordinates are presented in the following table:

Table 10-22: Coordinates TOmaDLoad In Datum WGS84 U19.

| Stage | North | This |
|--------------|-----------|---------|
| Construction | 7,665,851 | 383,250 |
| Operation | 7,665,677 | 383,097 |
| | 7,665,694 | 383,095 |
| | 7,665,697 | 383,113 |
| | 7,665,679 | 383,116 |

Source: Self-elaboration

10.9.6 Description and CAracterización of the CUerpo RReceiver SUperficial and/or SUBterráneo, IDentificando your Uses toCtuales and QReviewed

According to the field campaigns developed in spring 2013 and summer 2014 in the maritime and coastal area of Caleta San Marcos, site of the future project, the following results were obtained.

The hydrographic conditions of the coastal edge of interest, evaluated by vertical profiles carried out in two seasonal campaigns, revealed a dynamic behavior of the vertical structure of the water column throughout the evaluated period (Spring 2013 and summer 2014), where the presence of the mixing layer and eventual stratifications (E.g. thermocline), are modulated or conditioned by the action of important modulating physical forces or forcing agents, since the evaluated area corresponds to a coastal sector exposed to the direct action of those modulating agents such as wind and Preferential swell, those that come predominantly from SW. Thus for example, in spring the thermal structure and saline of the water column showed no greater estatificación, however, in summer some thermal stratification was appreciated in some stations on a superficial level with the presence of a thermocline not very Arcaded and probably modulated by the higher incidence of solar radiation during this seasonal period, and which was appreciated between surface and approximately 10 meters of depth; On the other hand the oxygen Dissolved (OD), presented a similar behavior between campaigns because at the superficial level, indicative values of an important oxygenation are recorded (between 90 – 100% saturation), which then record a sharp decrease depending on the depth, Approximately up to 10-15 m where minimum oxygen levels are reached, reaching 0 mlO₂/L (0% saturation).

Regarding the chemical quality of seawater, the following Analytes They showed concentrations below the limit of detection of the respective methodology used in all the seasons and depths analyzed of both seasonal campaigns, not recording evidence of deterioration of the quality of water by these parameters. The details of these concentrations are indicated in the following table. As for these parameters, the levels reported by the Analytical Laboratory for Coliforms Fecal, total suspended solids selenium and cadmium, allows classifying the body of water in category Class 1 according to the reference values given in the "Guide for the establishment of secondary standards of environmental quality for continental waters Superficial and marine ", that is to say, of very good quality and suitable for the protection of the aquatic communities and therefore, apt in turn for the described activities of the classes 2 and 3, that is, desalination of water for human consumption, water suitable for the development D (e) Aquaculture, extractive fishing activities, Suitable for port and navigation activities. Pb levels only allow classifying in Class 2, that is to say, of good quality, and the levels of Hg reported by the laboratory exceed even the Class 3 category, even though all the Hg records obtained are lower than the detection limit, which is why N Or it is possible to say with certainty about the environmental status of this element in seawater. Comparing the levels of those Analytes That presented quantifiable levels with the reference values provided in the "Guide for the establishment of secondary standards of environmental quality for shallow and marine continental waters", shows that the waters of the study area can be Preferably classified in the Class 1 quality range or "very good quality", with respect to arsenic and aluminium concentrations; In addition, it can also be classified in Class 2 quality category with respect to the levels or concentrations of the following parameters, although the vast majority of them show prefRentemente levels in the Class 1 range, but with a few values within Class 2: zinc, nickel, copper and chromium.

Table 10-23: Quality QUímica ToGua de MAr

| Analyte | Unit | Value |
|------------------------|------------|---------|
| Sedimentary solids | ML/L H | < 0.1 |
| Total Suspended solids | mg/L | < 5.0 |
| Coliforms Fecal | NMP/100 ML | < 1.8 |
| Cadmium | MgCd/l | < 0.001 |
| Iron | MgFe/l | < 0.002 |
| Mercury | MgHg/l | < 0.001 |
| Lead | MgPb/l | < 0.01 |
| Selenium | MgSe/l | < 0.005 |

Source: Chemical Oceanography Baseline.

It stands out, that the evaluated coastal sector presents characteristics suitable for recreational activities with direct contact (which would be limited mainly to the summer time on the beach of Caleta San Marcos), those parameters evaluated in this study and That presented reference values in the primary water quality standard (ds No. 144/08), comply with limits imposed by this normative body, such is the case of arsenic cadmium, chromium, mercury, lead, and PH.

With respect to vertical variability in the distribution of concentrations of different Analytes Evaluated chemicals, it is possible to establish that only alkalinity and BOD5 showed statistically significant differences between strata, and throughout the rest of the Analytes The concentrations did not record significant differences, which leaves in evidence a body of water without greater variability between the strata evaluated (surface and bottom). However, by analyzing variability between seasonal campaigns (Spring 2013 – Summer 2014), the trend shows that some Analytes They showed variation, such is the case of sulfate, calcium, vanadium and turbidity that recorded statistically superior concentrations in the Spring 2013 campaign, and chromium-zinc aluminum that showed significantly higher levels in the campaign Summer 2014; Arsenic, Bod5 chlorides, copper, manganese and organic matter in seawater showed no statistical differences between campaigns.

The subtidal sedimentary matrix evaluated in this baseline, showed an almost exclusive prevalence of the sand fraction, with little representativeness of the clay slime fraction (maximum of 2.4% in ASP2 during summer) and null presence of the gravel fraction in both Seasonal campaigns. The textural classification of the sand fraction showed a wide variability between campaigns and between seasons, fluctuating between very fine sand and very thick sand. In relation to the total organic matter, most of the seasons of both campaigns Exceeded the lower limit established by the Government of Ontario in Canada by 1% as a standard of sediment quality, but none surpassed the limit of effects on biota set at 10% in that regulation; In turn, the

9% limit established by the undersecretary for Fisheries and aquaculture (sub-PESCA) for aquaculture activities in marine sediments (the only national regulations available for the purposes of the country), which is why the values of matter Organically obtained can be considered normal. In the same way, the underfishing established a limit of ACEPAbility to reduce oxide potential corrected to Normal hydrogen electrode (NHE) of 50 Mv. The results indicate that of the total evaluated points of the subtidal environment in both seasonal campaigns, only three seasons in spring are under this threshold limit, specifically ASP3, ASP4 and ASP7 which also recorded the largest Concentration of organic matter during this campaign, and all other stations present acceptable conditions of oxide-reduction under this criterion.

The vast majority of the chemical parameters evaluated, showed concentrations lower than the limits established by the international standards consulted, and defined as suitable for the protection of marine aquatic life, such is the case of zinc, Vanadium, lead, nickel, iron, total chromium and copper. For the case of arsenic and cadmium several stations of both campaigns recorded levels above the threshold limit established by the Government of Canada ISQG/TEL (Interim Marine Sediment Quality Guidelines: Threshold level of effects on aquatic biota), and in the case of Mercury only 1 station showed this condition, however, none of the levels of these three elements was higher than the PEL boundary (probable Effect Levels) or probable effects on aquatic biota. The analysis of the variability of the concentrations of the Analytes By sampling station, it warns a pattern or tendency to group the highest concentrations in the stations ASP2 and ASP3 in the vast majority of parameters evaluated during both baseline campaigns, for example, such is the case of Zn, sulfates, Pb, NOR, Mn, Fe, Cr, Cd, V, Cu. This condition could be associated with the higher percentage of finer grains in these seasons, which have a greater surface/volume ratio that allow them to have greater adsorption capacity of Contaminants compared to the most grues sedimentss, for example, ASP2 as ASP3 presented a medium grain size corresponding to very fine sand in the summer campaign, and especially ASP2 recorded the highest percentage of the mud fraction in both campaigns. On the other hand, the analysis between seasonal campaigns reveals that of the totality of Analytes evaluated only nickel and sulfates showed significantly different concentrations between spring 2013 and summer 2014, so the subtidal sedimentary environment did not show significant changes between campaigns.

Regarding the chemical characterization of sediments Intertidal evaluated during The Summer campaign, it is possible to establish that of all the elements or metals evaluated ($n = 8$), only the arsenic recorded a punctual value over the Regulation ISQG/TEL but less than Limit of probable effects on the biota, all the rest of heavy metals evaluated showed levels lower than the limits established by the consulted regulation. The analysis of the variability of the concentrations of heavy metals in sediments Intertidal, shows a tendency to group the highest concentrations preferably in the Transects 6 and 7 of the area of study (such is the case of Zn, Pb, As, Cd, Cu, located at the ends of the coastal sector evaluated.

10.9.7 Effect ESperado of the DLoad SWorking the CUerpo or Course RReceiver COnsiderando the USos IDentificados

The salt water of discharge will comply with the DS 90/01 table N ° 5, which establishes the quality of the effluents discharged to a marine environment outside the ZPL. The detail of its composition is indicated in the Table 10-8.

On the other hand, considering that seawater enters the desalination plant with approximately 36,000 ppm (salinity unit) and that the efficiency of the process is around 45%, it is estimated that the salinity of the salt water of discharge will reach approximately 65,455 ppm.

With regard to the salt water temperature, it can be noted that this will be similar to that of seawater, since desalination does not consider thermal processes.

Regarding the salinity of the effluent, this It will be reduced quickly, matching Your Salinity with concentration Natural of the sea. Therefore the impact has a local and reversible extension, as the area where it can be manifested corresponds to the area of location of the facilities and sectors immediately adjacents to the discharge to the marine environment.

Given the above the effect of this discharge on the marine environment is considered of Low intensity or little significant due to:

- The brine or effluent of the desalination plant will present a local effect of increasing salinity in the receiving environment, bounded to the immediate vicinity of the emissary.
- Salinity reaches normal values very quickly to meters from the discharge.

In terms of reversibility, this reversible impact is considered, because once the discharge is stopped the water column will recover its basal condition.

Finally and COnsiderando that the discharged effluent corresponds to the same seawater asserted, that the discharge point is located at 350 M of the coast and that will comply with the established in the DS 90/2001 of the MINSEGPRES, no adverse effects are expected on the receiving body, in this case, The Marine environment Located Outside the ZPL.

10.9.8 Plan of MAnnex of Sludge and CUalquier OrTro RESiduo GEnrado

There is no sludge generation, so no management is required.

10.9.9 Plan of COntingencia

10.9.9.1 Overflow of EStanques

In the case that any of the ponds is overcome and overflows, it falls on Radier, without any possibility of overflowing to the earth, or the water is sucked with a motor pump and is available in emergency pond.

In response to this contingency:

- Suspend production and thus the generation of Riles.
- Avoid crossing flooded areas;
- Be aware of the existence of fallen electrical posts or cables in flooded areas.
- Wait for instructions from the head of the emergency.

10.9.9.2 Cuts of EEnergy that IMpidan the OrPear of the SSystem TAerosol treatment

If a power failure occurs, the backup generation system will be activated, preventing the lack of energy to carry out the treatment processes.

The electromechanic must check the electrical panel if it is short circuit.

If the board is short-circuited, the electrical mechanic must check the installations. Prior to this, the power supply must be cut to the desalination plant.

10.9.10 Emergency Plan

- The communications Plan will be activated, which specifies, depending on the magnitude of the accident, to whom to report.
- A restriction area will be immediately delimited, where only trained personnel can enter.
- Trained personnel, inspect the site of the accident, verifying that there are no injuries in the area.
- In case of registering injured by this accident, they will be taken to a care center.
- A specialist in risk prevention, will inspect the area, demarcating the areas of risk. The professional will determine if it is advisable to relocate the facilities. If this is the case, the relevant authorities will be informed.

10.10. Allow Sectoral environmental so mixed 139

Permission for the construction, repair, modification and extension of any public or particular work intended for the disposal, treatment or final disposal of industrial or mining waste

The permit for the construction, repair, modification and extension of any public or particular work intended for the evacuation, treatment or final disposal of industrial or mining waste shall be that laid down in article 71 (b), second part, Of the decree with force of Law n ° 725, of 1967, of the Ministry of Public Health, sanitary code.

Article 71 indicates that it is the responsibility of the Regional health authority to approve projects relating to the construction, repair, modification and extension of any public or private work intended for the evacuation, treatment or final disposition of Industrial or mining waste.

The requirement for its granting is that the water quality of the receiving body does not jeopardize the health of the population.

The project for the construction of its works will require the installation of 2 concrete plants located in the facilities of slaughter contemplated in the sector coast and in the sector plateau, from where the concrete is transported to the work in trucks Mixer. After the concrete is emptied, wash the gutters and Concrete Mixers Of the lorries, for which reason the mixed sectoral environmental permit is requested established in article 139 of the Regulation of the environmental impact system D. S N ° 40/2012, for the treatment system of washing water with remains of concrete, consisting of two areas of Washing of trucks in the vicinity of each concrete plant.

The following are the technical and formal contents To prove compliance.

10.10.1 Description of the Processes in which it is GThey RESIDUOS LÍQUIDOS INDUSTRIALES or MTools, ESTIMACIÓN of the CAUDALES and CARACTERIZACIÓN.

During the construction stage, industrial liquid waste will be generated from the washing of gutters and Concrete Mixers of the trucksS Mixer With concrete remnants, which They are preferentially wastewater which can present a high quantity of dissolved solids (sodium and potassium hydroxide) and suspended (calcium carbonate), high alkalinity and its quality is determined by the drag in the cleaning of the canoe.

A generation of 20 m is estimated³/month of water for washing canoes and Concrete Mixers of trucks Mixer With concrete remains.

As indicated in the Guide for the Control and prevention of Industrial pollution-products of cement and concrete- De CONAMA, Región Metropolitana, made in 1988, LEffluents from washing canoes and Concrete Mixers, can present a high amount of dissolved solids (sodium and potassium hydroxide) and suspended (calcium carbonate), high alkalinity, possibility of Autosetting, and residual heat. In addition, the liquid effluent from the maintenance and cleaning of plants and trucks can provide fats and oils from dislnks machinery and vehicles.

To Way of reference and conservatively, given that in this case the canoe and the Betonito Of the truck, there is a typical characterization of water washing trucks. The presence of microbiological content in wastewater is not expected due to the type of work that trucks will carry out.

Table 10-24: Characterization of ToGuas LAVado CAMiones

| Parameter | Estimated range of variation | Values according to DS-90 table N ° 2 |
|----------------------------|------------------------------|---------------------------------------|
| Oils and fats (mg/L) | 40-60 | 50 |
| Aluminium (mg/L) | 10-27 | 10 |
| Arsenic (mg/L) | 0.02-0.01 | 1 |
| Boron (mg/L) | 0.17 | 3 |
| Cadmium (mg/L) | < 0.005 | 0.3 |
| Cyanide (mg/L) | < 0.05 | 1 |
| Chloride (mg/L) | 3-7 | 2000 |
| Total Copper (mg/L) | 0.05-0.14 | 3 |
| Coliforms Stools NMP/100ML | < 2 | 1000 |
| Index Phenol (mg/L) | 0.001-0.007 | 1 |
| Chromium Hexavalent (mg/L) | < 0.01 | 0.2 |
| BOD5 (MG O2/L) | 6.8-10 | 300 |
| Fluoride (mg/L) | 0.1-0.35 | 5 |
| Phosphorus (mg/L) | 0.5-6 | 15 |
| Fixed hydrocarbons (mg/L) | < 0.1 | 50 |
| dissolved iron (mg/L) | 0.1-15 | 10 |
| Manganese (mg/L) | 0.7-4 | 3 |
| Mercury (mg/L) | < 0.001 | 0.01 |
| Molybdenum (mg/L) | < 0.01 | 2.5 |

| Parameter | Estimated range of variation | Values according to DS-90 table N ° 2 |
|-------------------------------|------------------------------|---------------------------------------|
| Nickel (Mg/L) | 0.02-0.05 | 3 |
| Total nitrogen Kj (Mg/L) | 1-7 | 75 |
| Pentachlorophenol (Mg/L) | N.d. | 0.01 |
| Ph | 9-11.5 | 6.0-8.5 |
| Lead (mg/L) | 0.08-0.15 | 0.5 |
| Power Foam mm | < 1 | 7 |
| Selenium (mg/L) | < 0.004 | 0.1 |
| Total suspended solids (mg/L) | 1,500-25,000 | 300 |
| Sulphates (mg/L) | 1-50 | 2000 |
| Sulfides (Mg/L) | < 0.5 | 10 |
| Toluene (mg/L) | N.d. | 40 |
| Trichloromethane (Mg/L) | < 0.01 | 0.4 |
| Temperature (°c) | 10 | 7 |
| Tetrachloroethene (Mg/L) | < 0.01 | 0.5 |
| Xylene (mg/L) | N.d. | 5 |
| Zinc (mg/L) | 0.1-0.8 | 20 |

Source: Characterization of crude riles of the hydroelectric plant La Higuera

In general terms, it is possible to anticipate that the main parameters that alter the quality of wastewater from the washing of machinery are as follows: PH mainly average alkaline (8-9) and suspended solids.

As for suspended solids, the surplus water contains a large amount of fine material contributed by aggregates to the cement mixture, elements such as lime (Cao) Silica (SiO₂) Alumina (Al₂O₃) Iron oxide (Fe₂O₃). At the time of the canoe washing and Betonito Of the truck are generated the aforementioned residual water surplus. Treatment options consider sedimentation in the water-repellent decanting pool, after a while the evaporative waters and the dry material will be removed as industrial waste to an authorized third party.

10.10.2 Plane of EMplazamiento of the SSystem TAerosol treatment

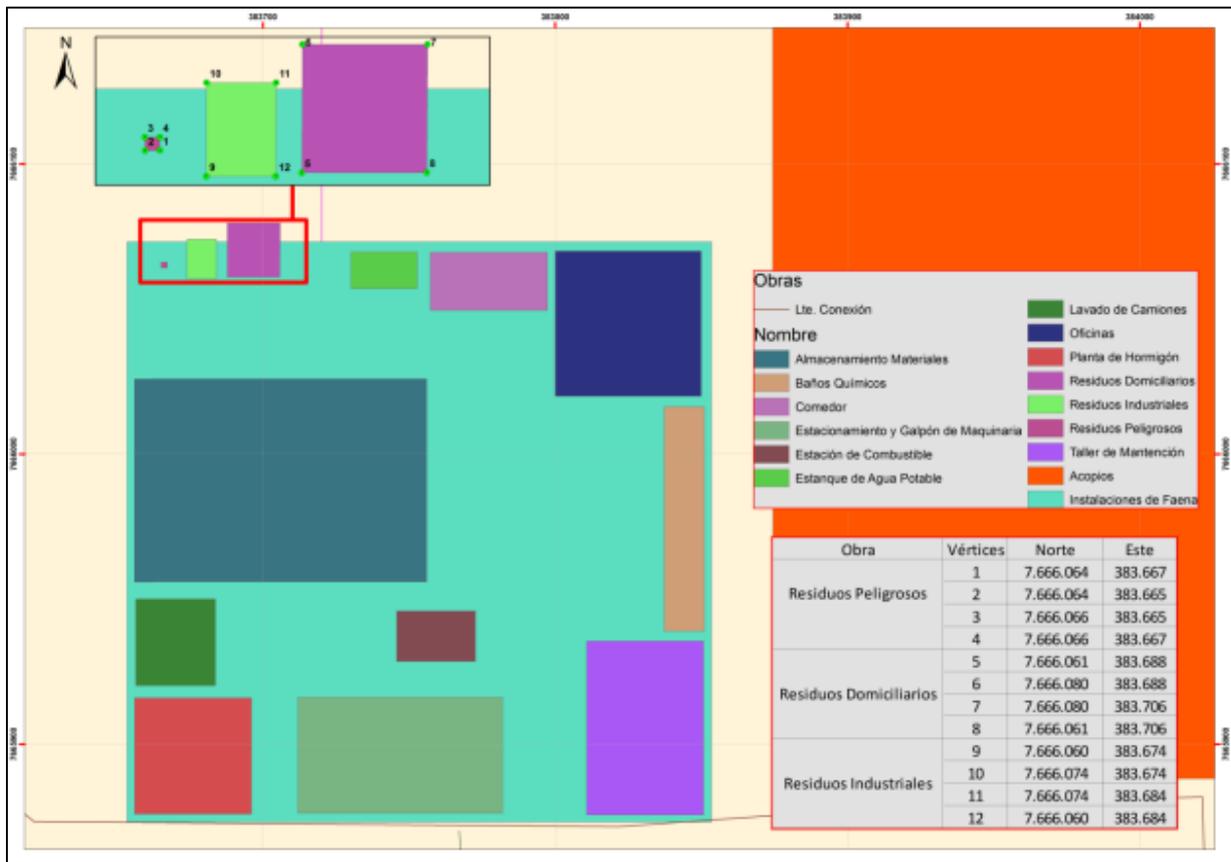
The truck washing industry will be Inside the Task Installation Area San Marcos and Reservoir, As shown in the figures Following, The detail of the coordinates is indicated in the Table 10-25.

Table 10-25: Sector LAVado CAMiones.

| Slaughter Installation | Detail | UTM coordinates (Centroid) | |
|------------------------|---------------|----------------------------|---------|
| | | North | East |
| IF San Marcos | Truck Washing | 7,665,935 | 383,670 |
| IF Reservoir | Truck Washing | 7,666,545 | 386,114 |

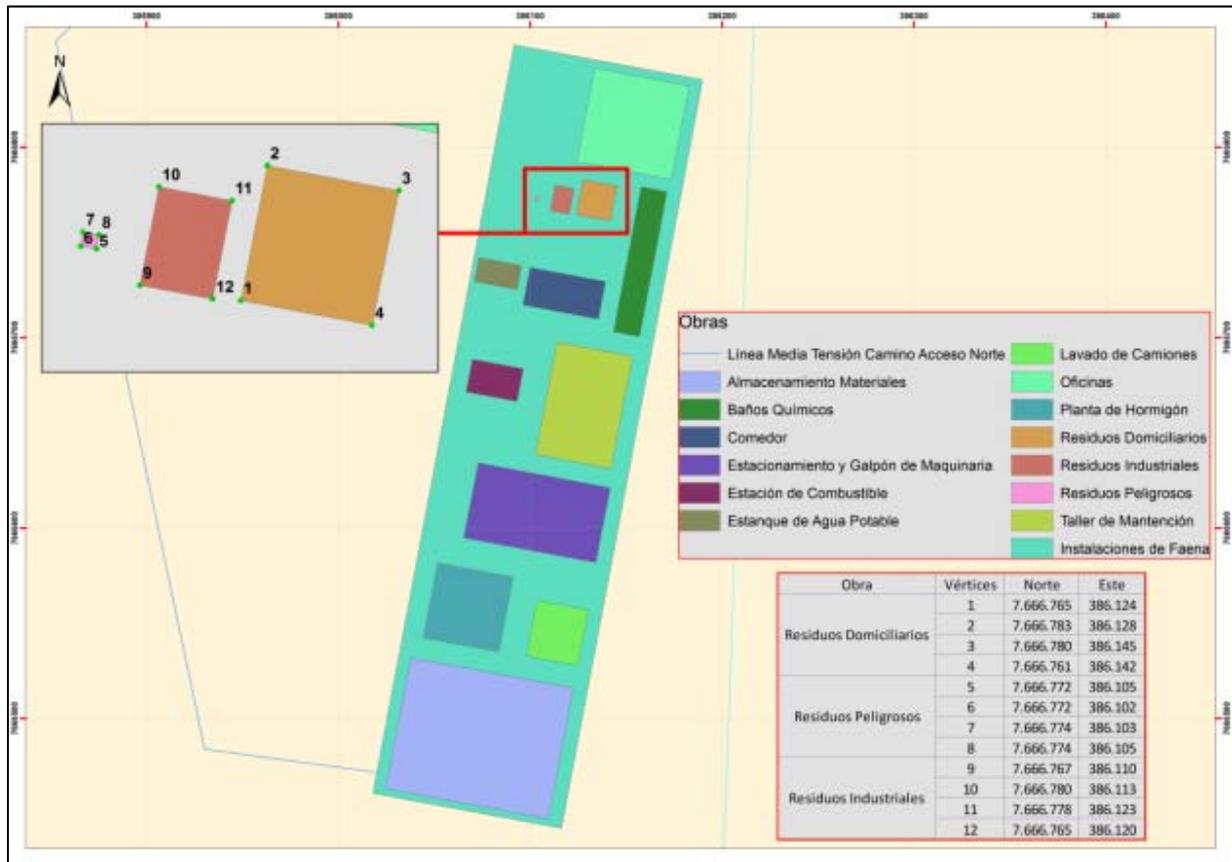
Source: Self-elaboration.

Figure 10-35: Sector Washing of CAMiones IF San Marcos.



Source: Self-elaboration

Figure 10-36: Sector Washing of CAiones IF Reservoir.



Source: Self-elaboration

10.10.3 Design of the System Dand treatment QEU include A diagram DE Flow And DE LAs units And Necessary equipment QTo drive, to treat And Download EL Effluent.

The management of the waters from the washing of the canoes and Betonito of the trucks Mixer will be as follows:

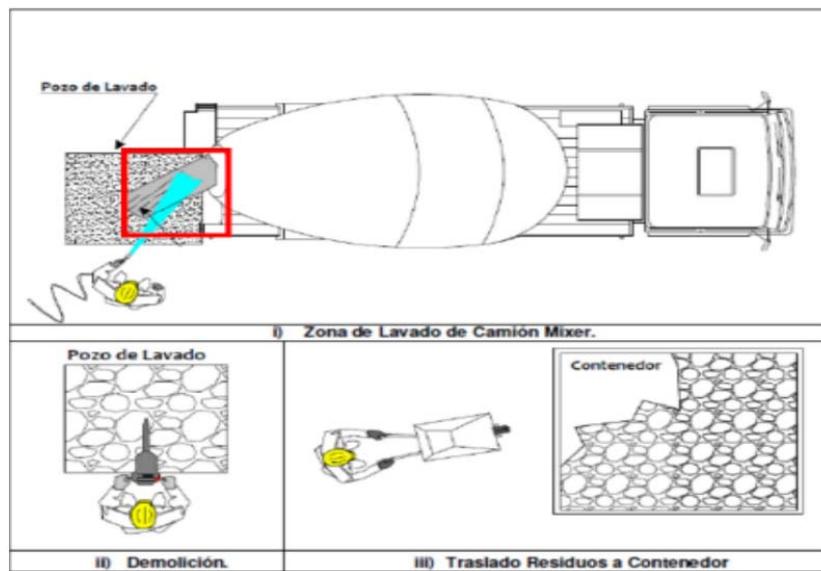
- Enabling a Waterproof Pool, Approximately 4 M³.
- Discharge of wastewater into the Pool, from the washing of the canoe discharge Concrete Truck Mixer.
- The Overwaters sand evaporate in a natural way And part is recovered for use in the Next washing of a truck's canoe. The cement with a percentage of water Minor (after 24

hoRAS or more) is removed from the pool As waste No Dangerous, is stored in the sectors enabled for that within each facility of slaughter, and finally is transported and deposited by companies specially authorized for this.

