



Consolidated EIA Process Summary

Espejo de Tarapacá Project

Region of Tarapacá, Chile

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1. INTRODUCTION

The following consolidated summary is based on the information generated in the Environmental Impact Assessment (EIA) of the Espejo de Tarapacá Project (EdT or the Project), including the public and formal process of impact assessment evaluation carried out in Chile. This process was conducted in accordance with the existing regulatory system that defines the type of works and/or activities, as well as, the specific locations and significant impacts generated by future projects that are required to submit an environmental permit application.

The impact assessment regulation requires that the application describe the baseline for 20 environmental components with bibliographic research, specification of expected species or findings in the area and, protected population, species, and land, as well as, field inspection of water, air and noise quality, considering the different seasons when relevant. The baseline includes all vegetation and wild life, terrestrial, marine, riverine, and birds, as well as, cultural heritage. The community must be described through the following specific five dimensions: geographic, demographic, anthropologic, socioeconomic and basic social wellbeing (social services and infrastructure), and in the case of protected populations, there is a special emphasis on their organization, belonging, cultural patrimony, values, symbols, ceremonies, use and value of the land and its resources.

The Project conducted a stakeholder engagement process at a national, regional and local level. This process was initiated at an early stage and was based on providing early, transparent and free information to stakeholders with regard to the Project's activities and plans. The stakeholder engagement plan implemented was designed to maintain fluent communication and relationships with the distinct stakeholders over the life of the Project. Once the stakeholders had been identified, meetings were coordinated with the most relevant parties to inform them about the Project and listen to their comments, questions and concerns. As part of the EIA approval process, the Project also conducted the required formal meaningful "community participation" process which included numerous community meetings and presentations to inform the communities about the Project and address their observations and concerns.

In Chile, EIAs are submitted to the Environmental Evaluation Service (*Servicio de Evaluación Ambiental* or SEA), the authority which coordinates evaluation of the study for technical verification of the application of correct methodologies and the appropriateness and completeness of the proposed measures with respect to the impacts identified. If the information is considered insufficient to make a proper impact evaluation and provide

certainty that the measures incorporated are appropriate, the SEA can reject the application before initiating a more detailed evaluation.

The SEA coordinates the participation from the various Public Service Agencies which are required to review and approve environmental permit applications. The Public Service Agencies involved in the evaluation and approval of the EdT Project EIA included: the National Forestry Agency, National Agency for Indigenous Development, National Agricultural Agency, National Fishing and Aquaculture Agency, National Water Agency, National Hydraulic Works Agency, National Tourism Agency, National Transportation Agency, National Electricity & Fuels Agency, National Geology and Mining Agency, Regional Maritime Authority, Ministry of Energy, Ministry of Agriculture, Ministry of Public Property, Ministry of Health, Ministry of Transportation and Telecommunications, Ministry of Housing and Urban Development, Ministry of Environment, National Monuments Authority, Superintendence of Sanitation, Superintendence of Environment, Municipality of Iquique, Municipality of Pozo Almonte, and the Regional Government of Tarapacá.

The preparation of the permit application for EdT required approximately two years, including field work, modeling, analysis, community engagement, engineering and design, and document preparation. The evaluation period was equivalent to one year and four months, including the public participation process and three requests for clarification or ICSARAs¹ issued by the SEA which were responded to by EdT with the submission of complementary information or Adenda². The consolidated evaluation report or ICE³ was issued on November 25, 2015 and the RCA⁴ or environmental permit was unanimously approved by all of the Public Service Agencies on December 10, 2015. The validity of the RCA is indefinite, as long as construction of EdT is initiated within 5 years of the approval date. Subsequently, two improvements to the temporary works layout have been presented to the SEA. The first minor modification was presented and approved by the SEA under a *Letter of Relevance* and, the second modification, principally related to the temporary works configuration and services, which was submitted as an *Environmental Impact Declaration* was also approved.

It should be noted that the technical and infrastructure components of EdT have been previously evaluated in Chile, both in the context of the Environment Impact Assessment

¹ ICSARA: Consolidated Report of Request for Clarification, Revision and/or Extension of the EIA issued by the SEA

² Adenda: Complementary EIA Addendum submitted by the Project in response to ICSARA

³ ICE: Consolidated Evaluation Report issued by the SEA

⁴ RCA: Resolution of Environmental Qualification issued by the SEA

System and in safety regulations. Similar projects that have been evaluated relate to the design, construction and operation of secure reservoirs and tunnels for hydroelectric plants, dams for agricultural irrigation, mining tunnels and tailings (as well as maintenance activities after closure), electric transmission infrastructure, roads, and intakes/discharges for thermoelectric power and desalinization plants, among others.

This document presents a consolidated summary of the EIA process for the Espejo de Tarapacá Project, including the evaluation process and approval conditions. The one-minute Project video which can be found at: <https://vimeo.com/152150996> provides a visual overview of the EdT Project's components. All the documentation for the environmental permitting process, including the original EIA, ICSARAs, Adendas, the public participation process, ICE, RCA, and notices and letters from the SEA and other Public Service Agencies, among others can be found on the SEA's website at:

http://seia.sea.gob.cl/expediente/expedientesEvaluacion.php?modo=ficha&id_expediente=2129687968.

2. EIA REQUIREMENT FOR THE PROJECT

In Chile there is a legally established system to determine whether a project is required to apply for an environmental permit under the Environmental Impact Assessment System (SEIA) which depends on the activities, works and location of the project. It considers the type and dimensions of the activities, works, inputs and outputs. In addition, there is a second filter to determine the type of instrument that must be presented to authorities depending on project impacts. If the Project could result in significant adverse effects on specific components, it is required to submit an Environmental Impact Assessment (EIA), if not, the Project may present an Environmental Impact Declaration. The Assessment is more demanding and requires obligatory implementation of a public participation process with the local communities.

It was determined that the Espejo de Tarapacá Project was required to enter the SEIA, as established by Law N° 19.300, Article 8 and 10 letters b), c) and p), as well as by S.D. N° 40/2012 of the Ministry of the Environment, Article 3 letters b), c) and p). It was determined that the Project is required to enter the SEIA with the submission of an EIA based on the following specific regulations:

- by virtue of Article 11(b) of the LBGMA in relation to Article 6(b) of the SEIA Regulations, since the Project generates or presents effects, characteristics or circumstances that could result in significant adverse effects on the quantity and

- quality of renewable natural resources, including soil, water and air. Specifically, in relation to letter b) due to the loss of specimens of the reptile group;
- by virtue of Article 11(f) of the LBGMA, in relation to Article 10, letter a) of the SEIA Regulations, since the Project could generate intervention of archaeological sites in the Coastal section; and
 - by virtue of Article 11 (d) of the LBGMA, and Article 8 of the SEIA Regulation, since the Project has works in and near an officially protected area.