- Once the construction stage has been completed, L Works Term, Proceed to fill the Pool With the material Previously excavated.

The following figure presents the procedure for handling the washing of the truck canoe Mixer.

Figure 10-37: Management of LAVado CAmiones Mixer



Source: Self-elaboration

10.10.4 Program of MONitoreo and CONtrol QARámetros OrPeracionales, INcluyendo QARámetros CRíticos

The monitoring program will consist of a daily visual inspection of the L of the pool, so l'mSTA does not overflow. In relation to the supernatant water, as mentioned above, part will evaporate in a natural way, and part will be reused in the same process of washing of canoes.

10.10.5 Description and GEorReferencing the OrBras o INfraestructura DBurden of the RESiduos TRatas, SI CORresponde

does not apply.

10.10.6 Description and Characterization of CUerpo Receiver SUPERficial and/or SUBterráneo, IDENTificando your USOs TOctuales and QReviewed

Whereas L Waste Industrial Liquids will be concentrated by the effect of climatic evaporation, And It will also enable A waterproof pool for handling It is not considered necessary to Evacuacion and final disposition of them.

10.10.7 Effect ESperado of the DLoad SWorking the CUerpo or CURso RReceiver CONsiderando the USOs IDENTificados

There will be no download of industrial liquid waste About body or receiving course.

10.10.8 Plan of MANNex of LOdos and CUalquier OrTro RESiduo GGenerado

Semi-solid waste that is deposited In the pool They'll be identified as sludge. The physical-chemical characterization of sludge andis related to aggregates and cement, which correspond to RESiduos that have been withdrawn from the activities of Canoe Washing Of all the Trucks Mixer.

The solids will be collected at a bimonthly frequency or when 60% of the height of the gutters is reached, to be arranged as non-hazardous industrial waste to an authorized third party.

10.10.9 Plan CONtingencia

A contingency situation may be considered when the decanting pools exceed their maximum level, for which the following actions are to be followed:

- Suspend the washing of trucks and close the washing area.
- The preventive maintenance program should be checked to determine if the fault should have been avoided.

10.10.10 Emergency Plan

- The communications Plan will be activated, which specifies, depending on the magnitude of the accident, to whom to report.
- A restriction area will be immediately delimited, where only trained personnel can enter.
- Trained personnel, inspect the site of the accident, verifying that there are no injuries in the area.
- In case of registering injured by this accident, they will be taken to a care center.

- A specialist in risk prevention, will inspect the area, demarcating the areas of risk. The professional will determine if it is advisable to relocate the facilities. If this is the case, the relevant authorities will be informed.

10.11. Mixed sectoral environmental Permit 140

Permission for the construction, repair, modification and extension of any waste and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or disposal End of rubbish and waste of any kind.

Permission for the construction, repair, modification and extension of any waste and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or disposal End of rubbish and waste of any kind, shall be that established in articles 79 ° and 80 ° of D.F. L N ° 725, of 1967, of the Ministry of Public Health, health Code, and provided that the application of another sectoral environmental permit is not appropriate for the same action.

The Temporary storage of non-hazardous domestic and industrial waste, generated by the project, both for its construction and operation stage, and subsequently, its dispatch to an authorized final disposition, requires the granting of this permit Environmental Sectoral.

The following are the technical and formal contents to certify compliance:

10.11.1 Background General

10.11.1.1 Description and QLANos of the Site

The Project considers the empowerment of 5 Storage yards and waste management:

Construction stage

- Waste yard Domestic and Industrial Non-hazardous, coastal Sector: Located at One side of the FA installationEna and will have a surface of 200 m².
- Waste yard Domestic and Industrial Non-hazardous, coastal Sector – San Marcos: Surface of 500 m².
- Waste yard Domestic and Industrial Non-hazardous, coastal Sector – Rio Seco: Surface of 200 m².
- Waste yard Domestic and Industrial, Plateau Sector: Located at One side of the slaughter plant and will have a surface of 500 m².
- Yard of domestic and industrial waste, Sector Costa – Camp: Area of 260 m².

Operation Stage

For the operation stage, the utilization of the waste yard enabled in the Costa-San Marcos Sector will continue, with a surface that reaches 500 m².

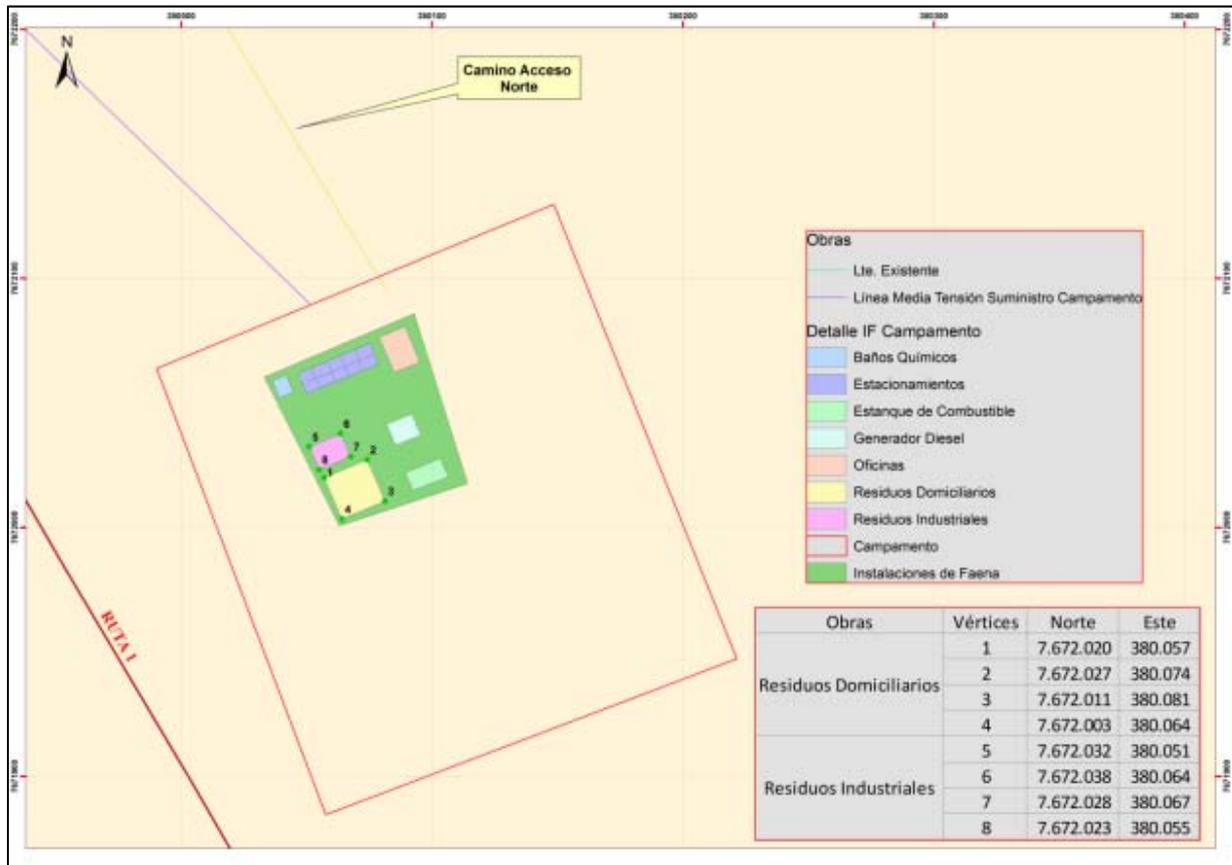
Below, in the Table 10-26, are indicated The surfaces associated with each patio described, also pointing out the figure showing the location and distribution for each one of them.

Table 10-26: Location Patios of AStorage

| Stage | Name | Sector | Surface area (m2) | Figures |
|------------------------|--|--------------------|-------------------|--------------|
| Construction | Non-hazardous domestic and industrial waste yard | Coast | 200 | Figure 10-38 |
| Construction/Operation | Non-hazardous domestic and industrial waste yard | Costa – San Marcos | 500 | Figure 10-39 |
| Construction | Non-hazardous domestic and industrial waste yard | Coast-Dry River | 200 | Figure 10-40 |
| Construction | Non-hazardous domestic and industrial waste yard | Plateau | 500 | |
| Construction | Non-hazardous domestic and industrial waste yard | Costa – Camping | 260 | Figure 10-42 |

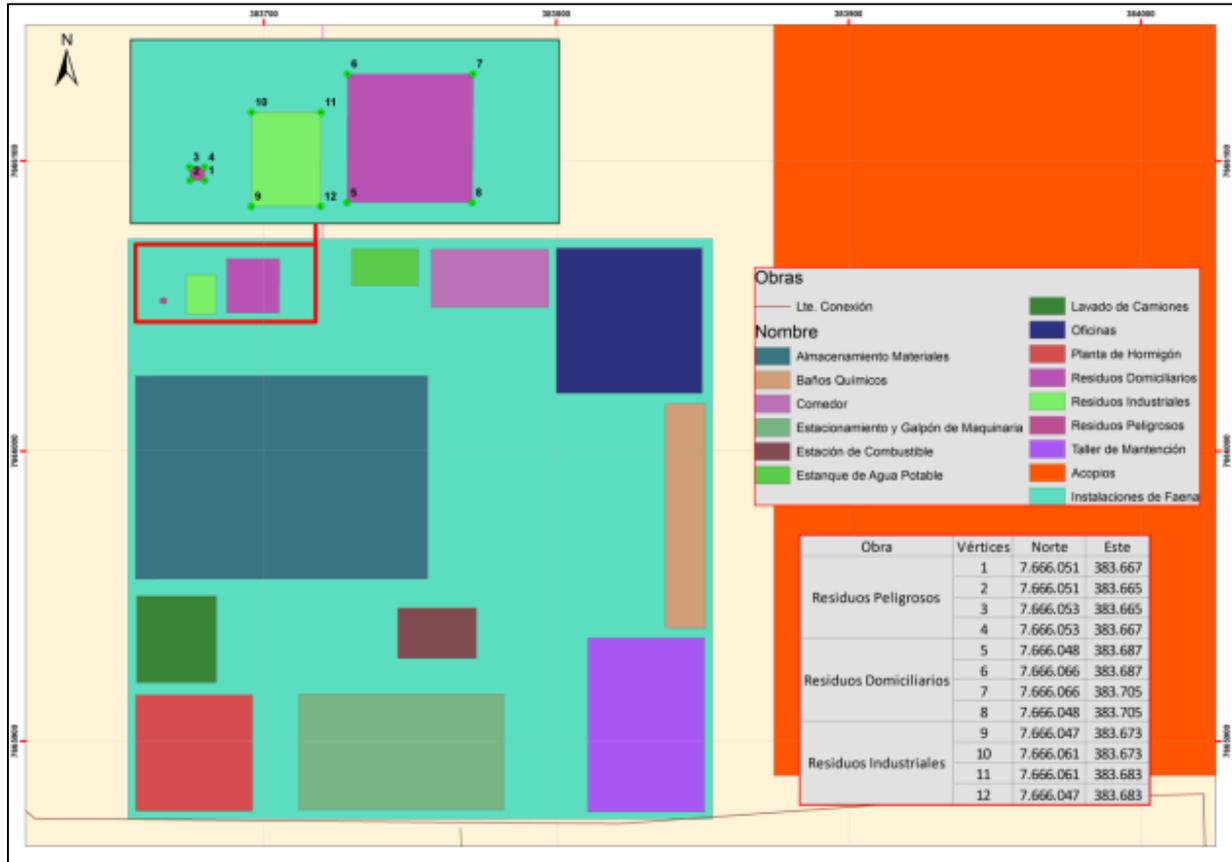
Source: Self-elaboration.

Figure 10-38: Patio de RESiduos DOMésticos and INdustriales NOR QEIligrosos. Sector Costa.



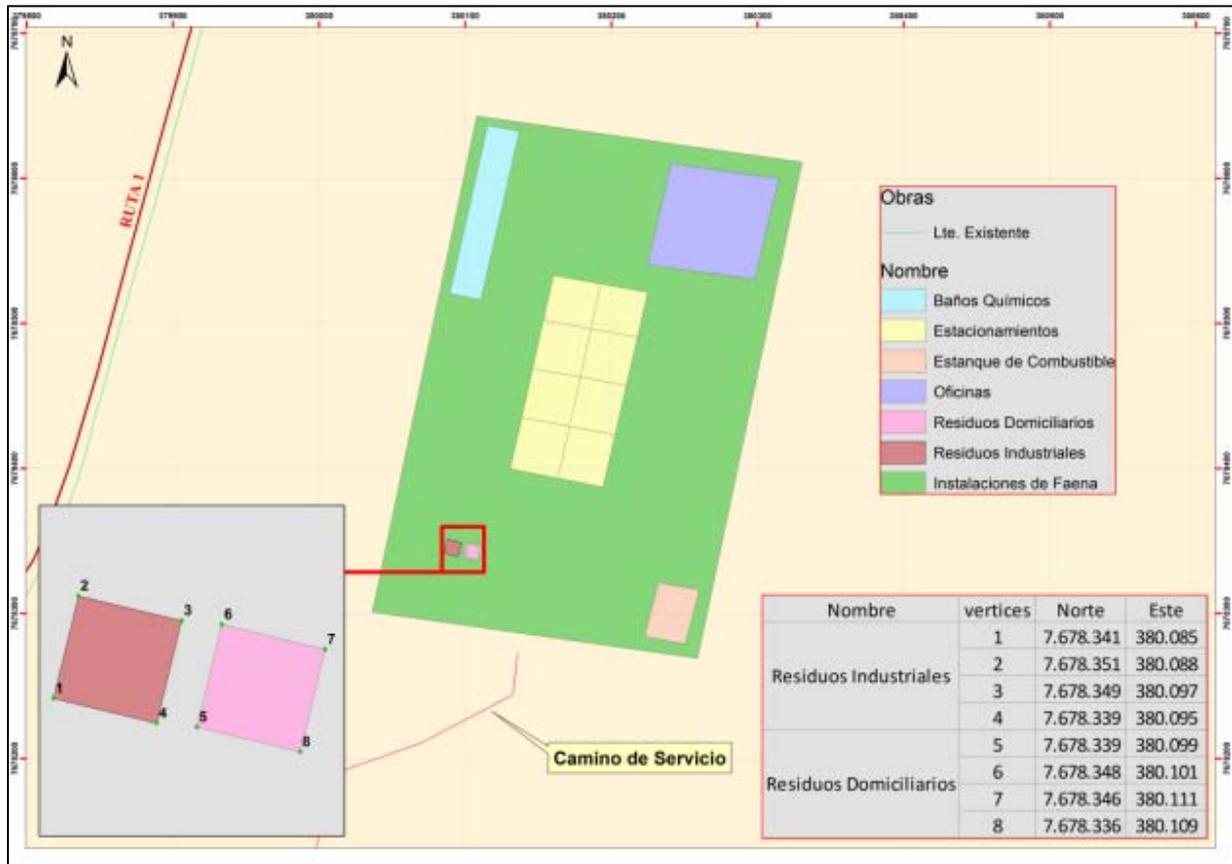
Source: Self-elaboration.

Figure 10-39: Courtyard RESiduos DOMésticos and INdustriales NOr QEligrosos. Sector Costa – San Marcos.



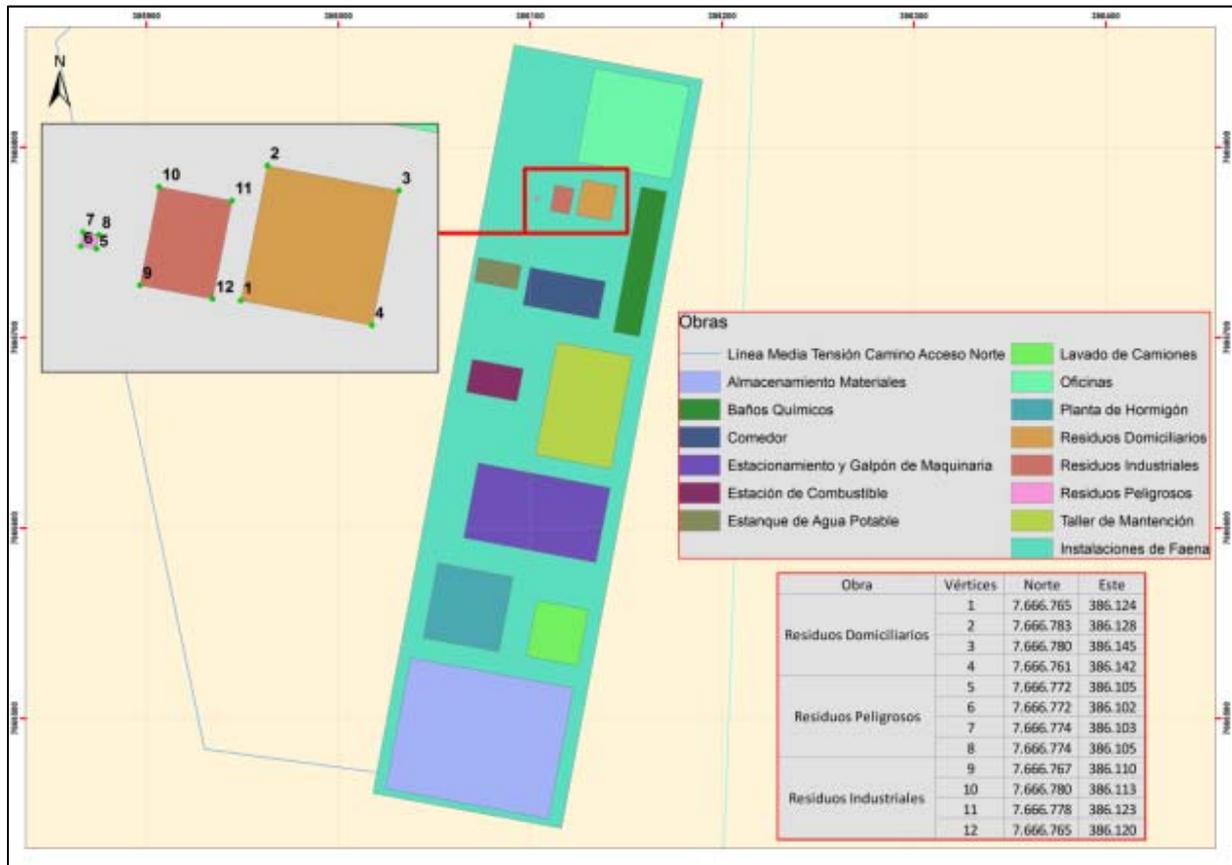
Source: Self-elaboration.

Figure 10-40: Courtyard Waste DOMésticos and INdustriales NOr QEligrosos. Sector Costa–Dry River.



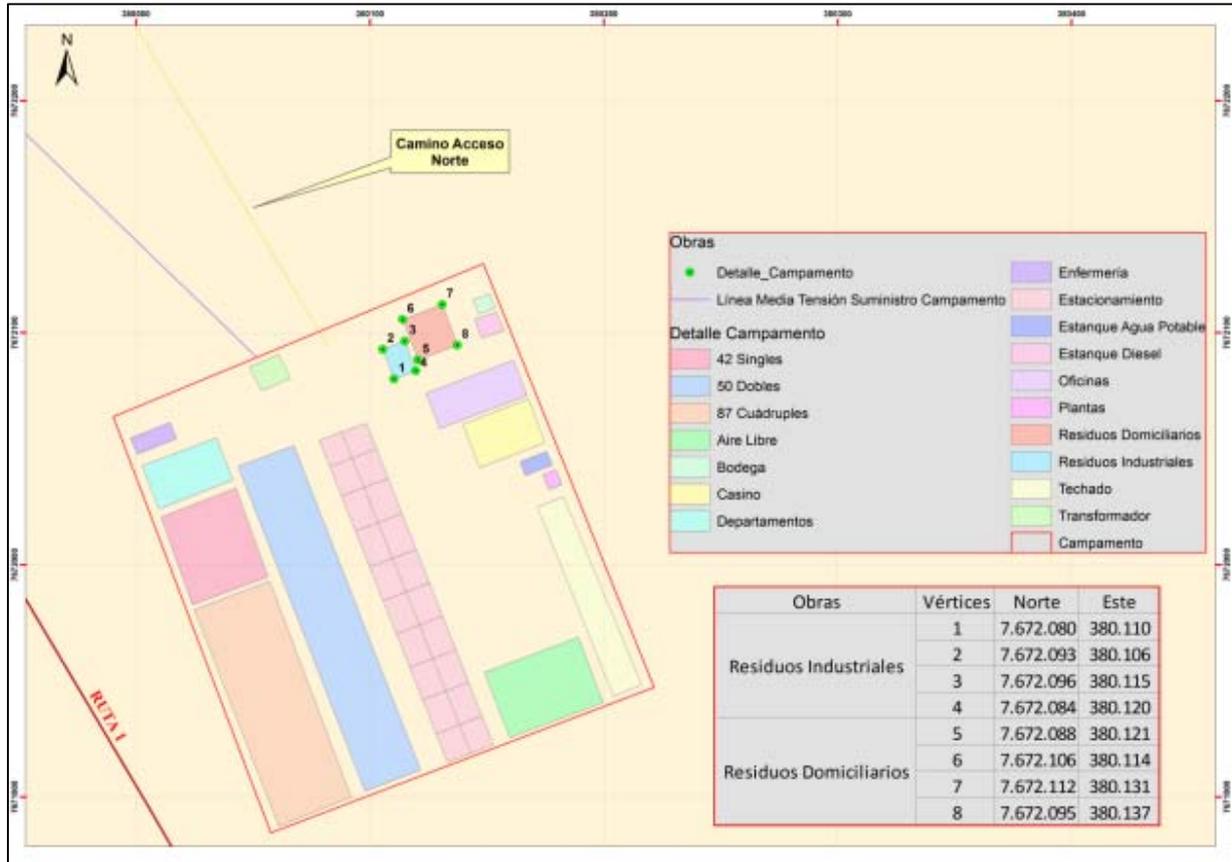
Source: Self-elaboration.

Figure 10-41: Patio de RESiduos DOmésticos and INdustriales NOr QEligrosos. Plateau Sector.



Source: Self-elaboration.

Figure 10-42: Courtyard RESiduos DOMésticos and INdustriales NOr QEligiosos. Sector Costa – Camping.



Source: Self-elaboration.

10.11.1.2 Description of Meteorological Variables

The meteorological variables obtained from the records of the Central internal meteorological station, in the period between December 2007 and March 2010, are presented below:

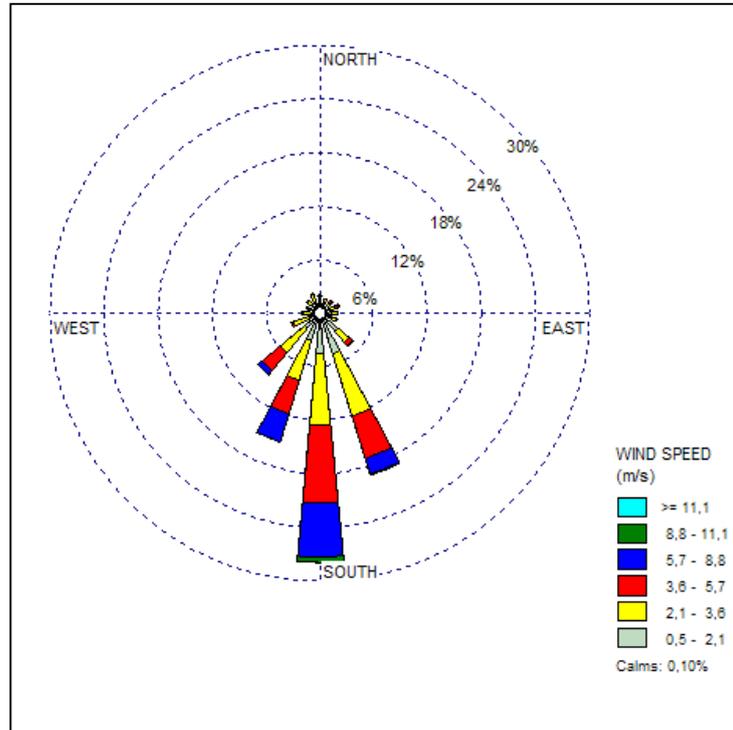
Table 10-27: Meteorological Variables Central Indoor Station (12/2007 – 03/2010)

| Variable | Value |
|----------------------------------|--|
| Wind speed (m/s) | |
| Average period | 3.22 |
| Maximum Value | 11.9 |
| Minimum value | 0.4 |
| Percentage of calms ⁴ | 0.10 |
| Wind Direction | |
| AddressOrNIs PredominantlyS | S (23.29%), SSE (15.89%), SSW (12.63%) |

Source: Central Indoor Weather Station

The following figure Presents the Wind Rose Accumulated for the period between The months of December 2007 to March 2010.

⁴ Porcentaje de calma: porcentaje del tiempo en que la velocidad del viento es menor a 0,5 m/s.

Figure 10-43: Rosa de los Vientos Interior Central Station


Source: Self-elaboration -Central station inside.

The winds show predominantly well defined direction for the period of registration, presenting average speed of 3.22 m/s and a 0.1% of calms. The fact that the percentage of calm is low, indicates that the air in the area shows dispersion capacity. The maximum hourly speed of the wind recorded for this period is 11.9 m/s.

The wind in this sector possesses components of predominant direction S, SSE, SSW, SW, ESE and WSW in 66, 1% of the time, indicating a direction of the wind very defined.

10.11.1.3 Estimation and CAracterización Qualitative and CUantitativa of the RESiduos TRatar

- i. **Household or assimilated household waste**
 - **Stage Construction**

During the construction stage, these wastes correspond mainly to papers, food scraps, containers and similar elements, generated in the casino, hygienic services and work fronts.

The generation of these wastes will be directly proportional to the amount of labour, that is to say, considering a maximum endowment of 500 People and a generation of 1 kg per person a day, is estimated a generation of waste of 500 KG a day.