3. PROJECT DESCRIPTION

3.1. General Overview

The Espejo de Tarapacá Project is a power generation project consisting of a reversible hydro pumped storage power station located in the coastal sector of Caleta San Marcos, about 100 kilometers south of the city of Iquique, and its Transmission System will connect to the existing Lagunas Substation in the northern part of the National Interconnected System (SEN based on the acronym in Spanish). The power station is located in the district of Iquique and the transmission system is located in the districts of Iquique and Pozo Almonte, all in the Tarapacá Region. The following GPS coordinates indicate the location of the Espejo de Tarapacá Project: Datum WGS84 HUSO 19 (Este 384.166, Norte 7.665.716).⁵

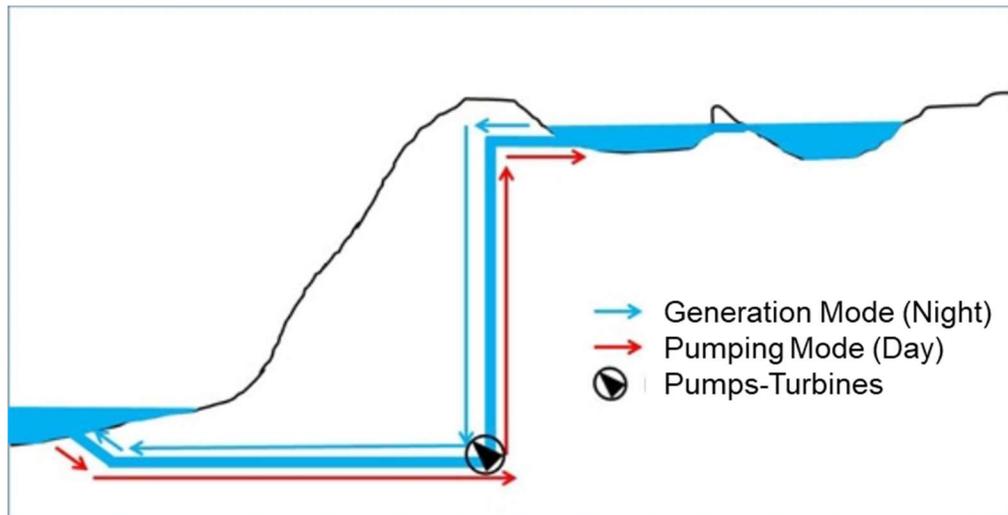
The general operating principle of the plant involves pumping seawater during the day, using energy from solar power plants located in the area which are connected to the SEN, storing it in a reservoir at higher elevation, and then, during the night, generating hydroelectricity by returning the water to the sea. In this way, production is achieved, which combines solar energy during the day with hydraulic energy during the night, ensuring 24 hours a day, 7 day a week (24/7) constant production that can be used to satisfy the power demands of third parties.

In order to achieve the above, three reversible Francis type turbines will be installed within a powerhouse cavern, which, operating with solar energy in pumping mode, will pump seawater up to a natural reservoir concavity located on a nearby upper plateau, and during the night, operating in turbine mode, will use the water accumulated in the upper plateau reservoir to generate energy and then return it to the sea. Both the seawater intake system and the tunneling system will be underground and bidirectional, i.e., the direction of the

⁵ A kmz file map for the Project can be downloaded on the SEA website by going to the following link <http://seia.sea.gob.cl/documentos/documento.php?idDocumento=2130295547> and selecting item "Anexos 1.1.2 Anexos Planos kmz CAD". Please note that downloading may take a few minutes due to file size.

water flow will depend on whether it is in pumping or turbine mode. The same tunnels, works and equipment will be used for both modes of operation.

Figure 3.1. Reversible Operation



The total installed pumping capacity is approximately 300 MW, which is equivalent to the total installed generation capacity of up to 300 MW; each reversible turbine will have capacity of 100 MW. In the pumping mode, the plant will consume 2.28 GWh/day, annual average, pumping an average flow rate of 45 m³/s for 8 hours, and in the generation mode it will produce 1.75 GWh/day, annual average, discharging at an average flow rate of 28 m³/s. The location of the marine intake/discharge is at 343 m from the seashore, which is outside of the Littoral Protection Zone defined by the marine authority, and at a depth of -15.5 m. The energy will be injected into the SEN at the existing Lagunas substation, via a 65 km high voltage electric transmission line (LAT).

Although this is a pioneering project at a national level, reversible pumped storage projects have vast international development and operational experience, with around 510 hydraulic pumping stations in operation, located throughout the world in locations such as the United States, China, Japan and Europe, among others, the oldest being the one located in Switzerland, on the Aare River, operational since 1908. In Japan, there is reversible hydro pumped storage plant similar to EdT which also uses seawater for electricity generation.

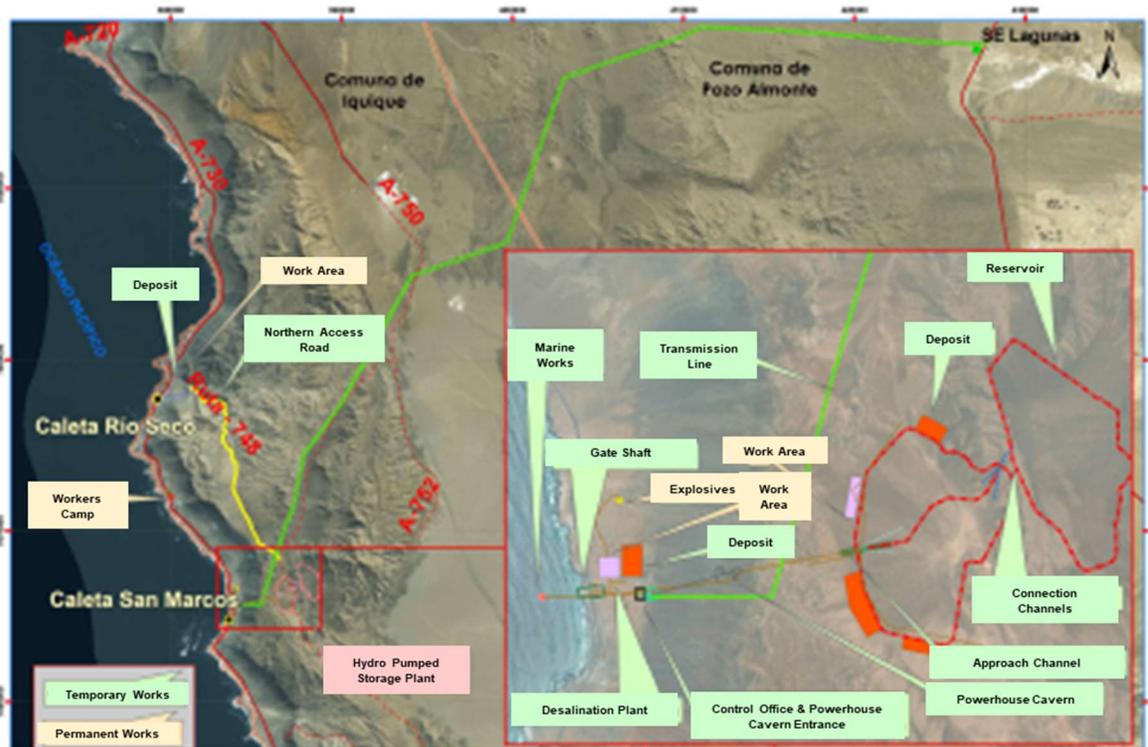
EdT will be developed in stages and the initial milestone is construction and installation of works.