On the other hand, the sludge generated from the wastewater treatment Plant (PTAS), considering a maximum endowment of 500 Workers and a generation rate of 0.88 KG mud per m³ of treated water, an estimated generation of 1,980 KG sludge/month from PTAS.

- **Operation Stage**

During the construction stage, these wastes correspond mainly to papers, leftover food, packaging and similar items, generated in the casino, hygienic services and Areas of work.

The generation of these wastes will be directly proportional to the amount of labour, that is, considering a maximum endowment of 50 people and a generation of 1 kg/Room/day, a waste generation of 50 kg/day is estimated.

On the other hand, the sludge generated from the wastewater treatment Plant (PTAS), considering a maximum endowment of 50 workers and a generation rate of 0.88 KG Sludge/M³ of treated water, an estimated generation of 198 Kg/month.

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

- **Construction stage**

Non-hazardous industrial wastes at the construction stage will correspond to Scraps of wood associated with obsolete parts and/or packings, reels and cables of the electric line, remainders of polyethylene binder, irons, etc. The volume of waste generated by the remains of unused inputs depends on the contractor's procedures, so their volume is variable.

Considering the magnitude of the activities, it is feasible to envisage a generation of 9,2 ton/month of this type of waste.

- **Operation Stage**

The types of solid waste No Hazards that are expected to be generated, They will correspond to waste generated from maintenance activities, such as iron, wood scraps, cables, etc. Considering the magnitude of the activities, it is feasible to envisage a generation of 200 Kg/month.

The Table 10-28 It shows the detail of the waste generated in the stages of construction and operation, indicating the form of collection and final disposition of these.

Table 10-28: Waste Generated By the project

| Waste type | Construction stage | Operation Stage | Temporary collection | Final disposition |
|---|--------------------|-------------------|---|-------------------|
| Household or assimilated household waste. | 500 Kg/day | 50 kg/day | Yard of domestic and industrial non-hazardous waste in closed and labeled containers. | Landfill. |
| Mud PTAS. | 1,980 KG Mud/month | 198 Kg Mud/month. | Withdrawal by authorized Company. | Landfill. |
| Non-hazardous industrial waste. | 9,2 ton/month | 200 kg/month | Non-hazardous domestic and industrial waste yard. | Landfill. |

Source: Self-elaboration

10.11.1.4 Design of the T Plant that Includes Diagrams and the Equipment

It should be noted that it is not considered a treatment plant in this project.

10.11.1.5 Forms of Particulate Emissions and Control and Management of Residues

- **Emissions**

In The Stage of construction Material emissions would be recorded Particulate resuspended and gases from the combustion of engines of machinery and equipment. Particulate matter emissions are mainly due to land movements and activities related to construction of works and roads.

The machinery and vehicles used in the construction stage will comply with the current emission regulations and have their technical review updated. A program of control and periodic measurements of the operating state of the motors will be carried out. Also is contemplated A plan to mitigate emissions of particulate matter (dust) into the atmosphere during, during the execution of the activities associated with the construction, which includes A Humectación program of soils in roads and areas of work.

En The operation stage, the project Not with Significant emissions, This is because the only emissions generated correspond to Those products Maintenance and repair work of the Central. These are isolated, low-frequency jobs and generally require a small amount of staff.

- **Noise**

For the construction stage, An inventory of noise emissions was carried out, the detail of which was Presented in the Chapter 04 Prediction and evaluation of environmental impacts, associated with the activities carried out during this stage, which indicated as main issuing sources, the Use of explosives in surface and underground works, use of machinery and vehicles. It should be noted that the activities developed during the construction of the project, have a specific duration and time-bound.

For the operation stage, no Identify impact-generating activities on these environmental components except the uninterrupted operation of the machine cavern, which is located under the surface and therefore does not Generates relevant levels of Audible noise from the surface. To dimension these effects has been made An assessment of the noise that would eventually be generated by the activities carried out by the project, Depending on the levels established by the Supreme Decree No. 38 for rural areas. The results of this study are presented in chapter 4 of this EIA, where It is concluded that the Operation stage, the maximum levels allowed in the receivers closest to the project will be fulfilled without the need to implement noise control measures.

- **Vibrations**

During the construction stage there will be vibrations inherent to this activity, however, these are punctual and associated construction activities Underground So they are not considered significant.

For the operation stage, no significant vibration is envisaged.

- **Vectors**

To avoid the presence of sanitary vectors, it is envisaged the installation of a perimeter closure in the waste storage areas, together with the implementation of a Program for the integral control of sanitary vectors, especially for the control of flies and rodents, which will be Realizado by an authorized company.

- **Smells**

No Odor generation is expected at this stage due to the types of waste to be generated. On the other hand it is important to note that the dryness of the environment hinders the generation of odours by the breakdown of organic matter. However, it should be noted that the containers used for the collection of waste will remain closed at all times in order to avoid odors and not attract possible vectors.

10.11.1.6 Description of the SSystem MAnnex of REchazos.

As mentioned above, waste treatment is not considered, so there is no rejection generation.

10.11.1.7 Plan of VERificación and SEguimiento of the RESiduos SEr TRatas and REchazados.

As mentioned above, waste treatment is not considered.

10.11.1.8 Contingency Plan.

Based on the type of activity to be executed and the technologies to be used, the main risks associated with the project are defined, which in turn are susceptible to affect the environment and cause accidents or emergencies. The contingency plan designed for the project is described below.

i. Objective

The aim of the Contingency Plan, is to have an administrative, organizational and operational tool that allows to respond to eventualities of natural or operative order, by means of the application of Guides of organization and response to optimize the efficiency and efficiency of the actions of Control of the emergency, in order to protect the environment, the infrastructure, the equipment and the human resource involved.

ii. Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external. Also, its application is considered both for the construction stage and throughout the operation.

iii. Development

Contingency situations are those that have a low probability of occurrence, such as failures in works or equipment, failures of operation or natural hazards, which when presented could give rise to a negative environmental impact on the environment.

The types of environmental contingencies considered are:

- Emanating smells.
- Proliferation of sanitary vectors.
- Waste spillage in transport.
- Natural hazards.
- Risk of fire.
- Leach Filtration Risks

1. Description General Measures

In the event of any contingency, the following measures must be taken:

- Notify the competent authorities within 24 hours of the contingency detected.
- Present an action plan to the competent authority.
- Equip the personnel who will assist the contingency with the corresponding personal protective equipment.
- Carry out the corrective actions described for each type of contingency. Maintain a systematized register in which the date, time, duration and specific place where the contingency occurred, responsible personnel, applied actions, duration of the executed works and results obtained are detailed.
- Inform the authorities, the results obtained with respect to the plan presented, causes of the contingency and the additional activities that have been necessary to carry out.

2. Emanating smells.

In the event of an increase in odours in the area of the project other than in the area of non-hazardous solid waste storage, inspection of the area involved and the corresponding cleaning shall be made.

3. Proliferation of sanitary vectors

In the case of a proliferation of vectors, specifically with regard to an excessive propagation of flies from the waste storage area, the following measures shall be taken:

- Immediate withdrawal by an authorized truck of the waste involved will be requested.
- The cleaning and sweeping of the areas involved will be reinforced in order to eliminate any piece of material, where the fly larvae can take refuge and fulfil their propagation cycle.
- Fumigation of installations with dump insecticides (Cypermethrin) and Systematics (Diazinon, Chlorpyrifos) or alternative products of similar effectiveness.

4. Waste spillage in transport

In the case of the occurrence of a spill of RESiduos during the transfer of éHese, with the aim of delivering a dynamic and effective response to avoid polluting the environment Holder will implement a series of actions aimed at minimizing the risk of contamination, some of these are mentioned below:

- Immediately alerted the emergency, the driver, must get off the vehicle and evaluate the fault.
- By inspecting the vehicle and the contour of the site, emergency signs should be placed, such as: Stop triangles, in front of the vehicle and behind it and locate the mobile in a parking position and do not interfere with normal vehicular traffic.

- If the fault is detected, if it is mechanical or hydraulic, the driver must immediately communicate by radio or telephone, to the control unit or to the mechanical maintenance area, the reason for the fault.
- If the emergency detected is due to spillage of liquids or residues, by effect of the system of lift, door or other; The driver must stop to inspect the The Failure, placing the mobile in a parking position and not interfering with normal vehicular traffic and communicating by radio and telephone, to the central or to the maintenance area.
- If the spill occurs on the roadway, the driver must isolate the site from the spill,
- ToLertar to vehicles, place signage and wait until support arrives.
- When support is reached, personnel must evacuate the entire residue throughout the spill area.
- By evacuating the residue, the cleaning of the site should be evaluated, if the dust pollution persists, the place must be repassed, until there is no residue of dust on the surface of the ground.
- Once the emergency has been completed, all road safety elements must be removed, the track completely cleared and at that moment, the central station must be radio-reported at the end of it.

5. Natural hazards

Natural hazards include earthquakes and floods. The following actions are:

- Inspect all Instalac in detaillons, immediately after The event occurred And once the security and accessibility conditions allow.
- Make repairs or reinforcements in the places that require it.

6. Fire hazards

The project envisages implementing the following measures of prevention associated with the risk of a fire.

- To have the advice of a professional in risk prevention, to train the personnel, to carry out and to control the measures presented below.
- Develop a Emergency PlanS fire-fighting.
- Comply with the indicated in the DS 594/00 of the Minsal.
- Train personnel in fire hint and firefighters management.
- Provide, according to the existing risk, the installation of portable extinguishers type ABC.
- Prohibit smoking throughout the premises, with the exception of areas identified in the Office and maintenance sector.

- In the extreme case of a fire in the plant, it is considered:
 - Smother the fire with Earth occupying the heavy machinery available.
 - Request the support of firefighters or fire brigades personnel.
 - Isolate the area of risk and prohibition of entry of persons outside the operation.
 - Take care that people are in the area located in the opposite direction to the wind.
 - Remove items that may Combustionarse of the fire area. If this is impossible, get away from the place and let them burn.

7. Leach Filtration Risks

The handling of non-hazardous industrial waste does not present any risk of leaching. In the case of household waste, these are handled in bags inside airtight containers that will not leak, and these wastes will be removed by authorized trucks periodically.

8. Waste collection Errors

If there are any errors in the process of collecting non-hazardous waste, we will proceed to:

- Check the type of waste to be collected by being checked and taken to the corresponding containers (signposted) or to the salvage yard.
- Track Administrative Of the waste coming out of the project at the final disposal.

10.11.1.9 Emergency Plan.

In emergencies, the most important thing is the timely communication according to the established organization chart and the evacuation of the exposed workers and/or that may interfere in the performance of the chief of the shift and emergency brigade.

i. Objective

The aim of the Emergency Plan, is to have an administrative, organizational and operational tool that allows responding to emergencies, natural or operational order, through the application of organization and response guides to optimize the efficiency and efficiency of the Control actions, in order to protect the environment, infrastructure, equipment and the human resource involved.

ii. Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external.

iii. Development

If an emergency situation is detected In the process GEneral, we will proceed to:

1. Construction Stage:

- The head of the work will be notified immediately who will inform the risk-prevention managers and the Emergency brigade
- Depending on the magnitude of the event, the works will be immediately paralyzed and if applicable, all personnel will be evacuated to safe areas
- In case of accident registration, they will be taken to a specialist in risk prevention and/or emergencies, inspect the area, demarcating the risk areas. The professional will determine what you is convenient About the event that happens. If this is the case, the relevant authorities will be informed.
- Suspension of service by carrier company Responsible.

2. Operation Stage

- Incident Control
- Suspension of service by carrier company Responsible.

During the operation stage, Is will continue to apply the preventive measures Emergency, which will includeN In addition to the measures proposed in this EIA, The indications that in this matter set the RCA.

For situSpecific emergency stirrupss, such as fires, spills, among others, the plan of Action described in the section shall be implemented 10.11.1.8, Contingency Plan. It is also considered in a timely manner, in cases of fire and proliferation of Vectors The following:

a) Fire hazards

In case of emergency of fireGave We will proceed to:

- Assess the level of fire severity to inform firefighters immediately.
- Avoid, whenever possible, that the fire is propagated to other sectors of the project by combating fire (avoiding risk) with the available extinguishing means (extinguishers).
- If it is not possible to control the fire, proceed to evacuate the enclosure and confirm the presence of the nearest fire brigade, giving the background of the waste involved and the respective safety sheets if they exist.

b) Proliferation of sanitary vectors

In the case of a proliferation of sanitary vectors, it shall be:

- Immediate withdrawal by an authorized truck of the waste involved will be requested.
- The cleaning and sweeping of the areas involved will be reinforced in order to eliminate any piece of material, where the fly larvae can take refuge and fulfil their propagation cycle.

10.11.2 In the case of ToStorage REsiduos

10.11.2.1 Specifications TÉCNicas of the CAracterísticas CONstructivas of the Siege of AStorage and MEasures QEnvironmental protection CConditions ToMbiales

Both domestic and non-hazardous industrial waste will be stored in a common yard Destined for that purpose, being Stored each type of waste In an orderly and segregated manner. Each storage sector will be defined According to the PR stageOyecto and corresponding sector:

i. Construction stage

- Waste yard Domestic and Industrial Non-hazardous, coastal Sector: Located at One side of the FA installationEna and will have a surface of 200 m².
- Waste yard Domestic and Industrial Non-hazardous, Sector Costa – San Marcos: Surface of 500 m².
- Waste yard Domestic and Industrial Non-hazardous, coastal Sector – Dry River: Surface of 200 m².
- Waste yard Domestic and Industrial, Plateau Sector: Located on the side of the slaughter plant and will have a surface of 500 m².

ii. Operation Stage

- Waste yard Domestic and Industrial Non-hazardous, coastal Sector, Located next to the workshop building, winery and group Diesel, from Dimensions of 2 x 3 M.

These PATioS of waste storage Domestic and Non-hazardous industrial WillIN with Perimeter closure of at least 1.80 meters high, which impedes the free access of animals. It will be installed on compacted soil and shall have gaps (movable barriers) to order the different wastes, according to type, with their respective signage. The Patio de salvage will have restricted access, in terms that can only be entered by personnel duly authorized by the person responsible.

10.11.2.2 Capacity MÁxima ToStorage.

The storage site shall be constructed with a maximum waste storage capacity exceeding 120% of the capacity presented in this permit.

10.11.2.3 Description of the TIPO of ToStorage TAles as To GRanel or in COntenedores.

i. Household or assimilated household waste

- **Construction stage**

The waste generated on the work fronts will be collected in garbage bags preferably "biodegradable" or in closed containers, and then transported from their origin to the places of collection in the facilities of slaughter. In all the facilities of slaughter, there will be an area destined to the temporary collection in plastic or metallic containers, duly labelled and covered.

These wastes will be transported to lugAres authorized by the respective health care, with a frequency of once a week in normal conditions and twice a week in conditions of maximum generation, so as to avoid the Garbage accumulation in slaughter.

- **Operation Stage**

The domestic solid waste generated during the operation stage will be stored in containers with ad hoc lids. The content accumulated in these containers will be transported to an authorized landfill. The retreat will be done at least one seesZ Per week, but in the course of the operation it will be possible to define a period according to the production of waste.

ii. Non-hazardous industrial waste

- **Construction stage**

Non-hazardous industrial waste will be stored neatly in the non-hazardous waste collection yard until shipment to final destination, which depends on its potential recycling. The waste will be classified and subsequently marketed through different companies authorized to recycle and/or recover the different types of waste.

The irons will be deposited in containers and selected those that are recyclable to be delivered to authorized and certified company that dedicates to the recycling of iron. With respect to the wood generated in the field, This Will be selected according to your possibility of reuse, Gathered in an orderly and packed form PFor later use in the work. If possible, and prior authorisation by the health care, the remaining wood May be DONada To The inhabitants of the sector Or Not bad To the project workers themselves.

The signage will be adequate to identify the materials that can be reused. The storage will be in bulk.

- **Operation Stage**

All these wastes They will be segregated at the origin and sent to yard of non-hazardous waste for storage, Privilegiando The recycling of These. That Non-feasible recycle fraction, will be sent for your Final disposition To companyS AuthorizedS, With a frequency of once a month.

10.12. Mixed sectoral environmental Permit 140 Various sectors

Permission for the construction, repair, modification and extension of any waste and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or disposal End of rubbish and waste of any kind.

Permission for the construction, repair, modification and extension of any waste and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or disposal End of rubbish and waste of any kind, will be the established in articles 79 ° and 80 ° of D.F. L N ° 725, of 1967, of the Ministry of Public Health, health Code, and provided that the application of another sectoral environmental permit is not appropriate for the same action.

The Temporary storage of non-hazardous domestic and industrial waste generated by the project, both for its construction and operation Stage, and subsequently its Submission to the authorized final disposition requires the granting of this sectoral environmental permit.

The project includes the implementation of five Excavation Material, whose main objective is to Collect Waste from the Extracted marine and surplus materials of the excavations in LDifferent fronts of work. This material shall be made solely of sand, dirt and stones, not constituting any risk of contamination for the disposal sector.

The technical and formal contents to be presented in order to certify compliance are as follows:

10.12.1 Background General

10.12.1.1 Description and QLanos of the Site

In the project are distinguished 5 sectors where they will carry out the works necessary for their operation, these are:

- Submarine Sector
- Underground Sector
- Sector Costa
- Plateau Sector (access road and Reservoir)

- Pampa Sector (LTE)

During the construction stage are considered different excavation activities associated with the implementation of the works that compose the project. The material generated will be deposited in 5 storage sectors, which as mentioned above, have as Main objective collect the waste from the Extracted marine and surplus materials of the excavations in LDifferent fronts of work. This material will be transported through hopper trucks, from the points of excavation, to the indicated billets. Its construction is considered in terraces of 5 m of height, with steps 2 m each, and with a inclination of 5:1. It is estimated that with two terraces will suffice.

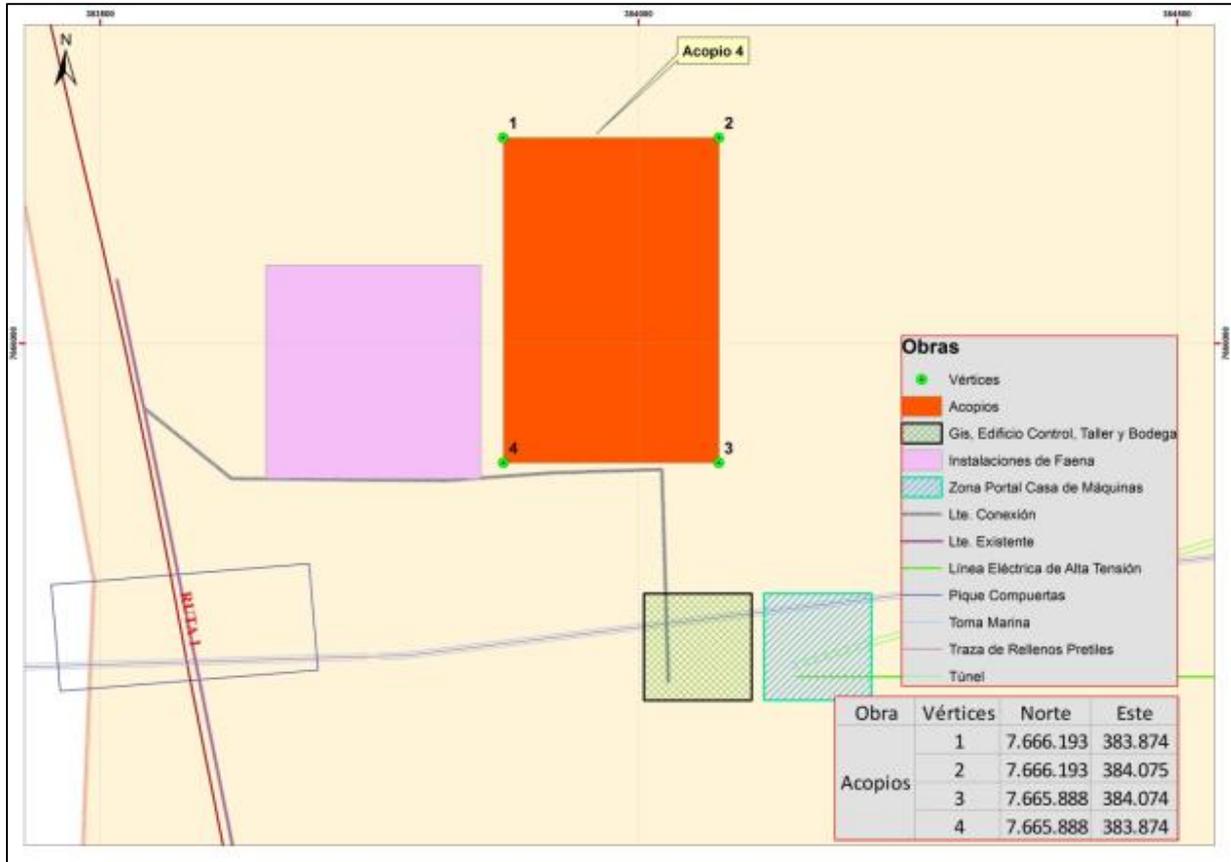
The 5 items of Material of excavations will be distributed in the coastal sector and the plateau sector, as detailed in the following table.

Table 10-29: Coordinates in Datum WGS84 H19S.

| Sector | Collection | North | This | Surface (HA) | Location |
|---------|------------------------|-----------|---------|--------------|--|
| Coast | Near Caleta San Marcos | 7,666.193 | 383.874 | 4.00 | Administration and Control Building Sector |
| | | 7,666.193 | 384,075 | | |
| | | 7,665.888 | 384,074 | | |
| | | 7,665.888 | 383.874 | | |
| | Near Rio Seco | 7.678.603 | 380.160 | 2.04 | Dry River Sector |
| | | 7.678.574 | 380.303 | | |
| | | 7.678.437 | 380.276 | | |
| | | 7.678.468 | 380.131 | | |
| Plateau | 1 | 7,667,302 | 386,703 | 4.4 | North of the West Reservoir |
| | | 7,667,443 | 386,778 | | |
| | | 7,667,314 | 387,020 | | |
| | | 7,667,172 | 386,945 | | |
| | 2 | 7,665,304 | 386,598 | 4.6 | South of the West Reservoir |
| | | 7,665,219 | 386,990 | | |
| | | 7,665,106 | 386,965 | | |
| | | 7,665,192 | 386,573 | | |
| | 3 | 7,665,936 | 386,175 | 11 | East of the West Reservoir |
| | | 7,665,766 | 386,207 | | |
| | | 7,665,375 | 386,382 | | |
| | | 7,665,295 | 386,243 | | |
| | | 7,665,592 | 386,069 | | |
| | | 7,665,894 | 386,015 | | |

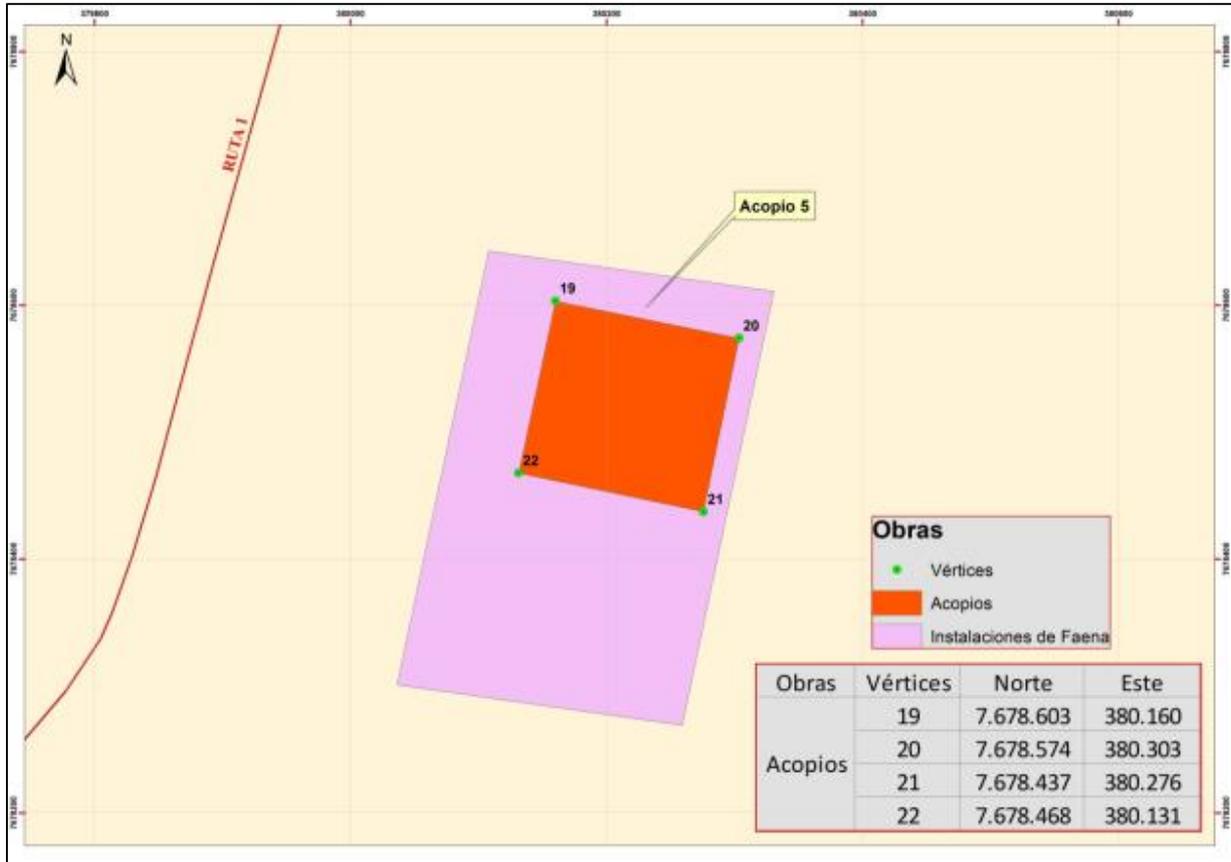
Source: Self-elaboration

Figure 10-44: Location Collection Sector San Marcos sector Costa.



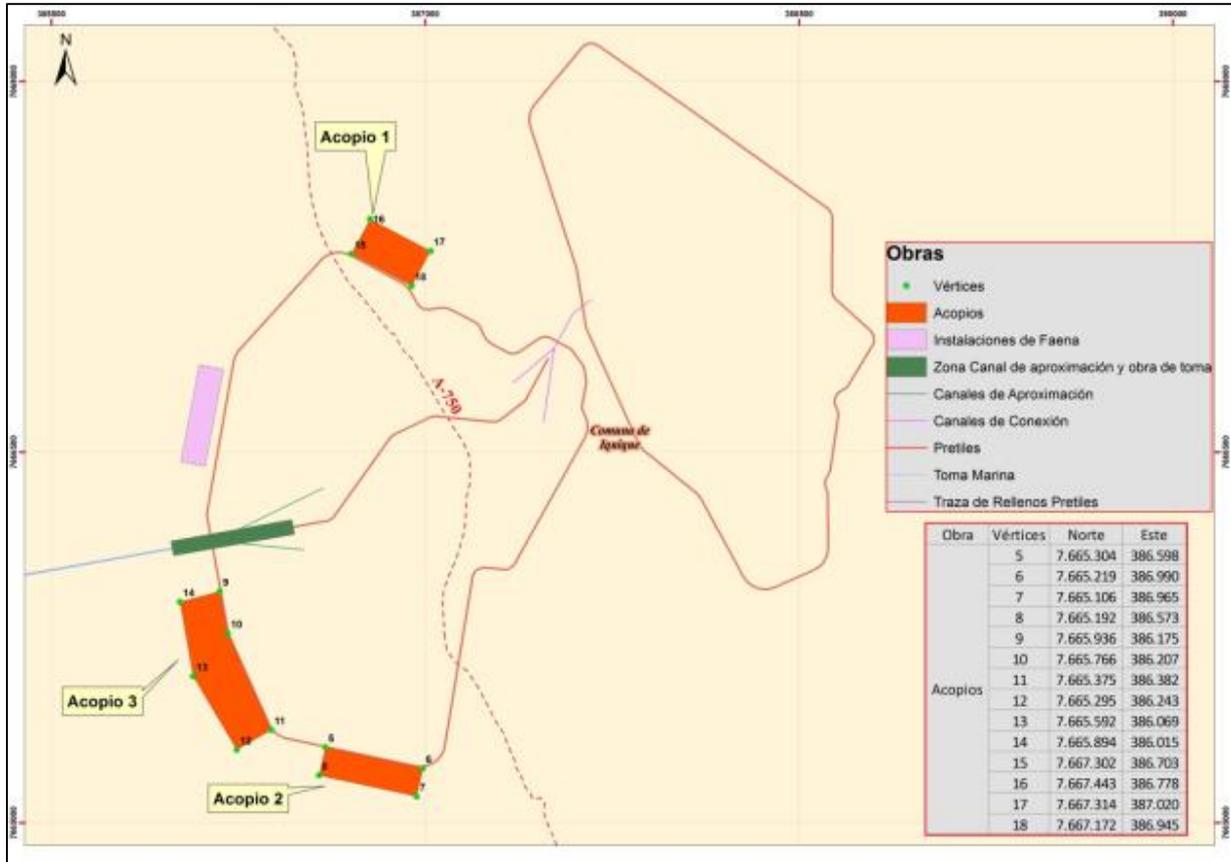
Source: Self-elaboration.

Figure 10-45: Location Dry river Sector Collection sector Costa.



Source: Self-elaboration.

Figure 10-46: Location of Billets Plateau Sector.



Source: Self-elaboration.

10.12.1.2 Description of Meteorological Variables

LA meteorological variables obtained from the records of the Central internal meteorological station, in the period between December 2007 and March 2010, are presented below:

Table 10-30: Meteorological Variables Central Indoor Station (12/2007 – 03/2010)

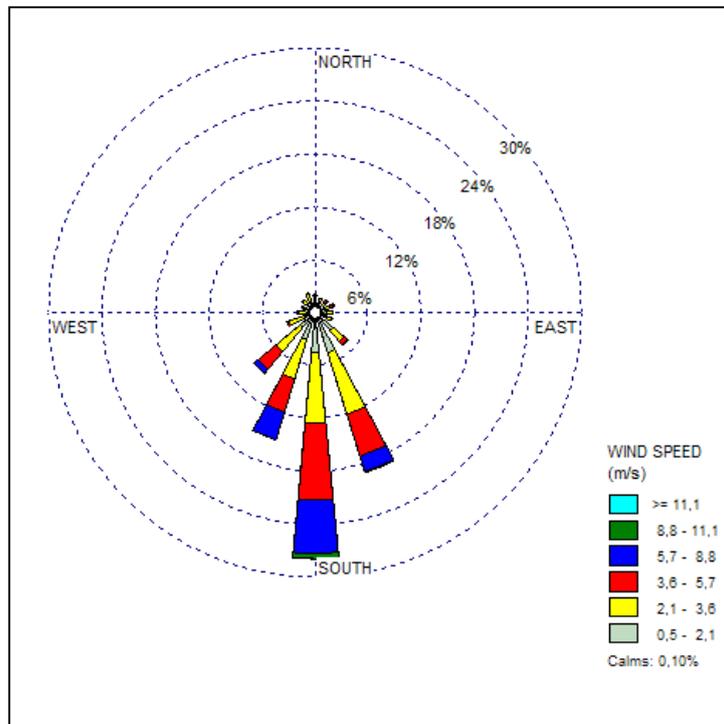
| Variable | Value |
|----------------------------------|--|
| Wind speed (m/s) | |
| Average period | 3.22 |
| Maximum Value | 11.9 |
| Minimum value | 0.4 |
| Percentage of calms ⁵ | 0.10 |
| Wind Direction | |
| AddressOrNIs PredominantlyS | S (23.29%), SSE (15.89%), SSW (12.63%) |

Source: Central Indoor Weather Station

The following figure Presents the Wind Rose Accumulated for the period between The months of December 2007 to March 2010.

Figure 10-47: Rosa de los Vientos Interior Central Station

⁵ Porcentaje de calma: porcentaje del tiempo en que la velocidad del viento es menor a 0,5 m/s.



Source: Self-elaboration -Central station inside.

The winds show predominantly well defined direction for the period of registration, presenting average speed of 3.22 m/s and a 0.1% of calms. The fact that the percentage of calm is low, indicates that the air in the area shows dispersion capacity. The maximum hourly speed of the wind recorded for this period is 11.9 m/s.

The wind in this sector possesses components of predominant direction S, SSE, SSW, SW, ESE and WSW in 66, 1% of the time, indicating a direction of the wind very defined.

10.12.1.3 Estimation and CAracterización CUALitativa and CUantitativa of the RESiduos TRatar

As mentioned above, the Material Deposited in the collection sectors It will correspond exclusively to sand, Earth and stones, Product of the different excavation activities developed throughout the project, Not constituting any risk of contamination for the disposal sector.

The following table shows the characteristics of surface, capacity and structure for each collection of excavation materials.

Table 10-31: Characterization of excavation Material

| Collection of excavation materials | Surface (HA) | Capacity (M ³) | Structure |
|--|------------------|-------------------------------------|---|
| Costa Sector: • Near Caleta San Marcos • Near Rio Seco | 4 2 | 960,600 472,800 | Built by 5 terraces 5 m high with steps of 2 m. |
| Plateau Sector: • Gathering 1 • Gathering 2 • Gathering 3 | 4.4 4.6 11 | 1,058,600 1,107,600 2,686,200 | |

Source: Self-elaboration.

10.12.1.4 Design of the QLanta de TRat that INcluya Diagrama FLuxury and the UClutches and Equipamiento

Considering the nature of the collection sectors, and that these correspond to deposits of excavation material, it does not apply the implementation of a treatment plant for its management.

10.12.1.5 Forms of ToPaddling EMISSIONS and CONTROL and MANnex of RESIDUOS

- **Emissions**

In relation to the implementation of the collection sectors, the main associated effect is the generation of emissions, The That will come from both the constructionÉHese, as of its Maintenance throughout the project operation.

To mitigate the above-mentioned emissions, the implementation of a program of periodic humidification and compaction is envisaged, which allows to minimise the atmospheric emissions associated to these sectors. The development of this program will have a record of each humidification and compaction made, which is available if required by the corresponding authority.

- **Noise**

For the construction stage, the emissions inventory is presented Of Noise Due to The ActividAdes made by the project.

For the Operation stage, It is anticipated the temporary generation of noise emissions, associated with the implementation of the Humidification and compaction program, which will be carried out periodically and will have a limited duration in time.

- **Vibrations**

As with noise emissions, there will be vibrations associated with the implementation of the program of Humidification and compaction, which will be periodic and limited in the tempo.

10.12.1.6 Description of the SSystem MAnnex of REchazos.

As mentioned above, waste treatment is not considered, so there is no rejection generation.

10.12.1.7 Plan of Verification and SEguimiento of the RESiduos SEr TRatas and REchazados.

As mentioned above, waste treatment is not considered.

10.12.1.8 Contingency Plan.

Based on the type of activity to be executed and the technologies to be used, the main risks associated with the project are defined, which in turn are susceptible to affect the environment and cause accidents or emergencies. The contingency plan designed for the project is described below.

i. Objective

The aim of the Contingency Plan, is to have an administrative, organizational and operational tool that allows to respond to eventualities of natural or operative order, by means of the application of Guides of organization and response to optimize the efficiency and efficiency of the actions of Control of the emergency, in order to protect the environment, the infrastructure, the equipment and the human resource involved.

ii. Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external. Also, its application is considered both for the construction stage and throughout the operation.

iii. Development

Contingency situations are those that have a low probability of occurrence, such as failures in works or equipment, failures of operation or natural hazards, which when presented could give rise to a negative environmental impact on the environment.

The types of environmental contingencies considered For the collection sectors Are:

- Landslides
- Natural hazards.

1. Description General Measures

In the event of any contingency, the following measures must be taken:

- Notify the competent authorities within 24 hours of the contingency detected.
- Present an action plan to the competent authority.
- Equip the personnel who will assist the contingency with the corresponding personal protective equipment.
- Carry out the corrective actions described for each type of contingency. Maintain a systematized register in which the date, time, duration and specific place where the contingency occurred, responsible personnel, applied actions, duration of the executed works and results obtained are detailed.
- Inform the authorities, the results obtained with respect to the plan presented, causes of the contingency and the additional activities that have been necessary to carry out.

2. Landslides

If the test is detected occurrence of a landslide, the following actions are:

- Immediately evacuate the affected area.
- Give notice to the area of administration/operations on the possibility of occurrence of a landslide.
- Identify the sectors that are in a position to yield imminently.
- Depending on the magnitude of the collapse, give notice immediately to the competent authorities
- Analyze whether to raise a retaining wall to avoid the occurrence of the collapse.

3. Natural hazards

Natural hazards include earthquakes and floods. The following actions are:

- Inspect all installations in detail immediately after the event.
- Make repairs or reinforcements in the places that require it.

10.12.1.9 Emergency Plan.

In emergencies, the most important thing is the timely communication according to the established organization chart and the evacuation of the exposed workers and/or that may interfere in the performance of the chief of the shift and emergency brigade.

i. Objective

The aim of the Emergency Plan, is to have an administrative, organizational and operational tool that allows responding to emergencies, natural or operational order, through the application of organization and response guides to optimize the efficiency and efficiency of the Control actions, in order to protect the environment, infrastructure, equipment and the human resource involved.

ii. Reach

The present Plan is applicable To all staff Working in construction and Project operation, Whether personal contracted by the holding company, subcontracts and external.

iii. Development

If an emergency situation is detected in the general process, it shall be:

- The head of the work will be notified immediately who will inform the risk-prevention managers and the Emergency brigade
- Depending on the magnitude of the event, the works will be immediately paralyzed and if applicable, all personnel will be evacuated to safe areas
- In case of accident registration, they will be taken to a specialist in risk prevention and/or emergencies, inspect the area, demarcating the risk areas. The professional will determine What you is convenient About the event that happens. If this is the case, the relevant authorities will be informed.
- Suspension of service by carrier company

During the operation stage, Is will continue to apply the preventive measures Emergency, which will includeN In addition to the measures proposed in this EIA, The indications that in this matter set the RCA.

Along with the Contingency Plan And emergencies described, the project has a Contingency and emergency prevention Plan For the project in its globality, which is described in Chapter 8 of this EIA.

10.12.2 In the case of ToStorage REsiduos

10.12.2.1 Specifications TÉCNICAS of the CARacterísticas CONstructivas of the Slte ToStorage and MEasures QEnvironmental protection CConditions ToMbiales

As already mentioned, the present PAS is requested for the habilitation of 5 sectors of collection Whose Main objective collect the waste from the Extracted marine and surplus materials of the excavations in LDifferent fronts of work. This material will be transported through hopper trucks, from the points of excavation, to the indicated billets. Its construction is considered in terraces of 5 m of height, with steps 2 m each, and with a inclination of 5:1. It is estimated that with two terraces will suffice.

10.12.2.2 Capacity MÁxima ToStorage.

The surface, capacity and structure characteristics for each collection of excavation materials are detailed in the Table 10-31 Described in the section 10.12.1.3.

10.12.2.3 Description of the TIPO of ToStorage TAles as To GRanel or in COntenedores.

The collection sectors covered will correspond To terraces of 5 m of height, with steps 2 m each, and with a inclination of 5:1. It is estimated that with two terraces will suffice.

10.13. Mixed sectoral environmental Permit 142

Permission to Any site intended for the storage of hazardous waste

The permit for hazardous waste storage sites, Be That established in article 29 of DS No 148, of 2003, of the Ministry of Health, sanitary regulations on the handling of hazardous wastes.

The requirement for its granting consists In That the storage of waste in a site Do not affect the quality of water, soil and air that may endanger the health of the population.

The activities of the project, both in construction and operation stage, will generate hazardous industrial waste that is to be stored in hazardous waste warehouses, for which the mixed sectoral environmental permit is requested, established in the Article 142 of the Regulation of the Environmental Impact System (DS) No 40/2012.

The technical and formal contents to be presented in order to certify compliance are as follows:

10.13.1 Description of the Site ToStorage

The project will enable warehouses for temporary storage of hazardous waste that Will be located In:

- Warehouses for temporary storage of hazardous waste, construction stage.
 - Control and administration Building, Sector, with an area of 4 M².
 - Facility, the plateau Sector, with an area of 4 M².
- Bodega de Hazardous waste storage, Operation stage.

During the operation phase, the winery implemented in the Control and administration building, described for the Costa Sector, will continue to be used.

Then in the Table 10-32, the surface and location of the wineries described above are indicated.

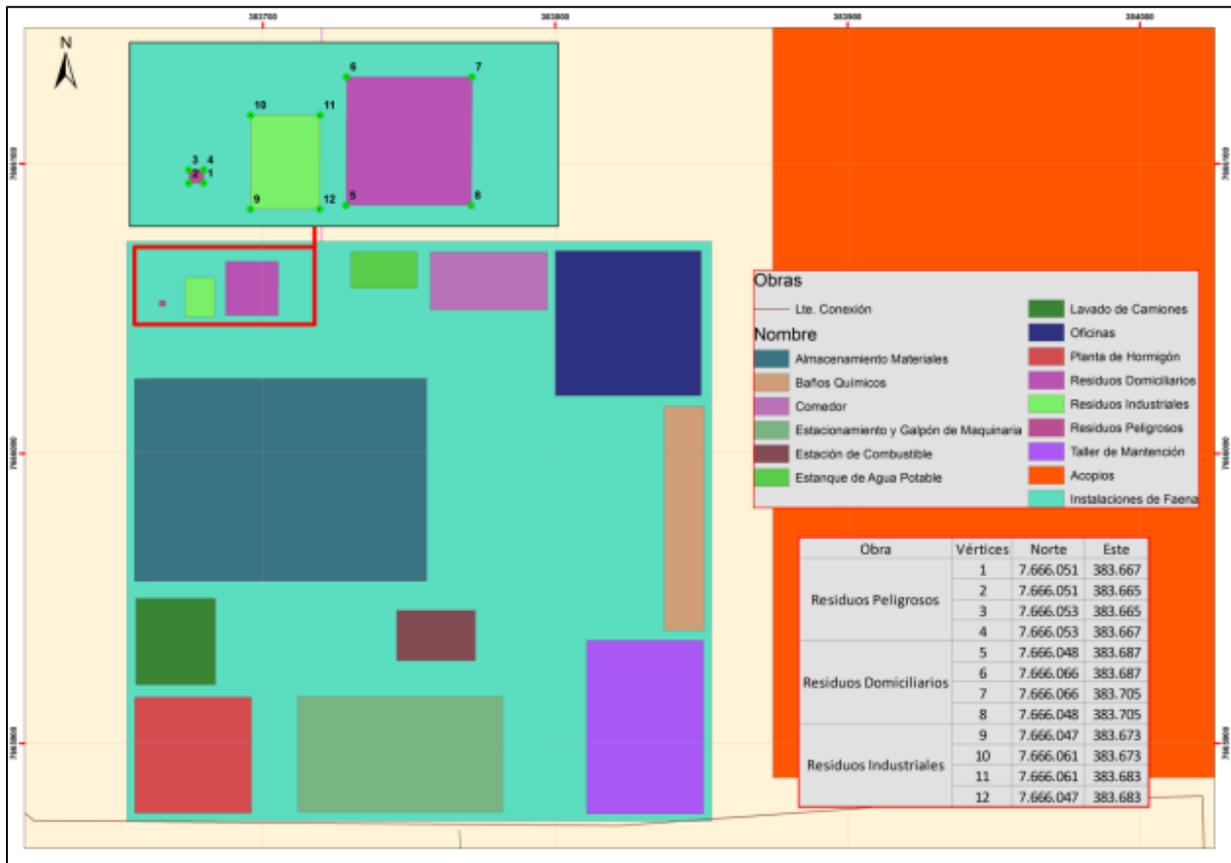
Table 10-32: Location Bodegas de ToStorage REsiduos QEliguos

| Stage | Name | Sector | Surface (M ²) |
|------------------------|-------------------------------------|--------|---------------------------|
| Construction/Operation | Warehouses for temporary storage of | Coast | 4 |

| | | | |
|--------------|---|---------|---|
| | hazardous waste San Marcos | | |
| Construction | Warehouses for temporary storage of hazardous waste reservoir | Plateau | 4 |

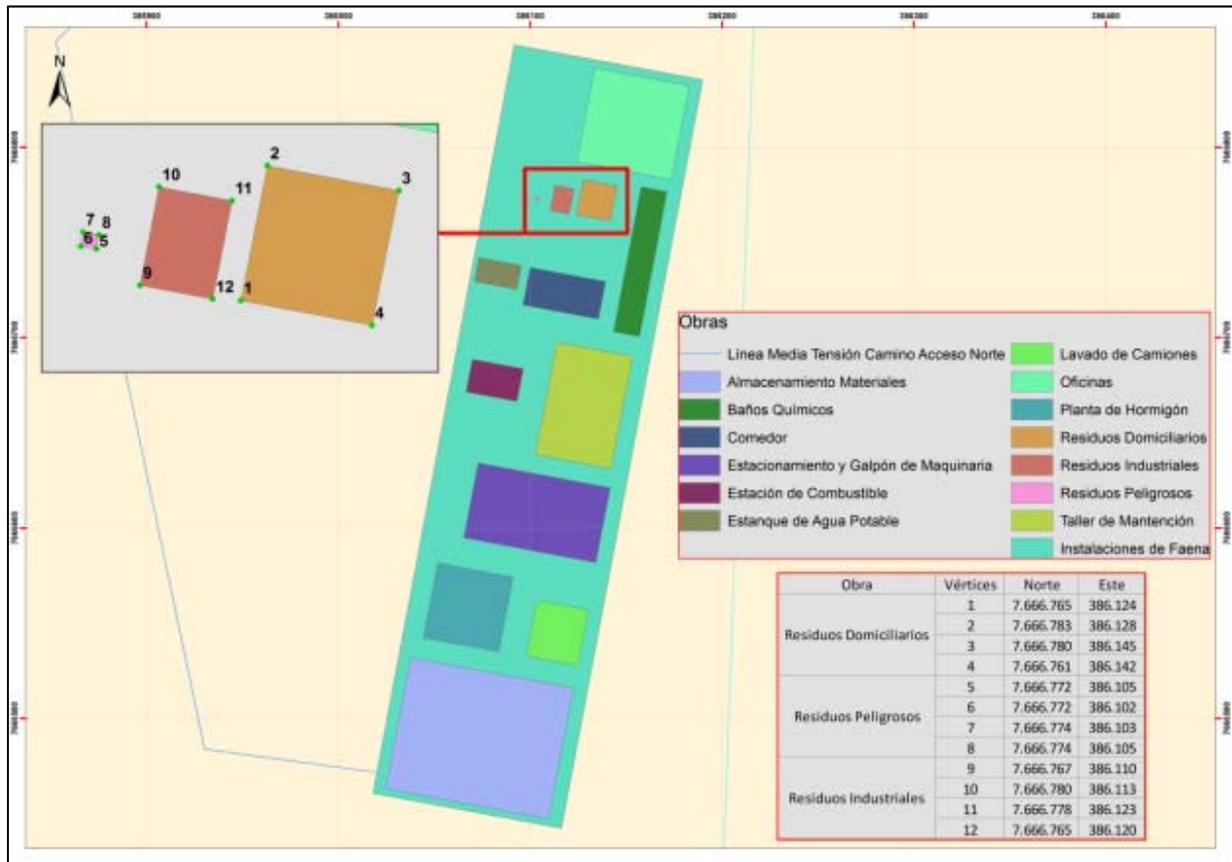
Source: Self-elaboration

Figure 10-48: Hazardous waste warehouses. IF San Marcos. Sector Costa.



Source: Self-elaboration

Figure 10-49: Hazardous waste warehouses. IF Reservoir. Plateau Sector.



Source: Self-elaboration

10.13.2 Specifications TÉCNicas CARacterísticas CONstructivas of the Siege of AStorage and Measures of PEnvironmental protection CConditions ToMBientales

The hazardous industrial waste that will be generated for each stage of the project will be stored in wineries especially for this purpose, as indicated in DS No. 148/2003 of the Ministry of Health. During the construction stage, these residues will be stored in drums duly labeled and sealed, in a place specially equipped for a safe temporary collection in the facilities of slaughters complying with all the corresponding legislation.

The following considerations shall be taken for the proper collection of hazardous waste:

- A place specially constructed for the temporary storage of hazardous waste shall be provided, which shall be designed and located in such a way as to the possibility of an emergency does not endanger persons, environment and facilities Own.
- This place will be a closed enclosure with frames and steel mesh of 2.20 m, which shall have a floor of Radier of cement with spill-catching pit for oils. The roof will be covered with zinc plates that cover the entire enclosure and must protrude at least 30 cm, on all sides.
- The sectors of temporary collection of hazardous waste will be signposted according to type of waste, that is: batteries, oils, lubricants and fats.
- At least one ABC multi-purpose extinguisher of 10 kg plus a bucket of sand will be installed. (Kit Spill)
- Entry into the area will be kept closed and controlled by authorized personnel.
- Inventory Control will be carried out for both the income and the exits of hazardous waste.
- The corresponding safety sheets will be counted.

The frequency of removal of hazardous wastes will depend on the amount generated and the issuance of the permits necessary to remove the waste to its final destination not exceeding 6 months of temporary storage. Hazardous waste will be finally arranged by an authorized company to whom the transfer service and final disposition will be hired. In order to maintain control over the transport and disposal of hazardous waste, a chain of custody shall be implemented, requiring proof of disposal of waste in authorized facilities.

10.13.3 Kind of RESiduos, CANTidades, CCapacity MÁxima and QERíodo ToStorage

The waste generated, for each stage of the project, will be classified as dangerous according to DS N ° 148/2003 of the Ministry of Health, whose type, quantity and place of storage per stage is presented in the following table:

Table 10-33 Type CAmount and LUgar ToStorage RESiduos INdustriales QEligrosos

| Project Stage | Type of waste | Quantity (ton/month) | Storage Place |
|---------------|---|----------------------|---|
| Construction | ToCeites, lubricants, greases, batteries, empty paint drums, printer toner, brushes, batteries, oil filters, contaminated gloves, etc.. | 0.95 | Warehouse temporary storage of hazardous waste from the coastal sector and the plateau sector |
| Operation | Oils and used lubricants, oiled rags, tubes Fluorescent Used, etc. | 0.2 | Warehouse hazardous waste storage sector Costa |

Likewise, the Table 10-34 Indicates a Detailed description of the waste to be stored, Including The type of residue, the state (solid or liquid), danger characteristic, and its classification As indicated in list I, II Or II (article 18) and Code of List A (article 19), both of the DS No. 148/2003 "sanitary regulations on hazardous waste management", in addition to the type of container for each type of waste.

Table 10-34: Classification RESiduos INdustriales QEligrosos, EtApa CConstruction and OrPeration

| Type of waste | State | Danger characteristic | List code I, II or II (article 18, DS 148/2003) | Code from List A (article 19, DS 148/2003) |
|---|--------|-----------------------|---|--|
| Oils and fats, cloths and guaipe, materials contaminated with oils and fats fats. | Solid | Toxic | I. 18/III. 2 | A3020 |
| Solvents and Paints | Liquid | Flammable | I. 12 | A4070 |
| Plastic and metal containers | Solid | Toxic | III. 2 | A3020 |
| Batteries and Batteries | Solid | Toxic corrosive | II. 13/III. 2 | A1160/A1170 |
| Disposal of chemical products | Solid | Toxic | III. 2 | A4130 |
| Toner | Solid | Toxic | I. 12 | A1020 |

Source: Self-elaboration.

As for the maximum storage capacity, this will be greater than the 120% capacity presented in this permit and the maximum storage period shall not exceed 6 months.

10.13.4 Measures to Minimize Mechanisms What Remain to Affect the Quality of the ToGua Tolre SLure that QOngaN In Riesgo the SAvalanche of the QOblation

No special measures are considered to minimize any mechanism that could affect water, because there are no surface channels or water runoff in the sector.

In relation to the affectation of the air quality, it is considered the humidification of roads.

It should be noted that the storage of hazardous waste will be carried out on a continuous, waterproof and structurally and chemically resistant basis to waste, so that the soil will not be affected. It should also be noted that the containers will remain permanent and duly labelled, complying with the applicable regulations. Without prejudice to the above, a visual inspection will be carried out once a month to the ground around the place of storage to confirm that there have been no alterations to the quality of the soil.

Finally, in relation to the risk of the health of the population, it is noted that in area of influence of the project there is no population susceptible of being affected.

10.13.5 Capacity Retención Escurrimientos or Derrames, Site ToStorage

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.