3.2. Description of the Parts and Physical Works of the Project

This description includes both temporary and permanent works and activities that will be undertaken during the phases of construction, operation and closing of the Project.

The following figure shows the general layout of the works.

Figure 3.2. General Layout



The Project area, as in most of the northern regions of Chile, most of the land is state-owned. As a result, the Company has or will enter into leases, easements or concessions with the Ministry of Public Property in order to use the seashore and marine area, as well as to permanently secure the land needed for the entire generation facility, the transmission line and substation. It should be noted that there are two small fishing villages located within the area of influence, however no resettlement or acquisition of private property is required by the Project.

Although the land used by the Project is located in a desert area, the land occupation can be classified in marine, underground and terrestrial works and such works can also be described in accordance with three sections for analysis purposes: coast, plateau and

pampas. The following figures detail the works in each area. Photos were included in the EIA in order to provide an impression of the terrestrial areas.

Figure 3.3. Marine and Underground Sections



Figure 3.4. Coastal Section

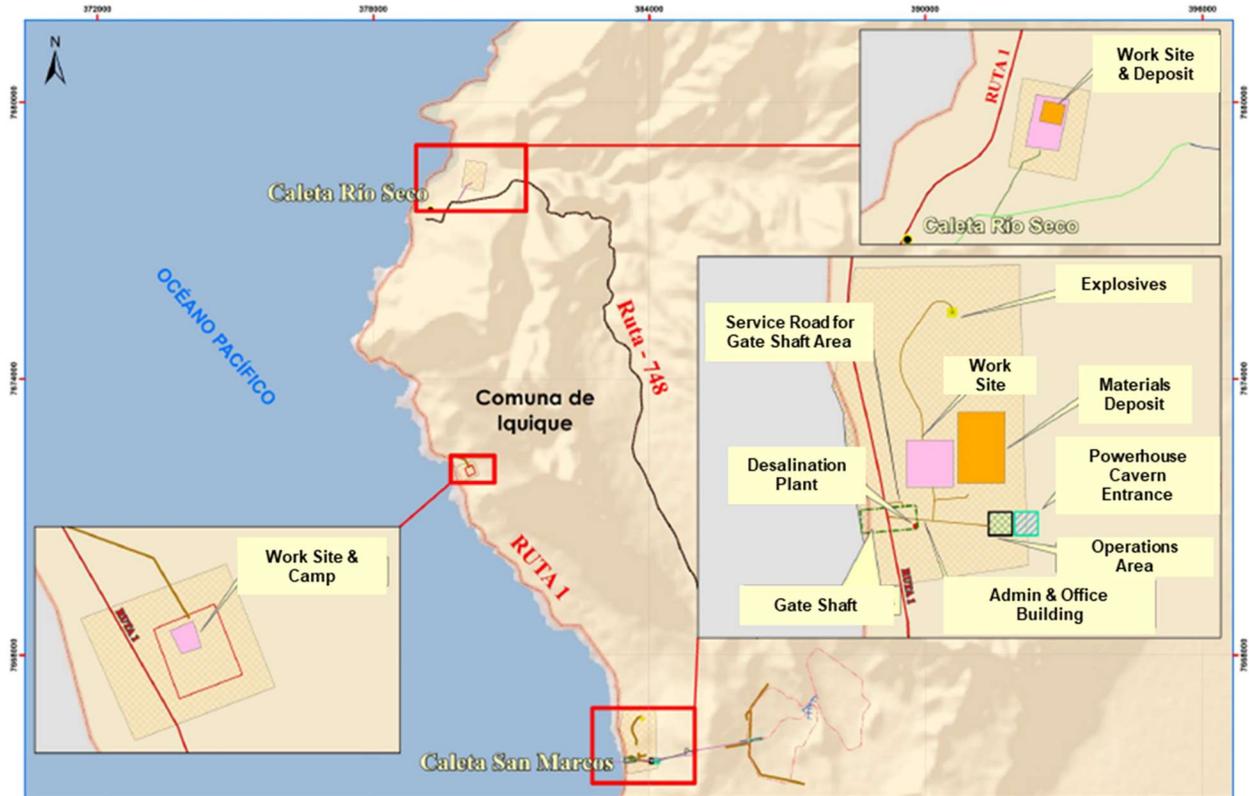


Figure 3.5. Plateau Section

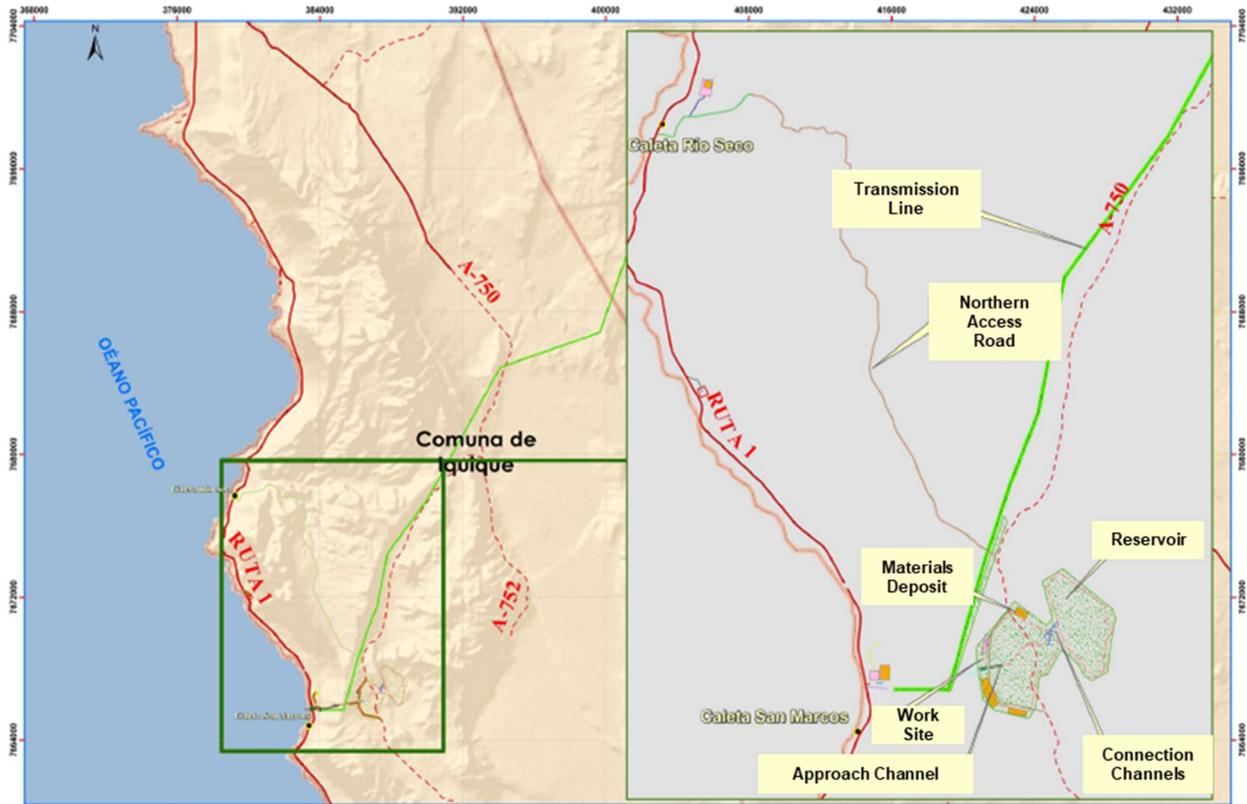
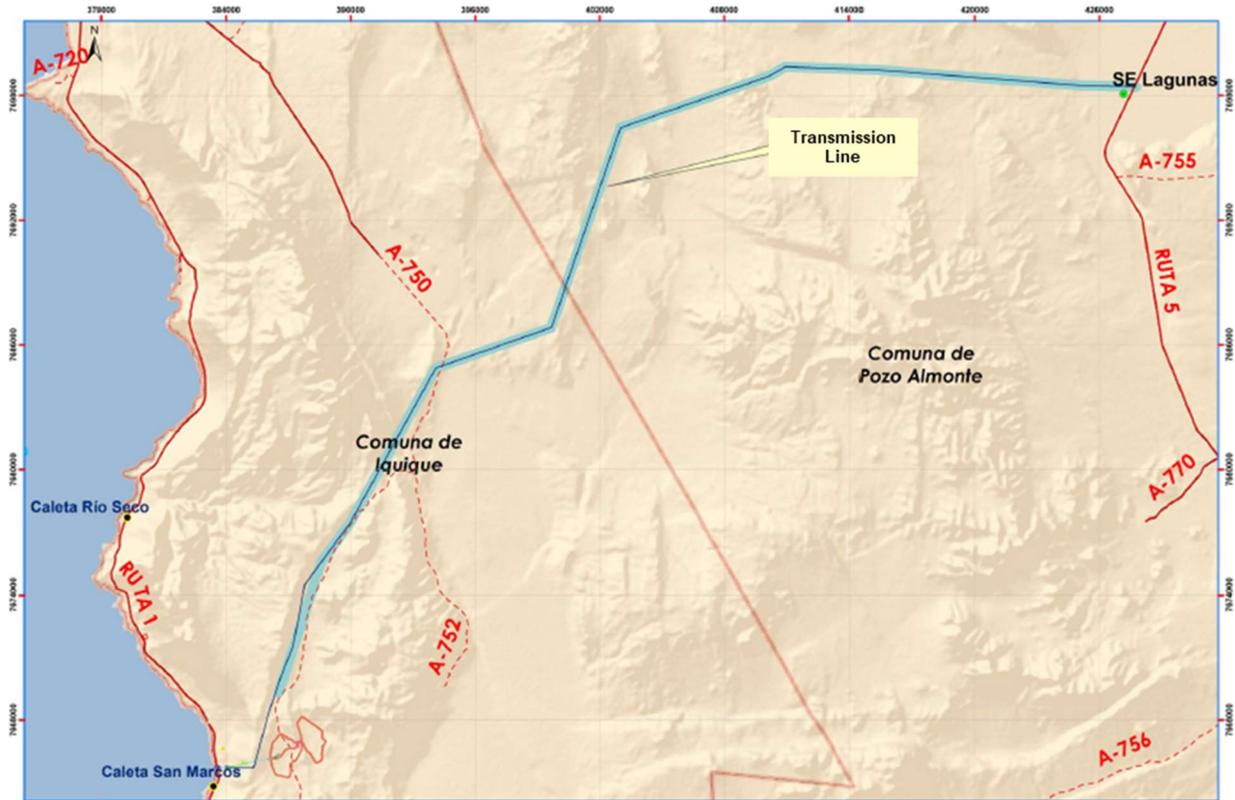


Figure 3.6. Pampa Section



3.2.1 Permanent Works

3.2.1.1 Submarine Sector

Submarine Intake and Discharge: located approximately at -15,5 m a.s.l. and it has a structure that surrounds it with a diameter of 16 m, total height of 6 m, solid cover of 10 m in diameter and the rest of the structure is a grid cage which totals 16 m in diameter. The base has 1 m of concrete and a grid of 5 m high sits on it with plates of 1 cm each to 5 cm distance. The underwater intake that will connect with the lower tunnel is located approx. 340 m from the coast and it has a diameter of about 5 m.

3.2.1.2 Underground Sector

Lower tunnel: a tunnel of 1830 m approx.; it is formed by 7 sections that connect the work of the intake and discharge with the powerhouse cavern. A 30-metre-long Lower Tunnel Gate Shaft will be installed, which will allow the tunnel gates to close. The Lower Tunnel Gate shaft access window is developed from the surface; and the Lower Balance Stack, of hydropneumatic type, consists of a blind tunnel built from the lower tunnel, with a length of 152 m, a diameter of 5 m, 6 meters high and an approximate slope of 13%.

Powerhouse Cavern: it contains the generation (pumping) equipment corresponding to the turbine-generators, the adduction shut-off valves and all auxiliary equipment. Armored steel trifurcations will be built in lower (discharge/generation) and upper (adduction/pumping) branches. The Transformer Cavern consists of an Access Cavern for the Transformers, and lateral Caverns where the transformers and the cable galleries are located. A compact underground GIS electrical substation is planned, located in the upper part of the Cavern. Access to personnel, machinery, supplies and equipment will be through the Powerhouse Cavern Access Tunnel. The first section of the LAT is underground and runs through this access tunnel approximately 1 km.