10.13.6 Contingency Plan

If there are any errors in the storage of hazardous wastes, it shall be:

- Check the type of residue that arrives at the place of storage of hazardous waste
- If it is not stored, take it to the corresponding containers (signposted) or to the storage site.
- If the hazardous waste came into contact with other wastes and contaminates them, they should also be considered hazardous.
- Track waste coming out of the project at the final disposal.

In the event of a Spill event The following actions and control measures shall be carried out:

- Act according to the type of product spilled and/or safety card
- Clearing and delimiting the affected area
- Do not touch or tread on the spilled substance
- Initiate the actions to control the spill or stop the leak until the arrival of aid if it was required, using the absorbent elements arranged in the sector.

- Surround the spill with a parapet of earth, sand, or any other element within reach that allows its displacement. Full absorption of the liquid by the absorbent material must be expected before starting the collection.
- Once the control tasks have been completed, collect the materials and/or products used for the control of the spill and if the case is the layer of contaminated soil, with shovel and wheelbarrow.
- Deposit this material in closed containers, drums or containers.
- Subsequently store it temporarily in the booths for hazardous waste, for subsequent withdrawal by the company contracted for the handling of the corresponding waste.
- Replace the affected area with clean material.
- Record the amount of waste generated, date of storage and date of removal of the plant.

10.13.7 Emergency Plan

In emergencies, the most important thing is the timely communication according to the established organization chart and the evacuation of the exposed workers and/or that may interfere in the performance of the chief of the shift and emergency brigade.

Thus, if an emergency situation is detected in the general process, it shall be:

- The communications Plan will be activated, which specifies, depending on the magnitude of the accident, to whom to report.
- A restriction area will be immediately delimited, where only trained personnel can enter.
- Trained personnel, inspect the site of the accident, verifying that there are no injuries in the area.
- In case of registering injured by this accident, they will be taken to a care center.
- A specialist in risk prevention, will inspect the area, demarcating the areas of risk. The professional will determine if it is advisable to relocate the facilities. If this is the case, the relevant authorities will be informed.

In particular, for each stage of development, it is envisaged:

Construction Stage:

- The head of the work will be notified immediately who will inform the risk-prevention managers and the Emergency brigade
- Depending on the magnitude of the event, the works will be immediately paralyzed and if applicable, all personnel will be evacuated to safe areas.
- The communications Plan will be activated, which specifies, depending on the magnitude of the accident, to whom to report.
- A restriction area will be immediately delimited, where only trained personnel can enter.
- Trained personnel, inspect the site of the accident, verifying that they are not affected in the area.
- In case of registration affected by this accident, they will be taken to a care center.
- A specialist in risk prevention and/or emergencies, will inspect the area, demarcating the areas of risk. The professional will determine if it is advisable to relocate the facilities. If this is the case, the relevant authorities will be informed.

Operation Stage:

During the operation phase, risk and contingency measures will continue to be applied, which shall include in addition to the measures proposed in this EIA the indications set out in this field by the RCA.

10.14. Mixed sectoral Environmental Permit 146

Permission for the hunting or capture of specimens of animals of protected species for research purposes, for the establishment of breeding centres or breeding grounds and for the sustainable use of the resource.

The impact assessment of the "Espejo de Tarapacá" project assessed the "loss of specimens" of the reptile group as being moderately significant, which is why a rescue Plan and relocation of individuals has been formulated. Of *Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus*.

Since such a measure requires the capture of⁶ of specimens, its execution is regulated by the Law of Hunting (Law n° 19.473/1996). Consequently, the joint sectoral environmental permit No. 146 (PASM 146) is applicable.

It is worth mentioning that although this document presents all the necessary antecedents for obtaining such sectoral environmental permit, the execution of the measure shall be subject to the obtaining of the corresponding catch permit, referred to in the Article 9 of the Hunting law.

However, it is intended to protect the local populations of the affected species, complying with the current regulations and minimizing the impact of the project on the fauna component.

10.14.1 Description General

The present "rescue and relocation Plan" consists of the translocation of individuals from two threatened and low-mobility species (*Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus*), From specific sectors located in the reservoir, in areas where the reptile species' findings were made.

The application of this measure is intended to Avoid the direct death of specimens and the deterioration of local populations.

The catches will be carried out by a team with experience in wildlife management, led by a professional specialist in the field. In order to decrease the probability of recolonization, these will be carried out in a near-time to the intervention of the area to be released.

The activities shall be carried out following the obtaining of the catch permit granted by the competent authority and in conformity with the requirements established by it.

10.14.2 Objective

The objective of the measure is to avoid the loss of copies by relocation in an area that will not be intervened by the execution of the project, so as to Increase the abundance of existing populations in this area.

10.14.3 Species SEXo and NUmber EJemplares CTo be

10.14.3.1 Species

The species that will be subject to the measure are detailed in the Table 10-35.

⁶ La Ley de Caza (Ley n° 19.473/1996) define "Captura" como el apoderamiento de animales silvestres vivos.

Table 10-35: Species subject to rescue Plan and relocation

| Class | Species | Common name | Origin | Conservation Category | |
|----------|-----------------------------------|--------------------------|--------|-----------------------|------|
| | | | | Hunting Law | Cers |
| Reptiles | <i>Liolaemus Stolzmanni</i> | Dragon of Stolzmann | E | Ic | - |
| | <i>Phyllodactylus Gerrhopygus</i> | Large North Salamanqueja | N | Vu | - |

Source: Self-elaboration.

10.14.3.2 Sex

The measure considers the capture of copies of both sexes.

10.14.3.3 Number of Ejemplares Captura

It will capture 100% of the specimens found in the Sectors where the rescue will take place.

10.1.1.1 Background Biológicos of the ESpecies

i. *Liolaemus Stolzmanni*

The Dragon of Stolzmann It is a reptile belonging to the genus *Liolaemus*, although given its morphological and behavioural peculiarities, it was considered for a long time within the genus *Phrynosaura*. It is a species that inhabits the absolute desert environment, but apparently it is associated with Tilandsiales and Oasis of Fog. Its distribution is Even Poorly understood, however, has recently been described its presence in a number of sites between Guatalaya (near Iquique, Región de Tarapacá) and Hornitos (Antofagasta region), through a mainly coastal distribution with certain interior projections. Its conservation category is inadequately known, According to the rules of the hunting law.

ii. *Phyllodactylus Gerrhopygus*

The large North Salamanqueja is a reptile of nocturnal habits, which is distributed from the surroundings of Lima, Peru, to the sector of Paposos (Antofagasta region). It has a preference for desert-type habitat, although in Peru it occupies areas with abundant Vegetation. Their diet is mainly formed by insects (Coleóptera, Dermáptera, Díptera and Crustacea). In the country, it is considered Vulnerable, according to the rules of the hunting law.

10.14.4 Methodology of Captura

Because the general conditions of the habitat determine the presence of the individuals of fauna in general, and of the reptiles in particular, rescue efforts will be developed only in specific sectors of the zone of sighting. This methodological approach is consistent in the rest with the

baseline sampling strategy, since it was focused on a targeted search, associated among others with sand stones or substrates. In this way, the rescues of individuals will be made in the Microhabitat Where the 2 species of this kind of vertebrates were sighted (or the bibliography indicate). The above is intended to increase the likelihood that the development of this Protocol would be effective and efficient. Regarding the foregoing, Ruiz de Gamboa & Ferrú (2013)⁷ They point out that *Liolaemus Stolzmanni* It is a species associated with different types of vegetation (E.g: Tillandsiales, Oasis of Fog, etc.), so that the sighting in the project frame (in the absence of vegetation), can be rather an uncommon case and therefore it becomes more important that the rescue be directed. The same situation would occur with *Phyllodactylus Gerrhopygus*, for whom Pérez & Balta (2011)⁸, indicate a similar condition in Peru. Nick (in preparation)⁹, corroborates the aforementioned, validating this condition for Chile.

It should be mentioned that in order to avoid recolonization of the rescued area, the time between the rescues and the start of the works should be as short as possible.

As already mentioned, the implementation of this measure and certain methodological details will ultimately be defined by technical aspects specified in the exempt resolution authorizing the capture work.

10.14.4.1 Capture MAnnual

This technique will be used to capture the species *Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus*.

Its implementation will consist in the active search of specimens of these species, in their potential shelters. The captured specimens will be held captive, transported and finally released.

⁷ Ruiz De Gamboa M & M Ferrú (2013). *Liolaemus stolzmanni* (Steindachner, 1891) (Squamata: Liolaemidae): Distribution update. Check List 9(5): 1067–1069, 2013

⁸ Pérez J & K Balta (2011). Ecología de *Phyllodactylus angustidigitus* y *P. gerrhopygus* (Squamata: Phyllodactylidae) de la Reserva Nacional de Paracas, Perú. Revista: Revista Peruana de Biología 2011 18(2)

⁹ Mella J (2014). Reptiles de Chile, Zona Norte. Peñaloza APG (editor). (en preparación). Serie Reptiles de Chile.

10.14.5 Terms of TRansporte and IFacilities

10.14.5.1 Transport

For the transfer of specimens from the capture areas to the release sites, individuals will be transported in containers previously enabled with substrate and temporary shelters appropriate to the nature of each species.

They will be located inside a vehicle whose temperature will emulate the outside temperature, after which the vehicle is moved to a maximum of 20 km/Hr.

Since the areas selected for relocation are located at a close distance from the catch areas (5 to 10 km), the transport will have a very limited duration.

10.14.5.2 Facilities

The specimens will be placed in plastic containers specially adapted for the captivity of specimens of the aforementioned species.

Each container will have holes that will allow adequate ventilation but at the same time preclude the escape of the previously captured specimens. Inside they have substrate and shelters that emulate the area of capture, as long as this does not represent a threat to the survival of the specimens.

In order to avoid negative interactions between specimens, such as aggression and depredation, a single individual will be placed in each container.

For the case of *Liolaemus Stolzmanni*, which is a kind of daytime habits, the captivity will be prolonged for a period of not more than 6 hours. The release of the specimens will be carried out during the same day in which they were captured, considering that the climatic conditions (temperature, luminosity, Etc.) are appropriate for proper reinsertion into the medium of the specimens.

In the case of *Phyllodactylus Gerrhopygus*, That is a kind of nocturnal habits, the captivity will prolong until there are the suitable conditions for the reinsertion of the specimens in the middle.

10.14.5.3 Place of CAptura

The catches will be made in EL area of the reservoir in the areas where the findings of the species of reptiles mentioned were made.

10.14.5.4 Place of DIntino

The captured specimens will be released in the sectors shown in the following figure, which meet the following criteria:

- Sites where species to relocate are present prior to release.
- Habitat characteristics similar to the place of origin (substrate, height, sun exposure, availability of shelters, among others).
- Surface at least equivalent to the area where the catch was made.
- The rescued specimens will be released in more than one site, so as not to overpopulated Artificially relocation site.
- The relocation area will not be operated by the project, guaranteeing its protection over time.

10.15. Sectoral environmental Permit 155

Permission for the construction of certain hydraulic works

The permit for the construction of certain hydraulic works shall be that established in article 294 of D.F. L N ° 1.122/1981, of the Ministry of Justice, Water code.

The requirement for its granting is not to produce water pollution.

The reason for requesting the This permit is because the reservoir will have a capacity greater than fifty thousand cubic meters and the aqueducts will have a flow greater than two cubic meters per second.

The following are the technical and formal contents to certify compliance:

10.15.1 Description of the work.

Although this project has been described in five environmental sectors: submarine Sector, Sector Underground Sector Coast Plateau Sector And Pampa Sector, for the purposes of the application of PAS 155, those containing hydraulic works are described, corresponding to:

- Submarine Sector
- Underground Sector
- Plateau Sector

10.15.1.1 Submarine Sector

Figure 10-50: Location REferencial of Works submarine Sector



Source: Self-elaboration

The submarine sector aims to carry out the intake and discharge of seawater and the effluent generated, respectively, through the designed underwater intake and discharge. The detail of the location and coordinates of each of them is indicated in chapter 15 appendix, annex 1.2 location plan with works of the project and annex 1.3 coordinate table.

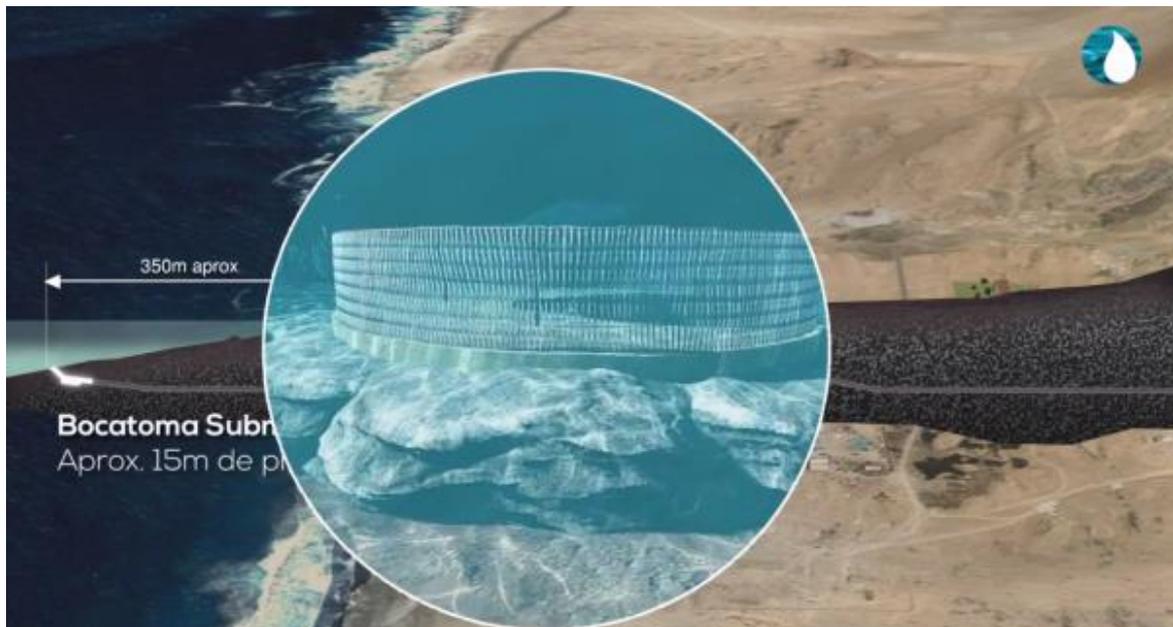
i. Underwater Take and unload

The work of taking and unloading submarine is located approximately At Cota-16 meters m. and has A structure that surrounds it. Its location coincides with a sea-bottom sector that corresponds to quite a couple of rock outcroppings. From this work the water is taken to be uploaded to the reservoir in pumping mode and from this work water is discharged into the sea in generation mode.

The diameter of the intake which will surface at the underwater bottom from the lower tunnel, approximately 343 m from the coast, shall be about 5 m and protected by the work of Take and

unload. This one considers a concrete ring of 16 m in diameter and 1 m of height anchored on rock and on this a series of concrete pillars. On this ring will be installed a protection side fence of about 5 m high with a passing light of 50 mm and plates of 10 Mm. In the upper part, in the center a solid cover of 10 m in diameter and around this cover, a top protection of the same characteristics that the side gate until reaching the 16 m in diameter and thus to close all the underwater work.

Figure 10-51: Submarine takeover and discharge work.



10.15.1.2 Underground Sector

Figure 10-52: Location REferencial of underground works



Source: Self-elaboration

The underground sector comprises three works: Lower tunnel, machine Cavern and Upper Tunnel, whose objective is to pump the seawater, to drive it through the tunnels Mentioned until the projected reservoir, and subsequently redirected through the same system, until its return to the sea, in the submarine sector (see section 10.2.1.1 Submarine Sector). Based on the above, the works that compose this sector are described below. The detail of the location and coordinates of each of them is indicated in chapter 15 appendix, annex 1.2 location plan with works of the project and annex 1.3 coordinate table.

i. Lower Tunnel

The lower tunnel is located between the sea And the Cave of machines. Part of this tunnel is below the bottom of the sea, then continues under the coastal plain and ends under the cliff.

At the beginning of the lower tunnel, under the bottom of the sea, begins with a section with inclination of 71° and about 15 m of length. This corresponds to a Norwegian shot that is to

build the exit of the tunnel from inside the tunnel dynamiting the section that would be missing to dig out, to continue with Inclination 16% About 81 m long.

These correspond to The first 2 sections. There are 5 Following (7 Sections In total for tunnel Inferior):

- Section 3: (0.2%; 114 m)
- Section 4: (10%; 396 m)
- Section 5 (Pique Gate): (0.5%; 22 M)
- Section 6: (10%; 390 M)
- Section 7: (01%; 792 M)

These 5 remaining sections have an approximate length of 1714 M to Cavern of machines.

In the elbow that joins the first two sections of the lower tunnel mentioned above, the stone trap will be located, consisting of a cavity that aims to receive the rock fragments from the seabed that will be detached when the connection is made Submarine by means of a controlled blasting called "Norwegian tyre", so as not to obstruct the lower tunnel and allow adequate entry and exit of water for the pumping and generation respectively.

Because Lower tunnel It is in an area of low internal pressures and that the quality of the rock allows it, In general It is contemplated not to redress this tunnel With molded concrete. The maintenance of the excavation will be of permanent action and are designed to The lifetime of the project.

From the lower tunnel are born the three branches of adduction. These tunnels lead the flow of water to each of the three generation units. The diameter of ENTTrifurcación is 3,25 m and the output diameter of each one of the branches is 2 M. The Trifurcación is Tá Steel-shielded.

ii. Cavern of Machines

The Cave of machines has as function to contain inside the equipment of Generation (or BOMbeo) corresponding to turbines and generators; adduction shutoff valves and all auxiliary equipment.

Inside the cavern lies the machine house structured in LYou Following Levels:

- Main floor
- Generators floor
- Turbine floor
- Valve Floor

The cross section of the cavern is of circular arches in the vault and of flat walls. The DGeneral mensiones are: of 13 m wide at the level of the flat walls and of 14 M in the vault area, the

Altura máxima de excavación es 29 M (en el cenit de la bóveda y el nivel más bajo del difusor), una longitud aproximada de 62 M.

Las Turbinas-Bombas serán Francis Reversibles de una sola etapa para privilegiar la eficiencia del conjunto, que se estima en 90%, valor típico para unidades cuya operación se realiza a flujo constante y cercano a la eficiencia máxima, y con variaciones en la altura de carga no relevante, como es el caso de estas unidades, en que no variará más allá de +/-2%.

El motor generador será de tipo síncrono, polos salientes y su bobinado refrigerado por intercambiador agua-aire, con su salida en 12 KV.

Para iniciar cada unidad en modo bomba, se considera un arranque suave para minimizar su impacto en el SING. Este interruptor tendrá un interruptor de bypass para que el motor pueda sincronizarse con la red.

Figure 10-53: Main floor cavern of machines.



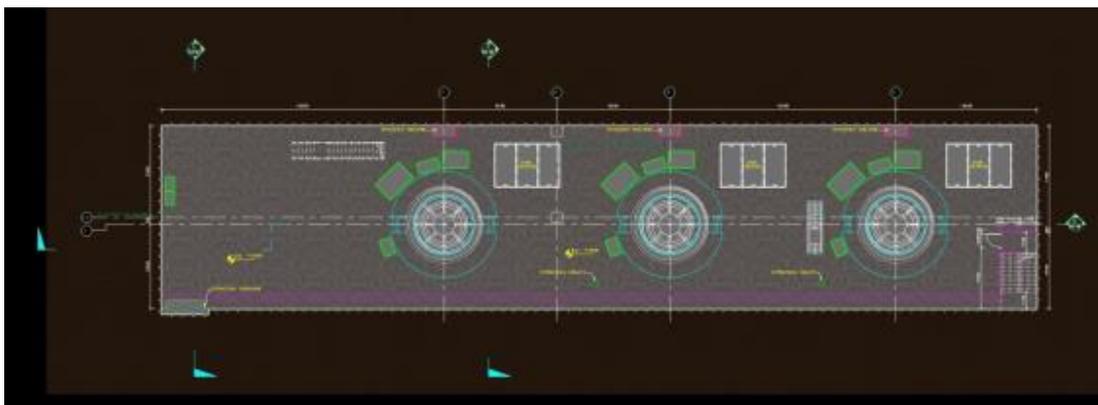
Source: Self-elaboration

Figure 10-54: Floor Generators cavern machines.



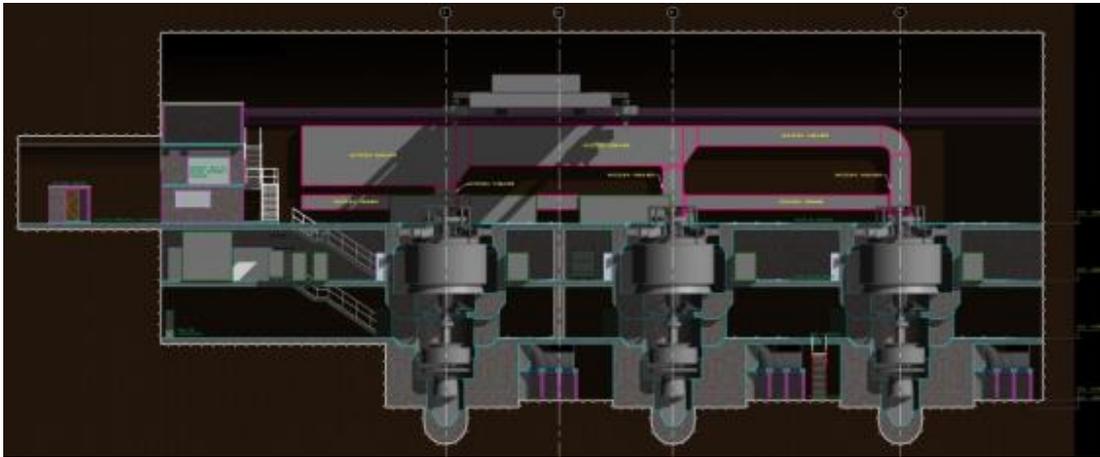
Source: Self-elaboration

Figure 10-55: Floor Turbines cavern machines.



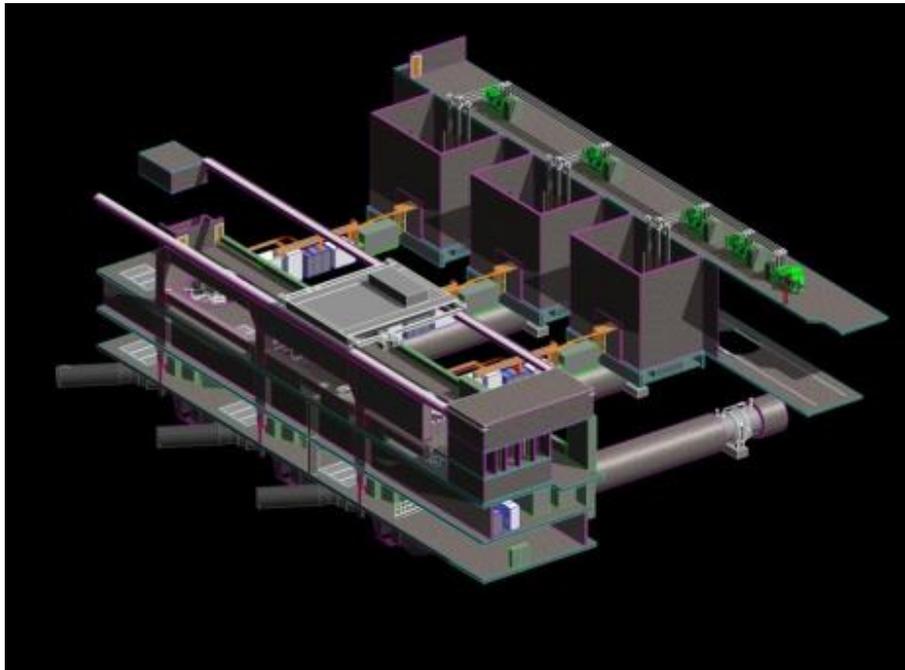
Source: Self-elaboration

Figure 10-56: General scheme pump-turbine.



Source: Self-elaboration

Figure 10-57: General view of the cavern of machines.



Source: Self-elaboration

Las Valves T Butterfly Únel Lower, allow Insulate hydraulic The generation or pumping units to the Trifurcación. Valves are located in the valve What It is located between the Transformers cavern and the tunnel Lower.

iii. Trifurcaciones

These Elements are the That divides in three the runoff that comes from Pressure or Lower tunnel, and then continue to The Cave of Machines In three branches. They are armoured in steel with the following characteristics:

- Upper or adducting branches: There are three (3) branches of adduction, each One of them is a steel pipe of 2 M inner diameter with steel shield, start at the Trifurcación and ends when entering the Cavern of machine, the lengths of each Or of them is 36 m, 33 m and 30 M for units 1, 2 and 3 respectively.
- Lower or unloading branches: There are three (3) And Lead the waters from the CaVerna de MaQuinas to the tunnel Lower. CadOne of them is a 2 pipe, 75 M Inside diameter, in the armoured area With Steel. The length of each one of them Is 64 m, 75 m and 86 m for units 1, 2 and 3 respectively.
- Compact electrical Substation (GIS): The Cavern of machines will also house the electric Sub-season and from it starts the high-voltage line of the project.

iv. Upper Tunnel

It corresponds to the tunnel that connects the reservoir with the pressure bite with an approximate inclination of 13% and a length of Around 886 M. Its approximate section is 25 M², with 5.6 m height (Floor by Key) And 5 m wide approx.