Pressure Shaft: it corresponds to a vertical underground work through which water will circulate under pressure for the generation of energy. It is about 502 m long and 4.9 m in diameter. It connects the Upper Tunnel with the Armored Tunnel prior to the Powerhouse Cavern. Its construction considers a lining with concrete.

Upper Tunnel: this tunnel is located immediately after the powerhouse cavern towards the pressure shaft; it is approximately 850 m long, with an inclination of 13%. It also has an Upper Balance Stack. The Upper Tunnel corresponds to the tunnel that connects the pressure shaft with the Reservoir. Its approximate section is of 25 m², with 5.6 m of height (floor to crown) and 5 m of width approx.

3.2.1.3 Coastal Sector

Operations Area: located near Caleta San Marcos, it has an administration and control building, workshop and warehouse building, industrial waste yard and warehouse for temporary storage of hazardous wastes, waste water treatment plant (WWTP), access, parking lots, service roads.

Desalination Plant: next to the Operations Area, it will have a capacity to desalinate up to 5 l/s during the construction and operation phase of the Project.

Works of Coastal Gates: The following accesses to the works are considered: Gates Shaft Surface Work; Access Window Portal to Gates Shaft; Access Tunnel Portal to Powerhouse cavern.

Stockpiling areas: they correspond to 2 deposits of 6 and 2 ha for the stockpiling of Excavation Material and Sand and Rock Excavation of Underground and Surface Works. It is planned to deposit the material in terraces.

North Access Road (Section Caleta Río Seco): This road considers the implementation of a new section and then the union with an existing route that will be improved. The first section corresponds to the first 2.5 km from route CH-1 towards the coastal cliffs, where the North Access road begins. This route will connect route CH-1 with route A-752, which from the coast has an approximate length of 15.3 km in total. 5 km of a new (planned) road through a bypass to the Reservoir are also considered.

Electric Lines: the construction of 4 electric lines in the Coastal Sector is considered, corresponding to the Medium Voltage Line to supply the Jobsite Facility and Operations Area (1,500 m); Medium Voltage Line to supply Camp; Medium Voltage Line, Jobsite Facility and Northern Access Road and a small part of the overhead section of the High Voltage Line of the Espejo de Tarapacá Project, which is subsequently developed in the plateau sector and mostly in the Pampa sector. The jobsite facilities will have 100-kVA back-up equipment.

3.2.1.4 Plateau Sector

Reservoir: it considers a reservoir located in two natural basins, called East and West Reservoirs respectively, both have a storage capacity of around 53,000,000 m³ of water, considering its maximum operating level of 608.5 m and a water mirror at that level of 375 ha. These reservoirs will be interconnected through a Connection Channel of 275 m and 7.5 m wide at its base, which is divided into two branches, north and south, 216 m and 300 m long respectively, which allow feeding independently the two portions into which the West Reservoir is subdivided.

The reservoirs will be covered with a highly impermeable bituminous membrane of a minimum thickness of 2.5 mm and will be surrounded in its entire perimeter by earth parapets of a variable height of up to 12 m and a width at its crown of 6 m where Project vehicles can circulate. The West Reservoir will be divided into two parts (North and South) by a division Parapet of about 1,350 m long, 4 m wide at its crown. The North-West Reservoir has a Drainage Channel 133 m long and 5 m basal wide.

There will be an intake and discharge of the reservoir and portals that allow access to underground works.

Reservoir Control and Communication Area: it consists of a closed local control panel for the operation phase, which will be used to monitor plant operation parameters in situ. It includes an electrical connection, a surveillance camera, and protection structure for the equipment of approximately 2 m by 3 m and a perimeter fence. This installation is not for the use of personnel, but only for equipment.

Medium Voltage Line North Access Road – Reservoir: from the existing line parallel to route A-1, a new medium-voltage line will be installed towards the reservoir and the jobsite facilities in the sector.

Access roads and road improvement: the north access connects route CH-1 with route A-752. It has an approximate length of 21 km, formed by part of a new road (planned) and the rest will be an improvement of an existing road. A 0.7 km section of Route A-752 will be improved. It is considered a detour of this route towards the west in the sector of the reservoir, in a section of 5 km.

Stockpiling areas: they involve 3 deposits known as Stockpile 1, 2 and 3, of 4.4 ha, 4.6 ha and 11 ha, respectively, for the stockpiling of Excavation Material and Sand and Rocks of the Underground and Surface Works. It is considered to deposit the material in terraces.

3.2.1.5 Pampa Sector

In the Pampa sector, the High Voltage Line and its service road will be installed. The LAT has an extension of 65 km running through the districts of Iquique and Pozo Almonte. It starts in the underground S/S GIS (planned for Espejo de Tarapacá), comes to the surface through the portal of the access tunnel to the powerhouse cavern, rests on a high voltage portal and a tower from where the coastal cliff rises and continues up the plateau and then the pampa to reach the S/S Lagunas of the SEN. It will have 202 towers, with a strip of right of way defined for each span. In the final section, approximately 600 meters before S/S Lagunas, an isolating substation for the connection of a future photovoltaic energy project is planned for a next stage of the Project. It will have a 67-km service road with an average width of 3.5 m.

3.2.2 Temporary Works

Jobsite Facilities: four jobsite facilities, three of which are in the coastal sector (Río Seco, Workers Camp and San Marcos) and the fourth in the plateau sector for the reservoir and LAT works.

Construction Roads: the main service roads add up to an approximate length of 3 km. Existing roads are considered sufficient. The Reservoir sector is considered sufficient, prioritizing the existing roads.

Construction personnel camp: capacity of 500 persons during construction, 7.5 km north of Caleta San Marcos, in an area of approximately 4 ha. The owner is currently leasing two houses in Caleta San Marcos.

Fixed jobsite facilities of the contractors: four Contractors' fixed jobsite facilities. The camp includes offices.

Work fronts: in addition to the jobsite facilities, there will be some container-type facilities equipped with offices, chemical toilets and areas for the stockpiling of materials and/or equipment, in areas of the tunnel portals, in the area of the reservoir connection channel and of mobile type in the High Voltage Transmission Line, the medium voltage line and the road that will connect Rio Seco with route A-752.

Powder magazines: up to 3 powder magazines on lands of 900 m² surface.

Medium Voltage Electrical Transmission Lines (LMT): four medium voltage power lines (23 kV), one that goes up from Río Seco to the Reservoir, a branch that goes to the Jobsite Facilities of the North Access Road sector, one for the Camp and another for the San Marcos sector, with their corresponding transformers, connected to the local distribution company's line that runs parallel to route CH-1.

3.3. Description of the Construction Stage

The construction phase will last approximately 5 years and a workforce of 750 persons in shifts is estimated during its peak of activity. The maximum number of workers housed in the camp at one time is 600, with shift rotation such that employees not working will live at their homes during downtime.

3.3.1 Activities

3.3.1.1 Submarine Sector

An opening will be made in the seabed using the construction method called "Norwegian Lake Tap Methodology", which consists of building the exit of the tunnel underground, from inside the Lower Tunnel by dynamiting the last section. The material originated by

the blasting will fall inside the tunnel in a cavity specifically arranged for this purpose, in order to keep the tunnel clear. When the explosion is carried out, the seawater will enter together with the material into the lower tunnel of the Project.

To avoid the entrance of fish or any other element present in the zone, the work of intake/discharge will be installed around this opening. A term of 6 months is estimated for its installation and assembly.

3.3.1.2 Underground Sector

The Underground Works Sector includes the construction of the following works:

- Tunnels, Shafts and Portals:
 - Lower Tunnel
 - Access portal to Gate Shaft of Tailrace Tunnel
 - Downstream surge shaft
 - Auxiliary Tunnel or Gallery
 - Powerhouse Cavern Access Tunnel
 - Pressure Shaft
 - Downstream surge shaft
 - Upper Tunnel
- Trifurcated Entry and Exit Turbine Branches
- Powerhouse Cavern
- Electric Substation

The construction of these works will begin with rock excavation using the Drill & Blast method which utilizes conventional pneumatic machines for underground mining.

The following materials will be used systematically for excavation and support: explosives, rock bolts, projected shotcrete reinforced with steel or fiber, Norwegian frames or steel web frames. In certain cases, other support material may be used such as marchiavanti (comprised of drilled or injected steel bars), radial perforated bolts or pipes, consolidating injections and/or waterproofing.

The following equipment will be used for construction:

- Jumbo drills for perforation
- Bulldozers and trucks for the loading and transport of rock deposits
- Mobile platforms for the installation of bolts and frames
- Concrete mixers for the transport of projected concrete
- Shotcrete machines
- Concrete pumps

The normal cycle of construction considers the following sequential activities:

- Perforation
- Loading of explosives

- Blast
- Ventilation
- Geological mapping
- Scaling
- Support

Required supporting equipment includes ventilation equipment, lighting, and water and air tubes.

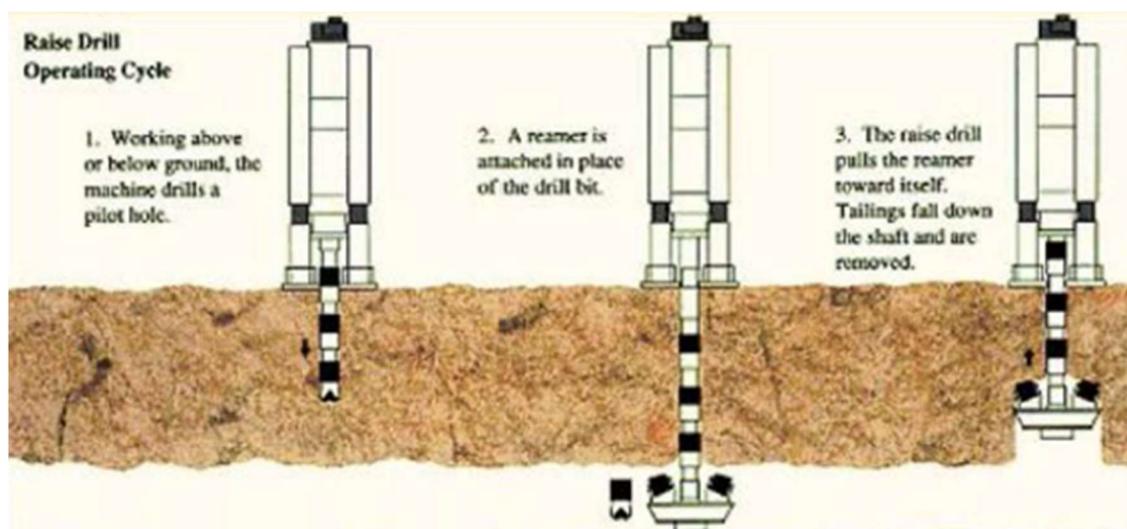
The Underground Sector also includes construction of the following Shafts:

- Lower tunnel gate shaft
- Pressure Shaft
- Upper surge shaft

The Lower Tunnel Gate Shaft will be excavated using the conventional Drill & Blast method, vertically excavating in sequence, starting from a small initial perforation, which will be widened from top to bottom removing the rock debris from the lower tunnel.

The Pressure Shaft will be constructed after the Upper Tunnel has been excavated until the high point of the shaft, where a Raise Borer machine will be installed. The Raise Borer will first perforate a pilot hole throughout the length of the tunnel, until reaching the location of the powerhouse cavern. Once the excavation of the powerhouse cavern access tunnel with the auxiliary tunnel or gallery has been completed, the tunnel opening will be widened to 4.2 m in diameter, proceeding to finish the perforation from bottom to top, with successive reaming.

Figure 3.7. Construction Cycle with Raise Borer



It should be noted that excavations will only be conducted during the construction phase of the Project.

3.3.2 Coastal Sector

The Coastal sector includes most of the works and actions associated with the Project's surface facilities, both temporary and permanent. The construction of the buildings will be performed with metallic structures, concrete and wood, metallic or similar formwork. Land will be levelled when required and excavated to fix the foundations. For temporary works, prefabricated modules (wood or containers) will be mounted on wooden or concrete foundations. Materials, equipment and structures will be transported by truck. Some works will require the use of cranes and heavy equipment. The activities associated with the construction of roads correspond to earthworks and compaction.

3.3.3 Plateau Sector

The main works correspond to the installation of the waterproofing membrane lining of the reservoir, the construction of exterior and divisional parapets, the construction of channels, as well as access to the Upper Tunnel and the works. The installation of the membrane will be performed in stages, starting with the preparation of the land, performing, as appropriate, scarping, compacting and filling for levelling. The parapets and channels will be built with heavy machinery and the required material will come from the excavations and earthworks.

3.3.4 Pampa Sector

The assembly of the metallic structures is considered for the towers of the high voltage line, which will be performed by means of mobile work fronts. In general, the foundations of the structures will be made of reinforced concrete. When the terrain and the design of the line allow it, the anchorage will be performed with the same material as the excavations. In cases where it is not possible to use concrete foundations, such as the case of firm rocks, special foundations will be used.

3.3.5 Supplies, Emissions, Effluents and Wastes

Water: drinking water will be supplied by the desalination plant at a rate of 5 l/s. Prior to start-up of the desalination plant and in the event that the plant is not operating for any reason, the supply will be contracted with authorized suppliers (drums or tanks).

Industrial water will be 1,200,000 l/day on all fronts, when the reef boring machine (RBM) is not operating, and 1,500,000 l/day on all fronts, when RBM is operating. Demand will be met with reuse, the desalination plant and purchase from third parties.