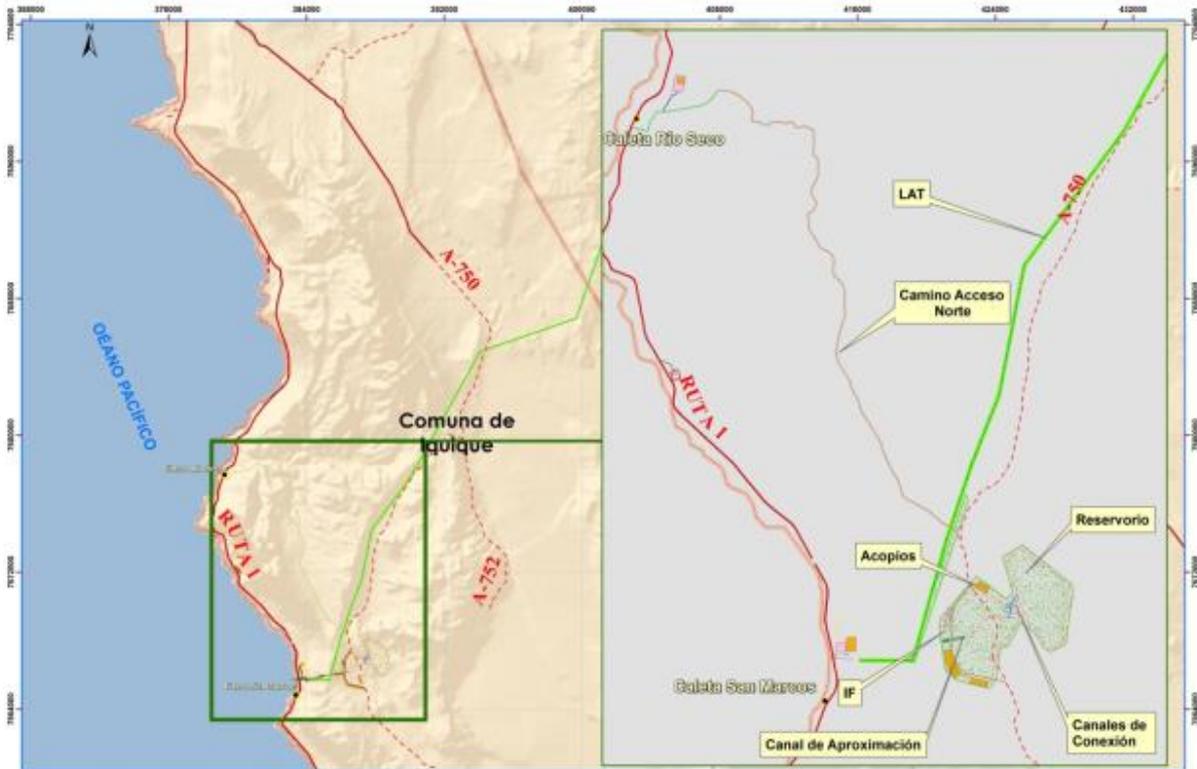
At the end ponyE Before the pressure is pressed, the connection with the upper balance chimney will be located.

It is considered the deployment of mobile working fronts according to the progress of each work.

Within the works that compose it, one finds the pressure Pique, which corresponds to a work underground vertical in pressure, of about 505 m of length and 5 m of diameter that connects the upper tunnel with the armoured tunnel. Unless the geotechnical conditions of the rock, found during excavation so advise, are not expected to be steel-shielded. If shielding is required by particular geological conditions, the space between the steel shield and the excavation will be filled with concrete.

10.15.1.3 Plateau Sector

Figure 10-58: Location REferencial of Works Plateau Sector.



Source: Self-elaboration

The main objective of the plateau sector is the storage of the extracted water, which will be carried out in the reservoir sector, located from 585 M.A.S.L. (see Figure 10-60), from Where it will be pumped to and from the submarine sector, to finally reinject it into the sea. The works associated with the aforementioned process are described below. The detail of the location and coordinates of each of them is indicated in chapter 15 appendix, annex 1.2 location plan with works of the project and annex 1.3 coordinate table.

i. Work takes and DReservoir

• Reservoir Pipeline Works

The work of taking and unloading coincides with the layout of the exterior parapet and consists of a structure that contains a set of 4 emergency floodgates of rectangular section of 5 m high and 3 m wide. The location of these floodgates has been envisaged in the horizontal zone of the approximation channel in order to minimize the size of the work and to allow the construction of an emergency access ramp between the work of Toma and the entrance portal of the upper tunnel.

In addition, in the direction from the portal of the upper tunnel towards the reservoir, it is envisaged the construction of a dividing wall that gives continuity to the parapet that divides in two parts the western basin of the reservoir. The purpose of this work is to be able to operate the plant with only 2 open floodgates and using only one of the parts of the West Basin when the water level is placed under the height 600 M.A.S.L. of the reservoir.

• Approach Channel

They are two in the Western basin of the reservoir and are connected to the work of taking and unloading the reservoir.

These works correspond to 2 channels of approximately 400 m long each one that connect the sub-reservoirs north and south of the West Reservoir with the work of Toma. The Radier Of these channels is located at elevation 592 M.A.S.L.; They have a basal width of 10 m and lateral slopes 1:2 (H:V). Downstream of the work of Toma, the channels are remelted in one only in a horizontal stretch of approximately 76 m and continues after about 56 m with a maximum slope of 13% until reaching the level 584 meters m . Where the Adduction portal is located.

ii. Reservoir

The reservoir is located On the elevation 584 M.A.S.L. approximately, will have an approximate surface of 375 has and will take advantage of two natural basins of the sector to be joined by the construction of a connecting channel (see Figure 10-60). For your Insulation of the soil, as well as to avoid seepage, the reservoir will be waterproofed with a bituminous membrane.

The two natural basins are located to a 1 Km Approximately East of the cliff Rocky Coastal Edge Close To Caleta San Marcos.

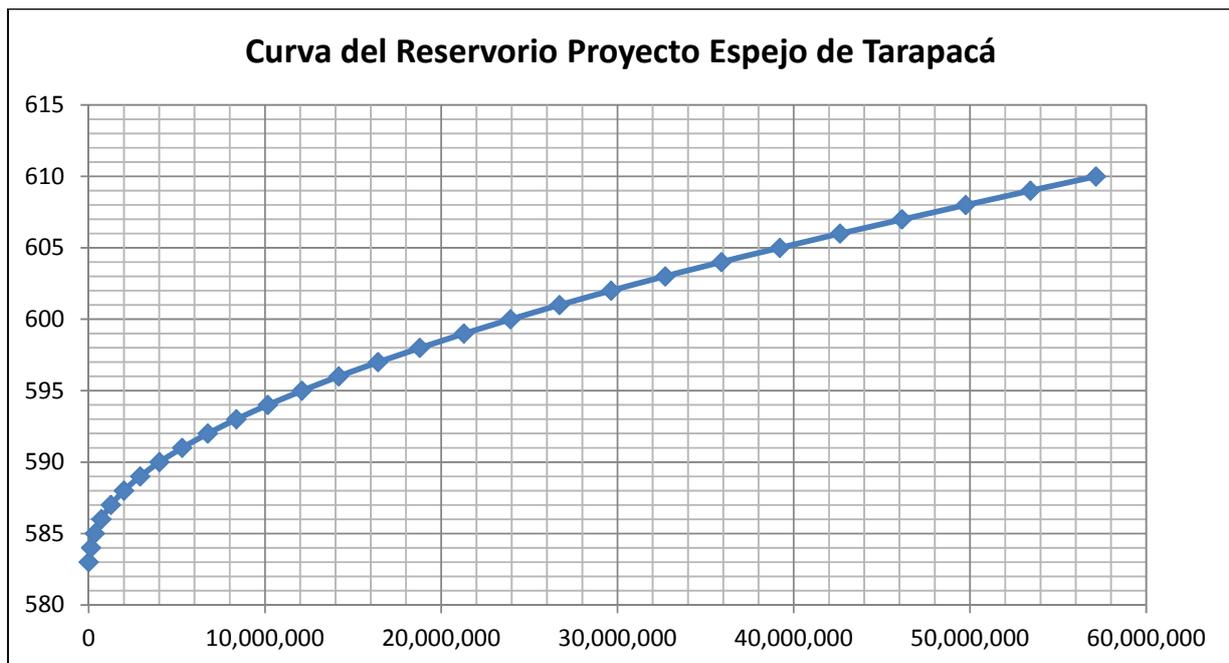
The lowest point is located in the Poniente Basin approximately at elevation 582 m.A.S.L., and has been considered the following Fill volumes:

Table 10-36: Reservoir volumes.

| Description | Cota (M.A.S.L.) | Volume (M ³) | Surface (HA) |
|-------------------------|-----------------|--------------------------|--------------|
| Permanent volume | 595 | 12 million | 201 |
| Base volume | 595-601 | 15 million | 286 |
| Volume normal operation | 601 – 608.5 | 25 million | 368 |

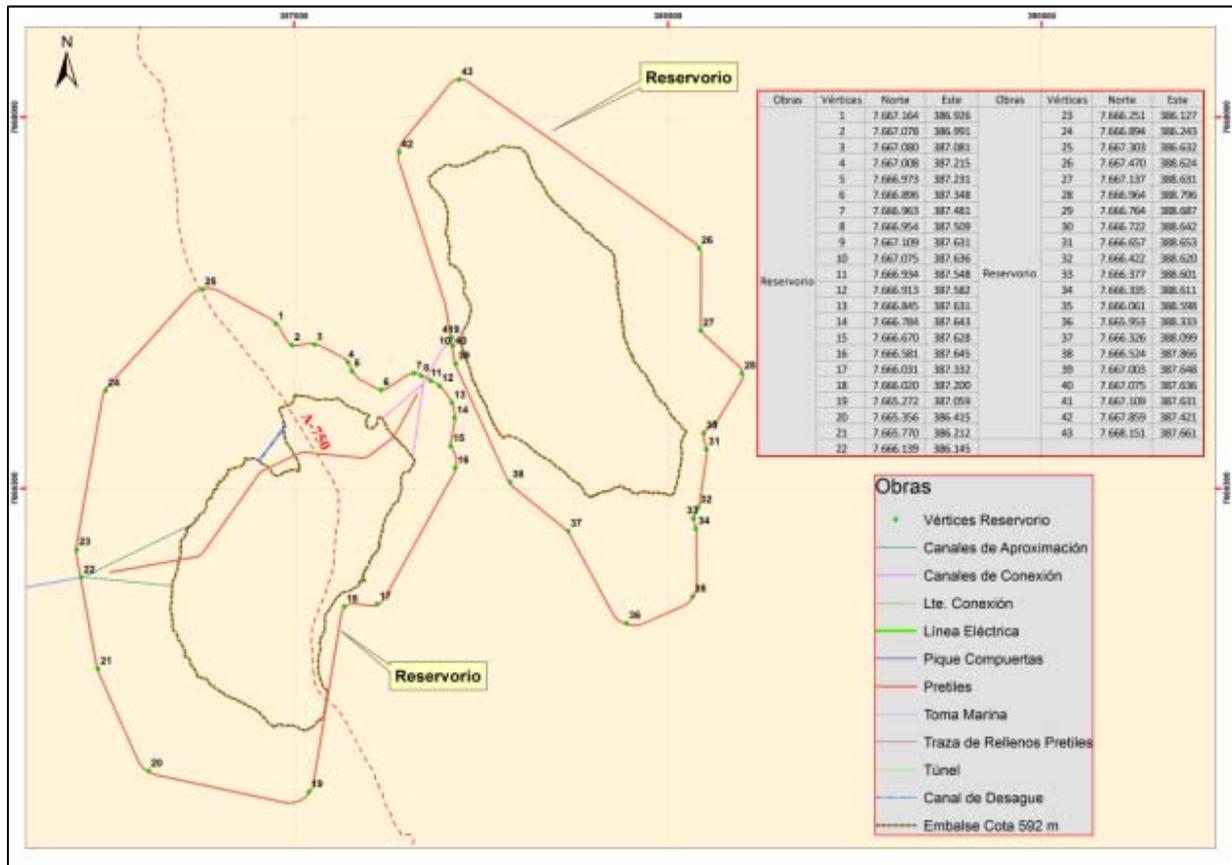
Source: Chapter 1, Project description.

It should also be mentioned that the volume of water accumulated in the reservoir will vary during the year, according to the detail indicated in the Figure 10-59, as the activity follows the availability of solar energy. In this way, the maximum volumes are reached at the end of the summer and the minimum volumes at the end of the winter.

Figure 10-59: Reservoir volume curve.


Source: Self-elaboration

Figure 10-60: Detail UReservoir. Plateau Sector.



Source: Self-elaboration

- **Reservoir Waterproofing Membrane cover**

The membrane has safety certification for drinking water storage.

As for the infiltration of the Geomembrane, it is understood that due to the nature of its composition and layer of bitumen, these have a high impermeability. As a reference, the following parameters are presented.

Bituminous membrane:

- Espesor minimum membrane 2.5 mm
- Minimum elasticity 30%
- Resistance to Punzonamiento To Static: Greater than 2.7 Kn
- Component: Sand, Bitumen Elastomer (or synthetic modified), non-woven polyester, glass veil, anti-R film Áices.

- "Carpet" Cloth Dimensions: Min 4 M X 80 M

Figure 10-61: Bituminous membrane



Source: Self-elaboration

- **Exterior and dividing Pretile**

- Exterior or Edge Pretile

This work consists of pretile land, built with material from borrowing and the excavations of the sector, its purpose is to provide a regular limit for the flood zone, will serve as a membrane anchorage for the waterproofing of the Reservoir and will serve as a roadside of the reservoir, is designed to complete the confinement of the East and West reservoirs. The crowning level of these works will be 610 M.A.S.L., will have a width of 6 m and a variable height up to 12 m. The length of these parapets is 6 Km for the Po ReservoirPIN male XLR and 5.6 Km for the East Reservoir.

- Pretile Divider Reservoir or Central

This work allows dividing the West reservoir into two sub-reservoirs: north of 0.5 km² and south of 1 km² so as to facilitate future repairs in them. For the foregoing, it has been considered to build this parapet by borrowing surpluses from excavations and tunnels or purchased from an authorized third party. Its crowning height shall be equal to 601 M.A.S.L., it will have a 4 m crowning width and will cover an extension of 1600 m from the approach channel to the connection channel.

- **Basin Connection Channel**

It contemplates an H channelHorizontal excavated at elevation 592 M.A.S.L., 7.5 M of basal width, approximately 300 m long and slopes 1:2 (H:According to the information obtained from LStudies carried out through Seismic refraction, this work is generally expected to be Mostly

excavated in moderately fractured rock So there will be Need to protect their slopes with some kind of coating.

The connection channel provides a STOP log structure consisting of a structure containing a set of 2 emergency floodgates with a rectangular section of 5 m high and 3 m wide.

Additionally upstream of the location of the floodgates this work contemplates a dividing wall so as to continue with the parapet of the approach channel, this in order to operate the plant with only 1 open gate at the time required to work With one of the sub-reservoirs of the West sector (north or south).

- **Drain Channel**

It is located in the North section of the West Reservoir and its function is to connect 2 sectors that are isolated under the altitude 601 M.A.S.L. to maintain the water flow, will be waterproofed. It will have about 160 m long, 6 m wide and a maximum depth of 4 m approximately.

10.15.2 Studies Generals of TOPografía, Geology, Hidrología, Hidrogeología, Hldrúlica FLuvial, Hldrodinámica and BScope ToGuas.

10.15.2.1 Topography

Regarding the topography is projected Make A topographic survey Through the system Airborne Laser (Lidar), which It consists of using a laser pulse transceiver, which records coordinate data from the previously defined area. Through this system Be possible to obtain Orthophotos and checkpoints that will allow Finally build A Digital terrain model (Mfrom which they will be generated The level curves required by the specifications, in this case for scale 1: 1,000, and the corresponding VStereoscopic 3d Isualización, for correct photointerpretation and restitution.

On the other hand, COn the end of Analyze the influence of the filling of the zone associated with the reservoir, and the possible impact on the stability of the coastal slope of the latter, an analysis was carried out of the Limit state End (Wedge analysis) using The method of Swedge V 5.0 (RocsienceTo calculate the theoretical water pressure along ITo Area In the Fails (Fissure Voltage) to Move Possible blocks in the Cliff CoastalLimit state due to instability); and modeling through The software program Plaxis 2d, For Model The transient flow of water From The filtration in The Reservoir to the fault zone.

The result of the study indicated that The long PeriodOdOr Necessary To accumulate water pressure behind The Potential key wedges (if any), Allows Discard A Negative impact on coastal slope stability.

In any case, in order to maintain a control over the stability of the reservoir it is proposed Implement a monitoring program, which includes the following activities:

- Maintain a permanent control of any unusual deviation from the daily balance of water in the reservoir (volume pumped, volume generated, evaporation from the reservoir).
- To carry out a careful annual underwater inspection of the entire Western reservoir's waterproof membrane, With special thoroughness in the Area closest to the Punta de Lobos fault.
- DBse A similar inspection in the eastern Reservoir every five years.

The detail of the studies carried out is in chapter 15 appendix, annex 10.2 Stability analysis slopes of the coastal cliff.

10.15.2.2 Geology

At the regional level The area of the Cordillera de la Costa, near the project area, the oldest rocks correspond to rocks formed during the cycle Gondwánico In a context of active continental margin, observing in an isolated way, outcrops of rocks Metasedimentary Palaeozoic (Carrizo et al., 2008), which correspond to schists micaceous, slates and Quartzites (DC4), of the Devonian belonging to the El Toco formation (Quezada et al, 2012), located about 30 km southeast of the project.

Structurally The project area is located at the north end of the SFA, where traces vary from N-S to NNW-SSE. The project is affected by the fault system antenna orientation $N20^{\circ} W$ and length of approximately 1.2 km; By the fault Chomache, more specifically, by the extreme North segment Punta de Lobos, orientation $N30^{\circ} -75^{\circ} W/90^{\circ}$, with a length of 9.8 km and kinematics Dextral; And in the south, by the White Bay segment Falla in the project area of 2.2 km length and average course $N28^{\circ} W$, which displaces deposits AluvialPaleosalina (Aged Miocene-Pliocene and Entraps the Pleistocene-Holocene alluvial systems (Carrizo et al., 2008).

Finally, at the local level, the main units that dominate the area of study, are the training office Viz, described as a monotonous continental volcanic sequence consisting of basaltic andesites Amigdaloidales, presenting in the vicinity of intrusive complexes a contact metamorphism evidenced by recrystallized biotite; The formation of the Black One (Jurassic), presented like a sequence of lavas Andesitic Porfídicas and Afaníticas Partly Amigdaloidales, Dacitas, Rhyolites, and gaps with sedimentary marine collations; The intrusive complex Cerro Carrasco, composed of a first facies of Monzonitas quartz of Amphibole and Biotita (Jssc (a)) and a second diorite facies of two Pyroxene and diorite of Amphibole and Biotita (Jssc (b)); Tertiary deposits, which correspond to blocks, supported Matrix gravels, sand, silts and clays semiconsolidated Materials and consolidated, clasts of origin With volcanic ash interlayers, which occasionally present levels of Evaporitic (Quezada et al, 2012); And quaternary deposits associated with Pleistocene-Holocene, including: saline deposits (PIHs), Ancient alluvial deposits (PIHa) and deposits Colluvial (PIHc).

10.15.2.3 Hydrology

Hydrologically speaking the project is located in an area characterized by the absence of superficial water courses, specifically in the area called coastal basins Arreicas. To a lesser extent the project is located within the Endorheic basin of the Pampa del Tamarugal, where the main water source corresponds to the aquifer that is located under the ground and whose main tributaries come from the Cordillera de los Andes. Climatic characteristics, which generate high temperature and evaporation as well as low rainfall and runoff, condition the extreme aridity of the study area

The most important hydrological element within the study area corresponds to the Salar Grande, which represents a national source of sodium chloride. Within the area you can also identify some intermittent streams.

10.15.2.4 Hydrogeology

With regard to hydrogeology, subsoil permeability is predominantly low, dominating the Jurassic deposits from volcanic rocks and plutonic that do not present aquifers characteristics. There are areas with primary permeability associated sedimentary deposits, but however within the study area are not identified aquifers, this product of the geological conditions or product of the absence of recharge in areas with certain Favorable features for underground storage. Only a small part of the area of influence is located on the Acuífero de la Pampa del Tamarugal, however, this area has a low relative permeability at the superficial level.

10.15.2.5 Hydrodynamics

Finished the construction phase and started its operation, EL Project will capture seawater through a work of underwater capture, The one you will find Connected to the lower tunnel, to later be Driven to the cavern of machines Where Be in The pumping equipment will be Generation, with their respective TRA-Nsformadores and step valves that correspond to 3 units, Each with a capacity of 100 MW of power, both in pumping mode and generation.

Then the water will be pumped through the pressure bite to the upper tunnel, Coming to the reservoir Through The final work of the Upper tunnel, Called the approach channel.

Subsequently, the water accumulated in the reservoir will be returned to the sea by gravity, using the same works and equipment that were used for the collection and pumping (see Figure 10-62). At this stage the water as it passes through the pump-generation equipment makes these equipment now act as turbines, generating the energy. This cycle will be daily, being able the central andn exceptional cases, operate 24 hours continuous or even DurBefore 9 days in generation mode.

Figure 10-62: Diagram operation Espejo de Tarapacá.



Source: Self-elaboration.

To determine The hydrodynamics of the system, a modelling of the system was carried out, depending on the meteorology and the established input and output flows, Using the Model DYRESM-CAEDYM (1d), which allow simulate the behavior of the physical and chemical parameters of the system. The detail of the modelling carried out and its results is found in Chapter 15 appendix, annex 10.1 Hydrodynamic modeling and water quality: "Espejo de Tarapacá".

The modeling carried out Was able to determine that the evaluated system has a marked stratification For much of the year mainly due to temperature variations in the see Thermal stratification, while the salinity ands practically constant in the reservoir and does not vary in time. The results show the development of a thermocline in mid-November which is maintained until the month of July, where the system loses heat on the surface and produces the complete mixture of the water column. The position of this thermocline is mainly determined by the elevation (dimension) to which occurs the exchange of flows and the level of entry/discharge of water to and from the sea. In this way, the modeling indicates that the thermocline is located around the height 592 M.A.S.L., with a variation not more than 1 m.

During the stratification period (November – June) The system reaches surface temperatures close to 26 °c in the month of February, a period that coincides with the maximum filling level. This increase in surface temperatures (above the thermocline) occurs mainly by the exchange of energy between the reservoir and the atmosphere, particularly radiation and wind. Under the thermocline the reservoir is kept cold all year round, with values close to 14 ° C.

In terms of water quality, it was determined that B Garlic The thermocline, the concentration of the different simulated quality variables Is Determined By the quality of the sea (same concentrations as the input flows), while on surface, Changes are observed of this Because of the hydrodynamic Existing. The PH is in an approximate range of 6 and 7.1, distributed in a homogeneous way. Under the thermocline, low concentrations of OD are observed, as well as the waters of entrance from the sea, mainly between the months of September to August. On the surface, a significant increase in OD concentrations is observed, reaching maximums close

to 6 mg/L, which vary in phase COn the growth of Microalgae, mainly marine diatoms, whose growth determines A significant decrease in surface oxygen levels.

Finally it is indicated that LA production of dinoflagellates is significantly less than the production of diatoms and that your Production is mainly concentrated In the period of August in mid-January. Marine diatoms also present an additional phase of production in the first 15 days of July, when the system is completely mixed and surface silica levels are replaced. In general, it is observed that the growth of marine diatoms in the system is strongly Limited By the availability of silica in the Epilimnion.

10.15.2.6 Water Balance

As mentioned Previously, the operation of the project focuses on the capture of seawater for the generation of energy, through the process described In the section 10.15.2.5 and plotted on the Figure 10-62.

The system's normal operating scheme is for a daily cycle, where during the day the sea water is captured and energy is generated during the night. However, the possibility, in exceptional cases, of Operate 24 hours continuous or even DurBefore 9 days in generation mode -Reaching your Maximum capacity of 300 MW -, which will depend on the requirements of the electrical system, which – either by faults of other generating plants or for instabilities in the frequency -, Involves Decrease the operating levels during pumping hours, or increase the generation level. This last scenario would imply the renovation of 100% of the reservoir water in the reservoir at least once a year.

As the maximum accumulated energy in the reservoir is close At 80 Gwh, It is expected that the operation of the units to cover these variations in the electricity supply of the system involves emptying and refilling the reservoir also once a year on average.

Under a normal operating scenario, On typical summer and winter days, Is Estimated to be pumpedN 45 m³/s (equivalent to 300 MW of power), and to be used A flow of 28 m³/s To generate Energy, looking at an average of 11 Hours Dand operation for The Suction phase and 13 for generation mode. The above involvedAC an input volume of 1,782.000 m³, throughout the 11 Hours of recruitment; and an output volume of 1.310,400 M³ Daily, which would generate a remnant of 471,600 M³ In normal periods. The volumes established for the operation of the reservoir are shown in the Table 10-36Described In the section 10.15.1.3.

Respect Of the download speeds, these are related to the output flow, which reaches a maximum of 56 m³/s, with a corresponding speed of 2.85 m/s in the submarine socket (Vt) and 0.18 m/s at gate Protection Side (Vr), located at the top of that shot. The Table 10-37 Indicates the speeds envisaged for the different projected flows.

Table 10-37: Speeds of DIt's a load.

| Q (m ³ /s) | Vt (m/s) | Vr (m/s) |
|-----------------------|----------|----------|
| 14 | 071 | 004 |
| 28 | 143 | 009 |
| 42 | 214 | 013 |
| 56 | 285 | 018 |

Source: Self-elaboration.

On the other hand, in relation to evaporation during the normal operation of the plant, described in the Table 10-38 This reaches its maximum value between 9:00 and 15:00 Hrs, with 45 m³/s, period in which it is operating in suction mode. (The negative values presented in the Table 10-38 represent the suction mode, while the positive values indicate the operation in Phase of Generation).

Table 10-38: Rule of EVaporación DUran LA ECover of OrPeration.

| Time | Evaporation Flow (M ³ /s) | | | | | | | | | | | | Average |
|------|--------------------------------------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| | Jan | Feb | Sea | April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
| 0 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 1 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 2 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 3 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 4 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 5 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 6 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 7 | 0 | 0 | 0 | 0 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -10 |
| 8 | -15 | -15 | -15 | -15 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -25 |
| 9 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -45 | -45 | -45 | -45 | -35 |
| 10 | -45 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -45 | -45 | -45 | -45 | -36 |
| 11 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 |
| 12 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 | -45 |
| 13 | -45 | -45 | -45 | -30 | -30 | -30 | -30 | -30 | -45 | -45 | -45 | -45 | -39 |
| 14 | -45 | -45 | -30 | -30 | -30 | -30 | -30 | -30 | -45 | -45 | -45 | -45 | -38 |
| 15 | -45 | -30 | -30 | -30 | -30 | -30 | -30 | -30 | -45 | -45 | -45 | -45 | -36 |
| 16 | -30 | -15 | -15 | -15 | -15 | -15 | -15 | -15 | -30 | -30 | -30 | -30 | -21 |
| 17 | -15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -15 | -15 | -15 | -15 | -6 |

| Time | Evaporation Flow (M ³ /s) | | | | | | | | | | | | |
|------|--------------------------------------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| | Jan | Feb | Sea | April | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Average |
| 18 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 18 | 14 |
| 19 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 20 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 21 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 22 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| 23 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |

Source: Self-elaboration.