Electricity: the electrical supply will be provided through the medium voltage lines indicated, and there will be 100 kVA Diesel generators located in each jobsite facility, to operate in cases of electrical system emergencies.

Fuels: a maximum consumption of 5,500 l/day has been considered for construction. Metal tanks with a total capacity of 12,000 liters are considered.

Explosives: 485,000 kg of explosives approximately are considered for underground works. In the case of emulsion, approximately 382,000 kg of explosives will be required.

Concrete and aggregates: 36,400 m³ of concrete and 1,000 m³ of asphalt are estimated. It should be considered that a technical evaluation will be carried out on site in each section of the underground works to define the method of structural support, if the quality of the rock so requires.

It is estimated that 35,000 m³ of gravel plus 24,000 m³ of sand will be required. A large part of the material removed by surface and underground works is expected to be reused. If required, material can be purchased from an authorized third party.

Chemical supplies: the chemical supplies of largest consumption correspond to oils and grease, estimated in 58,240 l/month. Smaller quantities (less than 5 l/month) will be required for Diluents, Degreasers, Antisol and Mold Remover.

Table 3.1. Emissions, Releases and Wastes by Type, Approximate Quantity and Management Measures Considered by the Project during the Construction Stage

General	Emissions, Releases and Wastes	Quantity	Management
Emissions to the atmosphere	MP10 (ton)	2036,16	Particulate matter emissions will be controlled through periodic humidification on roads and work fronts. Combustion equipment and vehicles will be maintained periodically and will have, when appropriate, the required authorizations for their operation.
	MP2.5 (ton)	443,48	
	CO (ton)	673,57	
	NOX (ton)	2569,11	
	SO2 (ton)	18,48	
	HC (ton)	217,9	
	Noise	-	Noise emissions are associated with work fronts. Expected noise levels meet the standard
Liquids	Household liquid waste (waste water)	150 l/person/day	In the case of the camp, particular sewage systems are considered for the collection of waste waters connected to the Waste Water Treatment Plant (WWTP) to cover the maximum monthly staff on site, considering a water supply of 150 l/person/day. Such a system will be implemented for both the Main Jobsite Facilities and the Reservoir Jobsite. Sanitary effluents will be treated to meet quality as per NCh 1.333 of. 1978 and stored in a 40 m3 tank to be used for road wetting.
Non-hazardous solids	Household solid wastes	500 kg/day	All waste of domestic origin will be accumulated in the jobsite facilities and from there will be transported to authorized places for final disposal.
	WWTP sludge	2700 kg/,month	They will be periodically collected and managed by authorized third parties.
	Industrial solid waste (cuttings of wood, reels, irons, cables, etc.)	92 ton/month	They will be stored in an orderly manner in the non-hazardous waste collection yard until they are sent to their final destination, which will depend on their potential recycling.
Hazardous solids	Oils, lubricants, greases, batteries, empty paint drums, printer toner, brushes, batteries, oil filters, contaminated gloves, etc.	0,95 ton/month	Stored in properly labeled and sealed drums, in a specially designated place for a safe temporary storage in the jobsite facilities in compliance with all relevant legislation

3.4. Description of the Operation Stage

The Project will capture seawater during the day through the underwater intake work, connected to the Lower Tunnel where the water will be led to the Powerhouse Cavern. The pumping-generation equipment will be arranged in the Powerhouse Cavern, 3 Francis type units, each with a capacity of 100 MW of power, both in pumping and generation mode, with their respective transformers and valves. Subsequently, the water will be pumped through the Pressure Shaft to the Upper Tunnel and the water will reach the Reservoir through the final work of the Upper Tunnel called the Approach Channel.

Subsequently, during the night, 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 intake

and pumping, in this stage the water passing through the pumping-generation equipment making this equipment now act as turbines with a capacity of up to 300 MW, generating energy. This cycle is expected daily, with the plant being able in exceptional cases to operate 24 hours continuously or even for 9.7 days in generation mode.

Routine inspections and maintenance will be carried out on underground works and maintenance of equipment in order to extend the lifespan of the Project, as well as the High Voltage Electrical Transmission Line (LAT). The management and monitoring of the plant will be carried out from the Control Building.

The lifespan of the Project is indefinite. On average, the workers considered for this phase will be 30 in total, divided into three shifts. Occasionally, and for preventive maintenance of the plant, the maximum number of workers will be 50.

Main Supplies

Water: the drinking water will be supplied from the desalination plant and considers an approximate intake of 11 l/s of seawater, which will be subjected to processes of pre-treatment, filtration and reverse osmosis, generating a final maximum flow of approximately 5 l/s of desalinated water.

For electricity generation, a maximum intake of 45 m³/s of seawater will be required (8 hours per day on average), which will be pumped only during the daytime hours, and will then be returned to the sea when the plant generates energy during the nighttime hours at an average rate of 28 m³/s, reaching 56 m³/s operating at full capacity.

Electricity: The facilities for the operation of the plant will have direct power supply from the Project facilities.

Fuel: For this phase, the implementation of a tank to store fuels is considered in the facilities of the Project for the diesel engine of 500 kVA black start in cases of emergency in the SEN.

The following table summarizes the emissions and wastes generated by the Project, the estimated volumes and type of management they will receive.

Table 3.2. Emissions, Releases and Wastes by Type, Approximate Quantity and Management Measures Considered by the Project in the Operational Stage

General	Emissions, Releases and Wastes	Quantity	Management
Emissions to the atmosphere	MP10 (ton)	17,75	Particulate matter emissions will be controlled through periodic wetting on roads and work fronts. Combustion equipment and vehicles will be maintained periodically and will have, when appropriate, the required authorizations for their operation.
	MP2.5 (ton)	8,28	
	CO (ton)	49,13	
	NOX (ton)	217,43	
	SO2 (ton)	0,36	
	HC (ton)	0,02	
Fields	Electromagnetic fields	-	The 23 kV line generates interferences due to the crown phenomenon, but of a much lower intensity than the limit established by the international regulations, so that it does not represent in general a problem for communications.
Liquids	Household liquid waste (waste water)	7,5 m ³ /day	Specific sewerage systems are considered for the collection of waste waters connected to Waste Water Treatment Plants (WWTP).
	Rejection brine desalination plant	18.000 m ³ /month	It will be disposed to the sea through the work of intake and discharge.
Non-hazardous solids	Household solid wastes	50 kg/day	All household wastes will be accumulated in trash bins and from there they will be transported to authorized places for final disposal.
	WWTP sludge	180 kg/month	They will be periodically collected and managed by authorized third parties.
	Industrial solid waste (cuttings of wood, reels, irons, cables, etc.)	200 kg/month	They will be stored in an orderly manner until they are sent to their final destination, which will depend on their potential recycling
Hazardous solids	Oils, lubricants, greases, batteries, empty paint drums, printer toner, brushes, batteries, oil filters, contaminated gloves, etc.	200 kg/month	Stored in properly labeled and sealed drums, in a specially designated place for a safe temporary storage in the jobsite facilities in compliance with all relevant legislation

3.5. Description of the Closure Stage

The lifespan of a hydroelectric plant is considered unlimited, so the Project does not include an abandonment phase, but rather a maintenance plan, which includes improvements in equipment or processes, or simply adjustments consistent with technological changes, where equipment will be reconditioned and upgraded from time to time.