10.15.3 Analysis of the Comportamiento of the CDeity of the ToGuas In the YesSight COn and SIn QProject.

In relation to the quality of water without project, this corresponds to the seawater, which will be pumped and stored in the sector of the reservoir, as described in previous sections.

In order to characterize the physical quality-current chemistry of the water, Made Field studies, described in Chapter 3, Baseline, which included the analysis of the structure of the water column, in terms of temperature, salinity, dissolved oxygen and chlorophyll-A and pH in a total of ten (10) sampling stations distributed in the area D and interest of the project, analyzing, for each one of them, a 25-parameter and variable battery.

The analysis carried out allows Classify the body of water in theS CategoryS Class 1 and 2, According to the reference values provided in the "Guide for the establishment of secondary standards of environmental quality for shallow and marine continental waters", that correspond in general to good quality waters, suitable for the development of various Activities, within which we contemplate the DesalinizacWater ion for human consumption. (The detail of the parameters analyzed is indicated in Chapter 3, Baseline, section 3.2.4.3 Chemical Oceanography (Quality Physical-Water chemistry and marine sediments).

Although PAnalyze the situation with project, it is required that theRvorio is already operating for which the proprietor undertakes to perform a characterization of the latter once the construction stage is completed, and to the extent that The volume of stored water allows it--a system modelling was performed, In FunClon of Meteorology and The Input and output flows Established, using the model DYRESM-CAEDYM (1d), which allows simulating the behavior of the physical and chemical parameters of the system. The detail of the modelling carried out and its results is found in Chapter 15 appendix, annex 10.1 Hydrodynamic modeling and water quality: "Espejo de Tarapacá".

The modeling carried out Was able to determine that the evaluated system has a marked stratification For much of the year mainly due to temperature variations in the seeThermal stratification, while the salinity ands practically constant in the reservoir and does not vary in time. The results show the development of a thermocline in mid-November which is maintained until the month of July, where the system loses heat on the surface and produces the complete mixture of the water column.

En Terms of water quality, it was determined that BGarlic The thermocline, the concentration of the different simulated quality variables is determined by the quality of the sea (same concentrations as the input flows), while on the surface, Changes are observed of this Because of the hydrodynamic Existing. The PH is in an approximate range of 6 and 7.1, distributed in a homogeneous way. Under the thermocline, low concentrations of OD are observed, as well as the waters of entrance from the sea, mainly between the months of September to August. On the surface, a significant increase in OD concentrations is observed, reaching maximums close to 6 mg/L, which vary in phase COn the growth of Microalgae, mainly marine diatoms, whose growth determines A significant decrease in surface oxygen levels.

Regarding the quality of water discharge to the sea, is indicated That the most sensitive parameter is the temperature, due to its high range of annual variation within the reservoirs (> 10 °c). However, the normal operation of the system shows that in 96% of the events of discharge will have a ΔT , between the discharge and the marine environment, less than 3 °c approvedXimadamente, what It allows the dilution of excess temperature modeling for the normal operating scenario, reducing the temperature difference of the feather below 3 °c, when it touches the surface of the sea.

10.15.4 Measures that EViten the COnaminación or ToLteración of the CDeity of the ToGuas in the FAcés of the QProject.

10.15.4.1 Phase of COnstrUction

For the construction of the marine take, a perforation will be carried out in the seabed by using the constructive method called Norwegian shot. This work will have an estimated duration of 2 months.

For the protection of this perforation (capture of seawater) and avoid the entry of fish or any other element that affects the aquatic life of the area, in addition to ensuring the correct functioning of the plant will install the work of take with the following Features:

The diameter of the intake shall be 10 m and protected by the work of taking and unloading. This one considers a concrete ring of 16 m diameter and 1 m of height anchored on rock. On this ring

will be installed a protection side gate of 5 m height with a passing light of 50 Mm. A 10-m diameter concrete cover and a protective upper grille will be installed on this gate.

Given the characteristics and the available background of the coastal conditions, it is possible to assert that the impact is minimal, becoming quickly into one more element of the habitat in the project area.

With regard to the tunnels, they will be built in rock, which means that only the rock that resists the passage of water can be left uncoated without deteriorating. If structurally reinforcing, it shall be done in accordance with the description of the project.

Finally, as noted above, the reservoir will be isolated from the soil by a bituminous membrane, What It has certification of safety for potable water storage and whose waterproofness protects the soil from possible leaks.

10.15.4.2 Phase of OrPeration

The main input will naturally be the use of seawater that will be circulated for energy generation purposes.

In order to determine whether or not there is any impact on water quality during the operation of the project, a system modelling was carried out, Depending on the Meteorology and the input and output flows established, using the model DYRESM-CAEDYM (1d), which allows simulate the behavior of the physical and chemical parameters of the system. The detail of the modelling carried out and its results is found in Chapter 15 appendix, annex 10.1 Hydrodynamic modeling and water quality: "Espejo de Tarapacá".

The analysis of the results obtained, with respect to the quality of the water discharge to the sea, indicated that, although the most sensitive parameter is the temperature, due to its high range of annual variation within the reservoirs ($> 10\text{ }^{\circ}\text{C}$), the normal operation of the system shows That in 96% of the events of discharge will have a ΔT , between the discharge and the marine environment, less than $3\text{ }^{\circ}\text{C}$ approximately, which allows the dilution of the excess of temperature modeling for the scenario of normal operation, reducing the temperature difference Of the pen below $3\text{ }^{\circ}\text{C}$, at the time ofLet this one touch the surface of the sea.

The other parameters analyzed, mainly nutrients, seaweed and some metals, do not present concentrations outside the expected ranges in the marine environment. Even some of these show concentrations below what is measured at sea. Nor was there an increase in salinity in the discharge, despite the initial assumption in which the case was assessed as the most unfavourable from the point of view of the discharge analysis and the dilution capacity of the underwater discharge.

10.15.5 Plans for SEguimiento and COntingencias, INcluyendo QLANes of COntrol and MOnitoreo TOmbiental TOGuas TOAbove and TOGuas TOUnder the OrBra.

10.15.5.1 Plan of SEguimiento

For the construction stage, the following plan is proposed for the marine environment, which seeks to establish a control over the variables that could be intervened during the development of the programmed activities. The detail of the follow-up plan is indicated in the Table 10-39.

Table 10-39: Monitoring program for Marine environmental Factor, Stage Construction

| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage |
|--|--|
| Component | Physical, chemical and biological oceanography |
| Associated Environmental impact | Habitat alteration for marine biota. |
| Parameters to use to characterize the status or evolution of the component | <p><u>Water column</u></p> <ul style="list-style-type: none"> - In each of the defined stations, the following parameters shall be measured in three strata or depth levels: a) on the surface, b) and half-water, and C) within one metre of the maximum depth of each station. <ul style="list-style-type: none"> • Profiles of temperature, salinity and dissolved oxygen • Chlorophyll "a" • Turbidity • Disc transparency Secchi • Conductivity • Sedimentary solids • Total Suspended solids • Residual free chlorine • Ph • Sulfates • Calcium • Chloride • Total organic matter • Bod5 • Alkalinity • Coliforms Fecal • Chromium (CR), nickel (Ni), zinc (Zn), aluminum (Al), iron (Fe), lead (Pb), Arsenic (As), Mercury (HG), Selenium (Se), cadmium (Cd), Manganese (MN), vanadium (Vn) and zinc (Zn). <p><u>Sediments:</u></p> <ul style="list-style-type: none"> • Metals: Chromium (CR), nickel (Ni), zinc (Zn), aluminum (Al), iron (Fe), lead (Pb), Arsenic (As), Mercury (HG), Selenium (Se), cadmium (Cd), Manganese (MN), vanadium (Vn) and zinc (Zn). • Sulfate |

| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage |
|------------------------------|--|
| | <ul style="list-style-type: none"> • Oxide Potential reduction (Redox) • Organic matter • Granulometry <p><u>Planktonic Communities:</u></p> <ul style="list-style-type: none"> • Phytoplankton composition and Abundance • Variability in vertical distribution • Diversity <p><u>Zooplankton (includes Ichthyoplankton)</u></p> <ul style="list-style-type: none"> • Richness of Species or number of taxa (S) • Numerical Abundance (Ind/100 m3) • Specific diversity (H ' expressed in Ln) • Uniformity of Pielou (J ') • Hierarchical classification analysis using the similarity index Bray-Curtis as a community partnership coefficient <p><u>Benthic communities of subtidal soft funds</u></p> <ul style="list-style-type: none"> • Species richness (S) • Average Abundance (Ind/0.01 m2) • Diversity (H ' expressed in Ln) • Average Biomass (Grs/0.01 m2), with biomass expressed in wet weight • Uniformity of Pielou (J ') • ABC curves (K-dominance curves) • Hierarchical classification analysis using the similarity index Bray-Curtis as a community partnership coefficient • Management analysis based on the similarity index of BrayCurtis. <p><u>BirdLife Marine mammals and reptiles:</u></p> <ul style="list-style-type: none"> • Composition and distribution of species • State of conservation |

| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage |
|------------------------------------|--|
| method to use or follow-up actions | <p><u>Physical and chemical oceanography:</u></p> <p>To take the samples, an oceanographic bottle is used, recommending the use of type bottles Niskin. The sampling bottle must be properly decontaminated between sampling stations following the same procedure and protocol described in the marine baseline developed under winter conditions.</p> <p>The analyses will be supported by the corresponding laboratory certificates.</p> <ul style="list-style-type: none"> • Density profile (temperature, salinity) and dissolved oxygen: the measurements will be carried out with a continuous recording sensor of salinity (conductivity), temperature, depth and dissolved oxygen. The instrument must be programmed to measure these parameters at five-second intervals as it descends through the water column to the maximum permissible depth at each station. The recorded information will be transferred to a computer for further processing. • PH: It will be measured in situ at the level of the surface and bottom of the water column. The measurements will be made with a computer Parameter, with built-in temperature correction. • Light penetration: For these measurements a disc will be used Secchi You must note the last depth that the disc reaches before it loses sight. The observations must always be carried out by the same observer. • Suspended solids, sedimentable solids, SAAM, fats & oils, and total hydrocarbons: Seawater samples will be collected from each definite sampling station in two strata (surface and bottom). The surface samples will be collected directly with the sterilized container from the analytical laboratory and the bottom samples using an oceanographic sampling bottle. Samples obtained must be stored, labeled and shipped to the laboratory under refrigeration conditions. • Residual free chlorine: This parameter shall be recorded on the basis of samples obtained every 10 meters of depth at each sampling station. This parameter should be measured <i>In situ</i> And samples will be collected by oceanographic bottle. <p><u>Planktonic Communities:</u></p> <p>-Qualitative sampling (NET)</p> <p>The qualitative samples of phytoplankton will be obtained with a simple net of 25u mesh opening, carrying out vertical drags from the maximum depth of each sampling station to the surface. The remnant will be deposited in plastic jars and fixed with formalin for further analysis. The quantitative analysis of phytoplankton will be carried out according to techniques described in specialized literature. The absolute abundance of phytoplankton will be determined using the methodology proposed by Uthermölh (1958):</p> $A = (Cc \times F \times 1000) / Vs$ <p>Where:</p> <p>A: Abundance (cells/litre); Cc: counted cells; F: Multiplication Factor (depends on the area of the observed camera); And Vs: Sediment volume (ml).</p> |

| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage |
|------------------------------|--|
| | <p>-Quantitative sampling (oceanographic bottle) Each station will have three sampling strata; Superficial (0.5 m depth), half-water (half-distance between the bottom and the surface of each station) and bottom (surface, half water and seabed). Each sample collected will be deposited in 200 cc jars and fixed with Lugol. The information will be presented and ordered in tables and figures.</p> <p><u>Zooplankton (includes Ichthyoplankton)</u> The samples of zooplankton and Ichthyoplankton will be obtained through a conical cylindrical network type Hansen, with mesh draught of 120 µm. The carried out trawls will be of the vertical stratified type, covering from the vicinity of the seabed of each sampling station up to half water (depending on the depth of each station), and between water and surface of the sea. In order to carry out a comparable analysis between the different samplings and with similar studies, ZOOPLANCTÓNICAS Fisheries will be standardized to a water volume of 100 m.³. The samples obtained will be labeled and affixed on board the support vessel with 10% buffered formalin and then sent to the analytical laboratory, duly labelled and identified. The zooplankton samples should be analyzed in their entirety, not performing subsamples which gives greater reliability to the results that are required.</p> <p><u>Subtidal communities of funds</u> At each station three samples should be obtained for biological analysis in order to ensure minimal statistical representation. For the extraction of the samples, the methodology exposed in this baseline should be followed.</p> |
| Checkpoint Location | <u>Water quality, subtidal sediment quality, plankton and subtidal Infauna</u> |

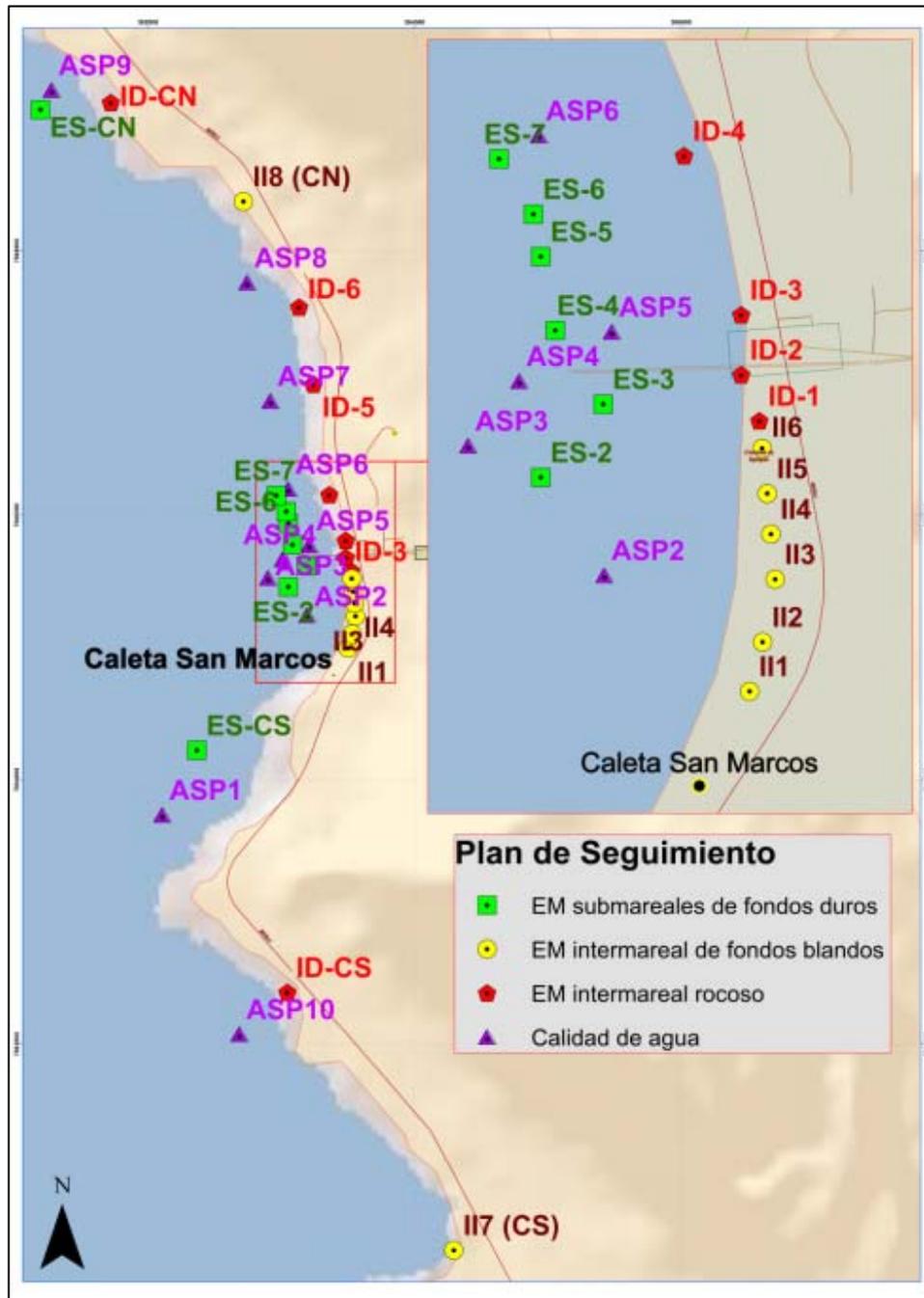
| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage | | |
|---|---|-----------------------|--------------------------|
| | ESTACIÓN | PROFUNDIDAD | CORDENADAS UTM |
| | | (m) | ESTE NORTE |
| | ASP1 | 19 | 382102 7663734 |
| | ASP2 | 15 | 383188 7665246 |
| | ASP3 | 24 | 382895 7665527 |
| | ASP4 | 21 | 383005 7665667 |
| | ASP5 | 14 | 383204 7665774 |
| | ASP6 | 16 | 383047 7666200 |
| | ASP7 | 15 | 382913 7666865 |
| | ASP8 | 11 | 382739 7667761 |
| | ASP9 | 11 | 381271 7669217 |
| ASP10 | 13 | 382680 7662076 | |
| <u>Rocky intertidal sampling stations and control sectors</u> | | | |
| | ESTACIÓN DE MUESTREO | COORDENADAS | |
| | | ESTE | NORTE |
| | ID-1 | 383523 | 7665581 |
| | ID-2 | 383484 | 7665681 |
| | ID-3 | 383484 | 7665811 |
| | ID-4 | 383361 | 7666156 |
| | ID-5 | 383241 | 7666992 |
| | ID-6 | 383134 | 7667575 |
| | ID-CN | 381722 | 7669122 |
| | ID-CS | 383046 | 7662392 |
| <u>intertidal soft-bottom sampling stations and intertidal sediment quality</u> | | | |
| | TRANSECTO | CORDENADAS UTM | |
| | | ESTE | NORTE |
| | II1 | 383502 | 7664994 |
| | II2 | 383530 | 7665101 |
| | II3 | 383557 | 7665237 |
| | II4 | 383548 | 7665335 |
| | II5 | 383540 | 7665423 |
| | II6 | 383529 | 7665521 |
| | II7 (CS) | 384295 | 7660440 |
| | II8 (CN) | 382716 | 7668373 |
| <u>Subtidal hard-fund sampling stations</u> | | | |
| | ESTACION DE | COORDENADAS | |

| Measure reason for follow-up | Protection of the habitat of Marine biota during the construction stage | | |
|--|--|--|---------|
| | MUESTREO | ESTE | NORTE |
| | ES-2 | 383053 | 7665458 |
| | ES-3 | 383187 | 7665617 |
| | ES-4 | 383084 | 7665777 |
| | ES-5 | 383053 | 7665937 |
| | ES-6 | 383037 | 7666029 |
| | ES-7 | 382963 | 7666149 |
| | ES-CN | 381193 | 7669067 |
| | ES-CS | 382367 | 7664222 |
| | | <p><u>Control of fish Communities</u> Subtidal transects of hard bottoms will be sampled.</p> <p><u>Birds, marine mammals and reptiles</u> Sea-border transects and sea-portion traverses are sampled on the baseline.</p> | |
| Measuring Duration and frequency | Semiannually during the construction stage. | | |
| Deadline and frequency of reporting | The headline will send a six-monthly report with the results of the monitoring. | | |
| Quantitative levels or limits allowed or committed | The results will be compared with those obtained during the baseline at the same sampling stations. | | |
| Competent body | Superintendence of the environment, SERNAPESCA and the maritime governors of Iquique and/or other competent body that the authority deems appropriate. | | |

Source: Self-elaboration

The Figure 10-63 Displays the location of the control points described for the follow-up plan in the table above.

Figure 10-63: Points of COntrol Plan to follow the marine medium construction stage.



Source: Self-elaboration.

10.15.5.2 Plan of COntingencia

The contingency Plan designed for the operation of the Tarapacá Mirror Project is described in chapter 08 Contingency and emergency prevention Plan, of the present EIA.

10.15.6 Plans for QReventing

The Plan of Prevention Designed for the operation of the Tarapacá Mirror Project, described in chapter 08 Contingency and emergency prevention Plan, of the present EIA.

10.15.7 Plans for ToCtion.

Specifically, if a contingency/emergency occurs, it is envisaged:

- Notify the immediate superior or the emergency chief of the situation.
- Dispose of the safety sheet of the spilled substance
- The most relevant characteristics of the substance should be identified in the safety sheet (identify the risks associated with health, flammability, reactivity, types of personal protective elements, forms of extinction, effects on the environment , among others).
- Assess the severity of the situation, verifying the existence of the spill and classifying it if it is a minor emergency or major emergency in order to define the appropriate measures for its action.
- If the spill is classified as minor:
 - If the spill or infiltration occurs from piping, cut the flow in the affected line by closing the corresponding valves upstream of the infiltration/breakage.
 - If this is the case, stop the infiltration, closing containers properly, changing their position to stop the spill or placing it inside another container.
 - Recover the spilled substance with the materials arranged in the emergency Kit.
- If the spill is classified as higher:
 - Give notice to external emergency services such as hospitals, firefighters, police.
 - The injured persons should be first rescued if any.
 - Those responsible for controlling the spill must first be conditioned with personal protective elements.
 - Block sewer drains, to prevent the product from entering these facilities, to contain spillage with material available on site by means of dikes (ditches) of sand, sandbags, dirt and/or sawdust.
 - Mark the spill area with signs that warn of the situation.
 - Keep the public away from the danger area.
 - Collect the spill in containers if this is possible without risk. If contaminated water is generated, it must be recovered in containers intended for this purpose.

- Once the control tasks have been completed, collect the materials and/or products used for the control of the spill, place them in suitable containers, closed and identified until their withdrawal by an authorized company.
- The head of emergency should evaluate the condition of damaged equipment and installations, signaling the risks with "danger not to operate" cards or fencing the sector with danger tape.
- The head of emergency shall issue a technical report on the causes of the emergency, and to refer it to the head of the plant.

10.16. Mixed sectoral environmental Permit 157

Permission to carry out works of regularization or defence of natural channels

The permission to carry out works of regularization or defence of natural watercourses shall be that established in paragraphs 1 and 2 of article 171 of the Decree with force of Law No. 1,122, of 1981, of the Ministry of Justice, Water code.

The requirement for its granting is not to affect the life or health of the inhabitants, by means of the non-significant alteration of the runoff and the natural erosive processes of the riverbed and the non-contamination of the waters.

The project requires the granting of this mixed sectoral environmental permit, because it must have the approval of the management GEneral of Waters (DGA) by the affection to Two BrokenS Naturalls By the development of a new projected path.

The following are the technical and formal contents to certify compliance:

10.16.1 Description of the LUgar EMplazamiento of the Work, INcluyendo A CRoquis Location GEneral ÉSta.

The project Of the North access road is located in the commune of Iquique in the First Región de Tarapacá. It has its beginning in the route CH-1 in the sector of dry river to about 85 Km to the south of Iquique, with a length of 15.3 km in a south-east direction, ends at its junction with the route A-750, about 4 km to the northeast of Caleta San Marcos.

The gutters by the cross of the roads to the ravines, are located in the UTM coordinates indicated below, in the Geographic coordinates system WGS 84, Spindle 19.

- Cruce de Quebrada Chica: 381,273 East, 7,678,190 North
- Cruce de Quebrada Grande: 381,806 East, 7,677,800 North

The following figures show the location of the project

Figure 10-64: Study Area



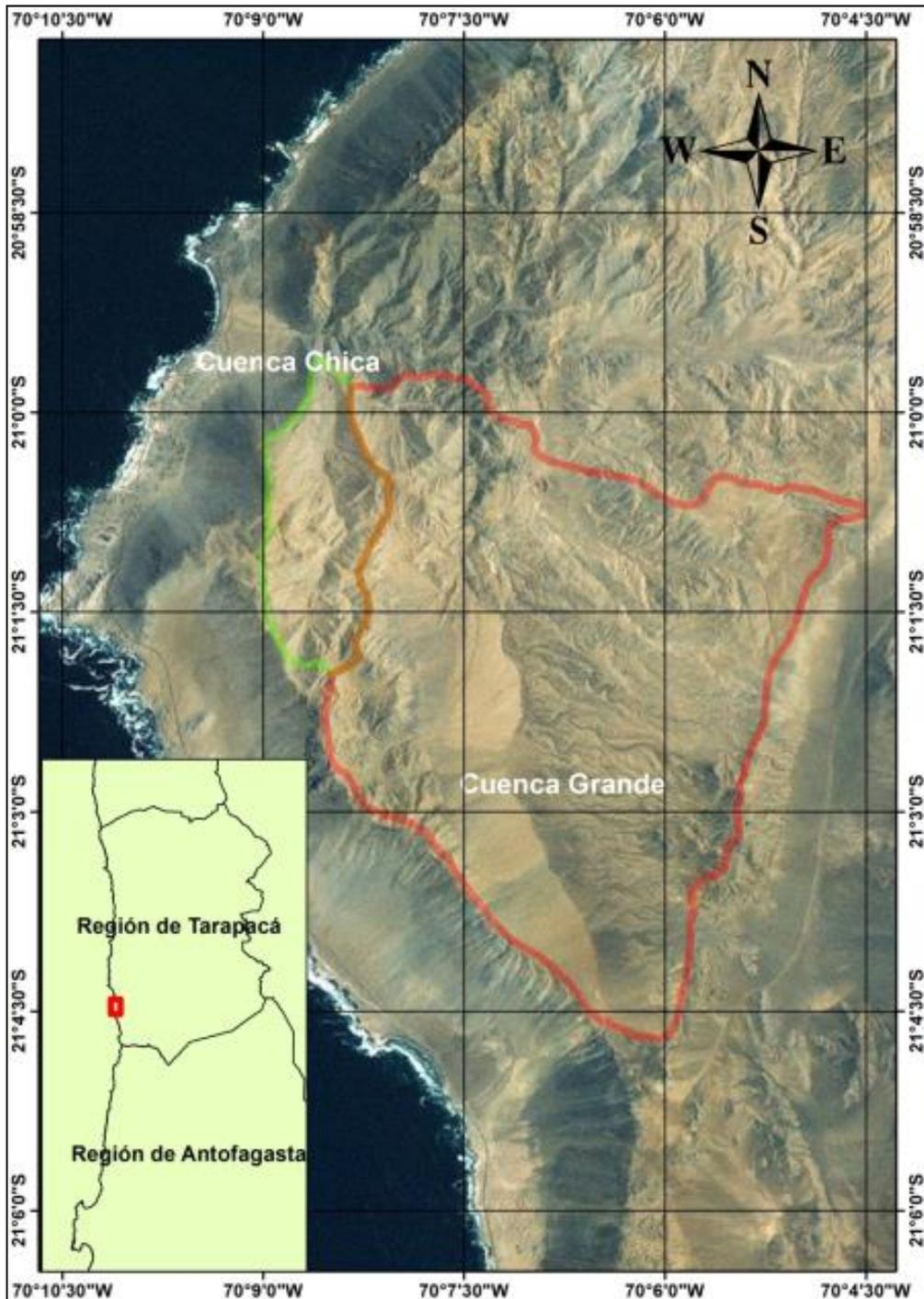
Source: Self-elaboration.

Figure 10-65: North Access Road Location



Source: Self-elaboration.

Figure 10-66: Location of CUencas at EStudio



Source: Self-elaboration.

10.16.2 Description of the works and their phases

Given the need for direct communication between the coastal sector in the vicinity of the Caleta San Marcos and the upper zone of the cliff, it was determined that the projection of a connecting road, which will be called North Access, was necessary.

The north access is posed as a double carriageway, approximately 8 m Width and a length of 16.2 Km. Their coverage will be of common material, as seen in the existing roads in the inner zone, and You will have a 0.2 m roll folder.

It has its beginning in the route CH-1 in the sector of Rio Seco to about 85 Km to the south of Iquique. From this sector begins its gradual ascent towards the orient inland by the coastal cliff until reaching a natural gorge, then continue towards southeast until joining the route A-750.

The development of this road has two different sectors to emphasize:

- Projected path (new): From Route CH-1 to about 4 Km of its development is necessary the projection of a completely new road, which is developed mainly by the slopes of the coastal cliff and the natural ravine.
- Improvement: from Km 4 From now on there is an existing private path of 12 Km splicing with Route A-750. In this sector only work of improvement of the road should be carried out, since this one is in a plain without abrupt conditions in all its extension.

Within the North access road, two crossing sewers will be built, one for the main ravine (big), and another for a lesser ravine (girl). The first of these consists of 2 pipes of 1.5 m in diameter of HDPE, while the other one will be 1 pipe of 1.0 m of diameter of the same material.

The gutters by the cross of the roads to the ravines, are located in the UTM coordinates indicated below, in the Geographic coordinates system WGS 84, Spindle 19.

Cruce de Quebrada Chica: 381,273 East, 7,678,190 North

Cruce de Quebrada Grande: 381,806 East, 7,677,800 North

10.16.3 Estimation of Terms and periods of CConstruction of the OrBras

This work will have a total period of 9 months of construction, and is part of the previous works to be carried out for the development of the project Espejo de Tarapacá.

According to the estimated these 9 months would begin to run since August/September of the year 2015, to end in May of the year 2016.

10.16.4 Flat TOPográfico QLanta and QErfiles, GEorreferenciado, OrBra and 'sRea SUceptible SEr ToFectada

The topographical plans of plant and georeferenced profile of the work road of North Access, are the following:

Table 10-40: Project Plans

| Code | Name |
|--------------------------|--|
| VALH-0001-000-PAS-PL-001 | General floor plan and large broken Longitudinal profile without project |
| VALH-0001-000-PAS-PL-002 | General floor plan and Longitudinal profile broken girl without project |
| VALH-0001-000-PAS-PL-003 | General floor plan and large broken Longitudinal profile with Project |
| VALH-0001-000-PAS-PL-004 | Plan General plant and Longitudinal profile broken girl with Project |
| VALH-0001-000-PAS-PL-005 | Flat Large Broken cross sections |
| VALH-0001-000-PAS-PL-006 | Plane cross sections Broken girl |

These can be seen in detail in the Annex 1.2 Location plan with project works.

10.16.5 Memory of the calculation of the hydrological, hydraulic, sediment-dragging and undermining study, for the situation with and without project, as appropriate.

In the Annex 10.3 We enclose the studies of hydrology, hydraulic-Fluvial and sediment trawling.

10.16.6 Monitoring Plan.

The state of the road and the crossing works will be reviewed before the rainy season (April), in order to ensure that the works are in optimal conditions for their correct functioning.

10.16.7 Measures Aimed To Minimize LEffects on LTo the quality of LAs Waters, downstream DThe place Dand construction DE LAs works.

During construction, the trucks will be cared for, circulated or parked on the ravines.

The installation of the gutters, It will be done minimizing the intervention of the channel. The project has defined the optimal section of the gutters by the cross of roads. It will be privileged that the works in channels are carried out to the end of the season of summer and beginning of autumn.

During the operation the projected crossover works (HDPE sewers) do not produce any change in water quality under the works, as well as the concrete walls that are at the entrance and exit of these.

10.16.8 Contingency Plan.

These works do not envisage contingency plan, because for meteorological events in which they are exceeded, the water will continue its natural course and pass over the projected road. In addition to the sector in which these works are located, there is no nearby human settlement that can be affected.

After each extreme event, the conditions of the works and facilities will be reviewed.

10.16.9 Emergency Plan, SI ToEscrow.

Given the type of work being projected, no emergency plans are envisaged.

In any case it is considered improvement of the road of hydraulic works and of the road if necessary.

10.17. Sectoral environmental Permit Mixed 160

Permission to subdivide and urbanize rural land or for constructions outside the urban limits.

The permit to subdivide and urbanize rural land to complement some industrial activity with housing, equip some rural sector or to enable a spa or tourist camp or for the construction of housing complexes of Housing or housing of up to 1,000 units of development that are eligible for a state subsidy, as well as for industrial buildings, equipment, tourism and populations outside the urban boundaries, It shall correspond to the authorisation and favorable reports establishing RES-Ectivamente in paragraphs 3 and 4 of article 55 of the Decree with force of Law n ° 458, of 1975, of the Ministry for the Housing and urbanism, General Law of urbanism and constructions.

The requirements for its granting are not to originate new urban nuclei outside urban planning and not to generate loss or degradation of the natural land resource.

Below are the background Associated with the facilities, infrastructure buildings or equipment constructions that will be located in the rural area, with a Objective other than the agricultural and not contemplating productive processes, in addition, it summarizes the study agrological for each work, to undergo environmental evaluation, in the process of obtaining the resolution of environmental qualification.

10.17.1 Destination of the EDificación

SE is associated with equipping the industrial activity, complementing the basic functions of living, producing or circulating. For control building cases, slaughter facilities and camp. These are destined to the permanence and circulation of people; For the case of the magazine it corresponds to a construction or building considered non-habitable, whose use is purely complementary to the industry.

The following table presents the works that the project contemplates.

Table 10-41: Works that Contemplates the QProject

| Installation | Construction objective | Type of Use |
|----------------------|--|--|
| Polvorines | Complementary | Industrial and equipment: ComplementDo Basic functions of living, producing or circulating. |
| Area of operations | Workshop building, warehouse and diesel group, temporary stockpile of hazardous waste | |
| Desalination plant | Complementary | |
| Control Area | Administrative offices; For maintenance staff, dining rooms and exchange halls. | |
| Slaughter facilities | Administrative offices; Maintenance workshop, dining room, warehouse of machinery, warehouses and exchange room. | |
| CampaMento Main | General office; Building for staff, casino, restrooms and services, wineries and other non-living rooms | |

10.17.2 Plane of Ucation, which SEñale the QProposition RELativa of the QRedio RSpecies of the TERrenos Cand the ESpaCio QÚblico

The relative position of the property with respect to the adjoining land and the space Public, it Enclosed in the The Plans of the ToNexus 10.4.

10.17.3 Flat EMplazamiento of the EDificaciones

The site plan is enclosed in Annex 10.4. In addition, in table 10-43, points to the vertices and areas for which this permission is requested. In the Table 10-42, it presents the identification (ID) of each plane agrological with the site of the buildings.

Table 10-42: Identification of QLantas de ToRquitectura ESquemática EDificaciones

| Agrological plane ID | Facilities included |
|---|---|
| Area of operations | Workshop building, warehouse and diesel group, warehouse for temporary collection of hazardous waste. |
| Camp | Casino, offices, Bodega, 87 quadruple, 42 singles, 50 doubles, infirmary. |
| Control Area | Control Board and Reservoir communication. |
| Camp Facility | Offices, dining Room |
| Installation of work for the construction phase | Offices, dining room, maintenance workshop, hazardous waste, machinery warehouse, warehouse for electromagnetic equipment, exchange room. |
| Reservoir Facility | Offices, dining room, parking and warehouse of machinery, maintenance workshop, hazardous waste, exchange room. |
| Dry River Operations Installation | Offices |
| Desalination plant | Desalination plant |
| Magazine Reservoir 1 (outside) | Powder keg |
| Magazine Reservoir 2 (inside) | Powder keg |
| Magazine Sector San Marcos | Powder keg |

Source: Self-elaboration.

Table 10-43: Vertices and Superficies for OrBras PASM160

| Installation | Works | Vertices | Areas (Há) | UTM coordinates (WG S84, spindle 19) | |
|--------------------|---|----------|------------|--------------------------------------|----------|
| | | | | North (M) | East (M) |
| Area of operations | Workshop building, warehouse and diesel group, temporary stockpile of hazardous waste | 1 | 0.0265 | 7,665,668 | 384,011 |
| | | 2 | | 7,665,694 | 384,011 |
| | | 3 | | 7,665,694 | 384,021 |
| | | 4 | | 7,665,668 | 384,021 |
| Camp | 87 quadruple | 1 | 0.3389 | 7,671,887 | 380,061 |
| | | 2 | | 7,671,981 | 380,025 |
| | | 3 | | 7,671,993 | 380,057 |
| | | 4 | | 7,671,900 | 380,092 |
| | 42 Singles | 5 | 0.1386 | 7,671,983 | 380,024 |
| | | 6 | | 7,672,020 | 380,011 |
| | | 7 | | 7,672,033 | 380,043 |
| | | 8 | | 7,671,995 | 380,056 |
| | 50 Doubles | 9 | 0.3811 | 7,671,902 | 380,098 |
| | | 10 | | 7,672,042 | 380,044 |
| | | 11 | | 7,672,051 | 380,067 |
| | | 12 | | 7,671,912 | 380,122 |
| | Casino | 13 | 0.0600 | 7,672,061 | 380,140 |
| | | 14 | | 7,672,071 | 380,168 |
| | | 15 | | 7,672,053 | 380,175 |
| | | 16 | | 7,672,042 | 380,147 |
| | Offices | 17 | 0.0650 | 7,672,074 | 380,124 |
| | | 18 | | 7,672,088 | 380,161 |
| | | 19 | | 7,672,073 | 380,167 |
| | | 20 | | 7,672,059 | 380,130 |
| | Winery | 21 | 0.0048 | 7,672,117 | 380,151 |
| | | 22 | | 7,672,111 | 380,153 |
| | | 23 | | 7,672,108 | 380,146 |
| | | 24 | | 7,672,114 | 380,144 |
| | Nursing | 25 | 0.0136 | 7,672,048 | 380,000 |
| | | 26 | | 7,672,055 | 379,998 |
| | | 27 | | 7,672,061 | 380,015 |

| Installation | Works | Vertices | Areas (Há) | UTM coordinates (WG S84, spindle 19) | |
|---|---|----------|------------|--------------------------------------|----------|
| | | | | North (M) | East (M) |
| | | 28 | | 7,672,054 | 380,017 |
| Control Area | Control Board and Reservoir communication | 1 | 0.002 | 7,666,096 | 386,127 |
| | | 2 | | 7,666,096 | 386,130 |
| | | 3 | | 7,666,088 | 386,130 |
| | | 4 | | 7,666,088 | 386,127 |
| Camp Facility | Offices | 1 | 0.081 | 7,672,058 | 380,080 |
| | | 2 | | 7,672,067 | 380,080 |
| | | 3 | | 7,672,067 | 380,089 |
| | | 4 | | 7,672,058 | 380,089 |
| | Dining room | 1 | 0.0018 | 7,672,078 | 380,088 |
| | | 2 | | 7,672,084 | 380,088 |
| | | 3 | | 7,672,084 | 380,091 |
| | | 4 | | 7,672,078 | 380,091 |
| Installation of work for the construction phase | Offices | 1 | 0.2500 | 7,666,020 | 383,800 |
| | | 2 | | 7,666,070 | 383,800 |
| | | 3 | | 7,666,070 | 383,850 |
| | | 4 | | 7,666,020 | 383,850 |
| | Dining room | 5 | 0.08 | 7,666,069 | 383,757 |
| | | 6 | | 7,666,070 | 383,797 |
| | | 7 | | 7,666,050 | 383,797 |
| | | 8 | | 7,666,049 | 383,757 |
| | Maintenance Workshop | 9 | 0.24 | 7,665,876 | 383,811 |
| | | 10 | | 7,665,936 | 383,811 |
| | | 11 | | 7,665,936 | 383,851 |
| | | 12 | | 7,665,876 | 383,851 |
| | Hazardous waste | 13 | 0.0004 | 7,666,051 | 383,667 |
| | | 14 | | 7,666,051 | 383,665 |
| | | 15 | | 7,666,053 | 383,665 |
| | | 16 | | 7,666,053 | 383,667 |
| | Machinery Warehouse | 17 | 0.1398 | 7,665,876 | 383,752 |
| | | 18 | | 7,665,916 | 383,752 |
| | | 19 | | 7,665,916 | 383,787 |

| Installation | Works | Vertices | Areas (Há) | UTM coordinates (WG S84, spindle 19) | |
|--------------------|---|-----------|------------|--------------------------------------|----------|
| | | | | North (M) | East (M) |
| | Warehouse for electromechanical equipment | 20 | 0.0010 | 7,665,876 | 383,786 |
| | | 21 | | 7,666,031 | 383,774 |
| | | 22 | | 7,666,033 | 383,774 |
| | | 23 | | 7,666,033 | 383,779 |
| | | 24 | | 7,666,031 | 383,779 |
| | Exchange Room | 25 | 0.0050 | 7,665,957 | 383,764 |
| | | 26 | | 7,665,967 | 383,764 |
| | | 27 | | 7,665,967 | 383,769 |
| 28 | | 7,665,957 | | 383,769 | |
| Reservoir Facility | Offices | 1 | 0.2500 | 7,666,792 | 386,124 |
| | | 2 | | 7,666,842 | 386,134 |
| | | 3 | | 7,666,832 | 386,183 |
| | | 4 | | 7,666,783 | 386,173 |
| | Dining room | 5 | 0.0801 | 7,666,737 | 386,100 |
| | | 6 | | 7,666,729 | 386,139 |
| | | 7 | | 7,666,710 | 386,135 |
| | | 8 | | 7,666,717 | 386,096 |
| | Parking and Machinery Warehouse | 9 | 0.2800 | 7,666,634 | 386,073 |
| | | 10 | | 7,666,621 | 386,142 |
| | | 11 | | 7,666,582 | 386,134 |
| | | 12 | | 7,666,595 | 386,065 |
| | Maintenance Workshop | 13 | 0.2400 | 7,666,639 | 386,103 |
| | | 14 | | 7,666,698 | 386,114 |
| | | 15 | | 7,666,690 | 386,153 |
| | | 16 | | 7,666,631 | 386,142 |
| | Hazardous waste | 17 | 0.0004 | 7,666,772 | 386,105 |
| | | 18 | | 7,666,772 | 386,102 |
| | | 19 | | 7,666,774 | 386,103 |
| | | 20 | | 7,666,774 | 386,105 |
| | Exchange Room | 21 | 0.0050 | 7,666,823 | 386,113 |
| | | 22 | | 7,666,822 | 386,118 |
| | | 23 | | 7,666,812 | 386,116 |

| Installation | Works | Vertices | Areas (Há) | UTM coordinates (WG S84, spindle 19) | |
|-----------------------------------|--------------------|----------|------------|--------------------------------------|----------|
| | | | | North (M) | East (M) |
| | | 24 | | 7,666,813 | 386,111 |
| Dry River Operations Installation | Offices | 1 | 0.5287 | 7,678,600 | 380,314 |
| | | 2 | | 7,678,530 | 380,298 |
| | | 3 | | 7,678,541 | 380,225 |
| | | 4 | | 7,678,610 | 380,241 |
| Desalination plant | Desalination plant | 1 | 0.015 | 7,665,710 | 383,685 |
| | | 2 | | 7,665,711 | 383,697 |
| | | 3 | | 7,665,699 | 383,698 |
| | | 4 | | 7,665,698 | 383,686 |
| Reservoir 1 Magazine | Powder keg | 1 | 0.09 | 7,666,017 | 385,651 |
| | | 2 | | 7,666,017 | 385,681 |
| | | 3 | | 7,665,987 | 385,681 |
| | | 4 | | 7,665,987 | 385,651 |
| Magazine Reservoir 2 | Powder keg | 1 | 0.09 | 7,665,888 | 386,726 |
| | | 2 | | 7,665,888 | 386,756 |
| | | 3 | | 7,665,858 | 386,756 |
| | | 4 | | 7,665,858 | 386,726 |
| Magazine Sector San Marcos | Powder keg | 1 | 0.09 | 7,666,604 | 383,865 |
| | | 2 | | 7,666,604 | 383,835 |
| | | 3 | | 7,666,634 | 383,835 |
| | | 4 | | 7,666,634 | 383,865 |

Source: Self-elaboration.

The total area of the works presented corresponds to 3.5 Hectares Approximately.

10.17.4 Plants of schematic architecture and silhouettes of the elevations that illustrate the salient points, their height, number of floors and the line corresponding to the natural soil.

Attached in annex 10.4, according to the following identification numbering (ID):

Table 10-44: Identification of the QLantas de ToRquitectura ESquemática of the EDificaciones

| Plant ID schematic architecture of the installation | Installation |
|---|---|
| Val-0001-006-Arq-PL-002-B, Val-0001-006-Arq-PL-003-B, Val-0001-006-Arq-PL-004-B, Val-0001-006-Arq-PL-006-C, Val-0001-006-Arq-PL-001-C | Area of operations |
| PL001, PL002, PL003, PL005, PL006, PL007, PL008, PL009, PL010. | Camp |
| PL001 | Control Area |
| PL001, PL002, PL003, PL004, PL006. | Camp Facility |
| PL001, PL002, PL003, PL004, PL005, PL006, PL007, PL008, PL009, PL010. | Installation of work for the construction phase |
| PL001, PL002, PL003, PL005, PL006, PL007, PL008, PL009, PL010. | Reservoir Facility |
| PL001, PL002, PL003. | Dry River Operations Installation |
| PL001 | Desalination plant |
| PL001 | Magazine Reservoir 1 (outside) |
| PL001 | Magazine Reservoir 2 (inside) |
| PL001 | Magazine Sector San Marcos |

Source: Self-elaboration.

10.17.5 Characterization of the SLure

For the elaboration of the agrological study and the Plans The information presented in the Edaphology baseline chapter of this EIA was used.

The soil of the installation subject to sectoral environmental permit (PAS) was characterized by sampling with agrological, pits and road cuts, supported by surface and soil profile photographs; We compared the background taken in the field with those raised in the cabinet stage

Thus, based on the pattern for soil studies of SAG (2011) were determined The Interpretive descriptions according to the type of capacity of use.

10.17.5.1 Interpretative characterization of soils

Soils affected by the different buildings associated with the mixed sectoral environmental permit 160, according to the Article 55 of the Decree with force of law N ° 458, of 1975, of the Ministry of the Housing and urbanism, General Law of Urbanism and Constructions, correspond to soils Low development, thin, with rocky, thick structures And without the presence of roots, High erosion, many with presence of desert pavement; Thin in depth; With the presence of sediment layers, high in gravel and excessive drainage. These characteristics added to the difference in slopes and location would reflect the variations of characteristics Physicochemical and geomorphologically identified by both bibliographic and Photointerpretation studies, and final validation in the field. All features that give you The definition of non-arable, i.e., without agricultural value.

According to the above characteristics, a classification is determined Of use capacity VIII, for all units IDentificadas, for corresponding to non-productive soils from the point of view arable, but that at the environmental level, in some cases they fulfil functions like giving physical support to some living organisms if they are preserved.

These soils were describedCough in homogeneous units, Of Those affected by buildings associated with the PASM160 correspond to:

- Coastal Terrace: It corresponds to soils formed by the mixed action of continental and Marine units. Simple slope, slightly inclined and complex, slightly wavy. With PRofundidades variables according to the stratification sequence of the source materials.

This unit has two variants:

- UTL-1: The fine sands and francosas textures predominate; With dry-loose consistency. of thin in depth, and with presence of massive calcareous rock resistant under 25cm.
- UTL-2: coarse arene texture prevails. With granitic rock exposed to a high percentage of the surface and in sectors where low development soil is observed, this is very thin.

- Washout Batter: correspond to a deposit Aluvio-Colluvial Chaotic, very deep. Arene texture with a moderate wavy slope. In the fan position of the cliff unit.
- Fan Aluvio-colluvial: Corresponds to soils that have variants of simple slopes slightly inclined to complex of slightly wavy to more than 30%, in fan location. With varying depths depending on the level of the slope in which it is located.
- Unit of hills: it is a very thin ground, in position of slope of Hill, and Cone colluvial high, with simple slopes of slope with complex in the highest positions, being of moderately wavy to strongly wavy. It presents rocky outcrops in many of the variants and texture arene francosas.

Following is the individualization of the works presented, according to the type of soil affected, kind of capacity of use of soil and surface affected.

i. Soils area of operations

The control Building will be built on the ground Of the littoral plain, between the homogeneous unit of terrace floor and washout slope.

Table 10-45: Soils Associated with Installation of the building of COntrol.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS (Há) |
|--------------------|---|------------------------|-----------------|----------------------------------|
| Area of operations | Workshop building, warehouse and diesel group, warehouse for temporary collection of hazardous waste. | Viii | Coastal Terrace | 00265 |
| | | | Washout batter | 00004 |

Source: Self-elaboration

ii. Ground Camp

The main camp will be built on Soil of coastal Terrace.

Table 10-46: Soils ToAssociated with the Installation of Campamento QRincipal.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|--------------|---|------------------------|-----------------|--------------------------------|
| Camp | Casino, offices, Bodega, 87 quadruple, 42 singles, 50 doubles, infirmary. | Viii | Coastal Terrace | 10356 |

Source: Self-elaboration

iii. Floor Control Area

The Control area will be built on a fan ground AluvioCOLuvial.

Table 10-47: Soils ToMembers of the Control area.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|--------------|---|------------------------|---------------------|--------------------------------|
| Control Area | Control Board and Reservoir communication | Viii | Fan Aluvio-COLuvial | 0.002 |

Source: Self-elaboration

iv. Soils installation of Slaughter camp

The Camp facility has offices like works, and these BeN BuiltS On the ground of coastal Terrace.

Table 10-48: Soils ToAssociated with the Installation Of FAena Campamento.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|---------------|-------------------------|------------------------|-----------------|--------------------------------|
| Camp Facility | Offices and dining Room | Viii | Coastal Terrace | 0.022 |

Source: Self-elaboration

v. Flooring installation of work for the construction phase

The Slaughter Installation For the construction phase will be built on ground corresponding to Coastal terrace.

Table 10-49: Soils ToAssociated with the Installation Of FAena for the construction phase.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|---|---|------------------------|-----------------|--------------------------------|
| Installation of work for the construction phase | Offices, dining room, maintenance workshop, hazardous waste, machinery warehouse, warehouse for electromagnetic equipment, exchange room. | Viii | Coastal Terrace | 0.7163 |

Source: Self-elaboration

vi. Soil installation of the reservoir

The Installation of Reservoir will be built on Soil corresponding to Fan Aluvio-Colluvial.

Table 10-50: Soils ToAssociated with the Installation Of FAena Reservoir.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|--------------------|---|------------------------|----------------------|--------------------------------|
| Reservoir Facility | Offices, dining room, parking and warehouse of machinery, maintenance workshop, hazardous waste, exchange room. | Viii | Fan Aluvio-Colluvial | 0.8555 |

Source: Self-elaboration

vii. Soils installation of Dry river

The Installation of Reservoir will be built on Soil corresponding to Hills.

Table 10-51: Soils ToAssociated with the Installation Of FAena Seco River.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|-----------------------------------|---------|------------------------|--------------|--------------------------------|
| Dry River Operations Installation | Offices | Viii | Hills | 0.5287 |

Source: Self-elaboration

viii. Desalination plant Soils

The Desalination plant will be built on Soil corresponding to Coastal Terrace.

Table 10-52: Soils ToAssociated with the Desalination plant.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS Há |
|--------------------|--------------------|------------------------|-----------------|--------------------------------|
| Desalination plant | Desalination plant | Viii | Coastal Terrace | 0.015 |

Source: Self-elaboration

ix. Soil magazine Reservoir 1 (outside)

The Reservoir 1 Magazine will be built On ground corresponding to Cerro.

Table 10-53: Soils ToPartners toL Reservoir Magazine 1.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS (Ha) |
|----------------------|------------|------------------------|--------------|----------------------------------|
| Reservoir 1 Magazine | Powder keg | Viii | Mount | 0.09 |

Source: Self-elaboration

x. Soil magazine Reservoir 2 (inside)

The Magazine Reservoir 2 will be built On ground Fan-related Aluvio-Colluvial.

Table 10-54: Soils ToAssociated with the lInstallation of magazine Reservoir 2.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS (Ha) |
|----------------------|------------|------------------------|------------------------|----------------------------------|
| Magazine Reservoir 2 | Powder keg | Viii | Range Aluvio-Colluvial | 0.09 |

Source: Self-elaboration

xi. Soil Gunpowder SEctor San Marcos

The magazine Sector San Frames will be built On ground corresponding to Coastal terrace.

Table 10-55: Soils ToAssociated with the Installation of gunpowder SEctor San Marcos.

| Installation | Works | Capacity of use (CCUS) | Type of soil | Total surface affecting CUS (Ha) |
|----------------------------|------------|------------------------|-----------------|----------------------------------|
| Magazine Sector San Marcos | Powder keg | Viii | Coastal Terrace | 0.09 |

Source: Self-elaboration.

10.17.6 Conclusions

In this way, the construction and subsequent operation of the works indicated in the present study NO Will generate a significant loss or degradation of the natural soil resource of the sites where they would be built, because the intervening use capacity corresponds to class VIII.

It is also considered that the type of work and the location of the aforementioned installations do not geneRará urban nuclei in the area, Apart from regional urban planning, since its end is purely industrial.