In the event that the cessation of operations is required, together with the hiring of labor, the activities considered in the closure and abandonment phase would be the dismantling or closure of the following works:

- Submarine Intake and Discharge
- Hydraulic Power Plant
- Power Transmission Lines
- Desalination Plant

- Reservoir
- Underground tunnels

4. AREA OF INFLUENCE AND BASELINE DESCRIPTION

The area of influence is defined below and a brief description is provided about the baseline for each of the components that could potentially be impacted by the Project.

4.1. Air quality

Area of influence: area including Caletas San Marcos and Río Seco and Tenardita Mine.

Brief description of the baseline: None of the sectors in which the Project will be located are in areas declared latent or saturated by any contaminant (including dust and fine particles).

4.2. Noise and Vibrations

Area of influence: 4 km around from the transmitter source. Within this radius there are sensitive receivers (Caletas San Marcos and Río Seco and Tenardita Mine).

Brief description of the baseline: The main sources of noise detected at the time of the measurements correspond to the noise produced by the interaction between the wind, vehicular traffic on Route 1 and the breaking of the waves. The values obtained vary between 36 and 52 [dB(A)] for the day period and between 29 and 54 [dB(A)] for the night period. On the other hand, it can be determined that the vibration records obtained for all the evaluation points are below the perception threshold defined in FTA-VA-90-1003-06 which is 65 [VdB].

4.3. Electromagnetic fields

Area of influence: 20 m on each side of the line (total 40 m), defined mainly by the behavior of the electric field. In the case of radio interference, an area of influence of 10 meters is defined on each side of the medium-voltage line.

Brief description of the baseline: Values measured in all locations are well below the regulated limits and do not pose a health risk.

4.4. **Geology and Geomorphology**

Area of influence: area of 50 meters around the works of the Project.

Brief description of the baseline:

Underground Works Sector Geology: The geological units present in the reservoir area are the following three:

- **Soils, Inland basins:** sand and gravel with some fine-grained. Intercalations of levels of cemented salts.
- **Rock, Central and east sector of the basins:** Volcanic rock with a high degree of weathering and surface erosion. Mainly andesites, dacites, rhyolites and red tuffs. Power strata between 10 and 30 meters.
- **Rock, West sector of the basins:** Volcanic rock with a high degree of weathering and surface erosion. Mainly andesites and dacites. No alternation between strata is observed.

Regarding the geology of the marine works' sector, the findings indicate the presence of marine sand with gravel, composed mainly of the erosion of intrusive rocks and, intrusive rocks, mainly granites to monzogranites with presence of mafic dykes. Present alterations are argillic to propyl.

The geomorphological units present in the Coastal sector are from west to east, Coastal Plains and Coastal Cliff.

- **Coastal Surface Works Sector:** The geomorphological unit corresponds to the Coastal Plain.
- **Plateau Sector:** The geomorphological unit present in this sector is the Cordillera de la Costa.

4.5. **Hydrology**

Area of influence: watersheds corresponding to the Project components

Brief description of the baseline: The area is characterized by its aridity, with high temperatures, low levels of rain and considerable evaporation rates. In relation to the hydrological characteristics of the study area, the absence of permanent watercourses stands out. The principal sub-basin is the Pampa de las Zorras y Salar Grande.

4.6. Hydrogeology

Area of influence: areas of the Project

Brief description of the baseline: The common characteristic is a low (Salar Grande and Pampa del Tamarugal) or null (underground corresponding to Jurassic-Cretaceous formations of plutonic and hypabyssal rocks composed of intrusive granite and impermeable basement, coast and part of the plateau) permeability, related to hydrological characteristics, the absence of permanent watercourses, and the climatological characteristics of high temperatures and low rainfall, which make this sector identified by being very arid and desert. In the Project area there are no aquifers identified, this is product of geological conditions or product of the absence of recharge in areas with low permeability and certain characteristics for underground storage.

4.7. Soils

Area of influence: area of 50 meters around the Project works

Brief description of the baseline: the identified soils presented null to scarce agricultural potential, with predominance of thick materials, sandy textures and without presence of roots, of high erosion, many with presence of desert pavement; thin in depth; with presence of sediments, high in gravel and stones and excessive drainage.

4.8. Marine water and sediment quality

Area of influence: the maximum area determined by the limits of dispersion of the thermal plume, saline and suspended solids both on the surface and on the seabed.

Brief description of the baseline: A dynamic behavior of the vertical structure of the water column is revealed, where the presence of the mixing layer and possible stratifications are modulated by the action of important physical forces or forcing agents such as prevailing wind and waves, which preferably come from the S-SW and W-SW, respectively. The salinity is almost homohaline except for the autumn campaign when this surface range fluctuated widely between 34.4 and 35.1 psu, and then decreases in gradient. Dissolved oxygen (DO) presents an important oxygenation at surface level that then undergoes a sharp decrease depending on the depth up to 10-15 m (0% saturation). The levels of chlorophyll registered in spring were indicative of a high productivity of the

water body and were noticeably higher than those obtained in summer. Water quality is good.

With regard to sediments, in the majority of the measurement stations and at the various depths analyzed, the results were the following: sediment particles (<0.1 ml/L) and suspended particles (<5.0 mg/L).

4.9. Terrestrial Flora

Area of influence: it covers the areas of jobsite facilities and development of Project activities.

Brief description of the baseline: it was determined that there is a total absence of vegetation, indicative of an absolute desert. Special interest was placed in the search for oasis of fog and tilandsias, with no field evidence suggesting the presence of either.

4.10. Terrestrial Fauna

Area of influence: it covers all of the Project areas and 500 meters around all of the Project works

Brief description of the baseline: Two distinct fauna environments and a site of interest were recorded, corresponding to a presumed nesting area of *Oceanodroma markhami* (sea swallow) on a section of the North Access Road, the presence of this potential habitat was not confirmed following the implementation of a field study requested by the Agriculture and Livestock Service that was initiated in the first round of questions and answers with the administration. A total of 24 species were recorded in the inventories, nine of which have some conservation status under current national legislation. The specific species found and associated national and IUCN classifications are detailed in the table below.

Table 4.1. Species Classification

Species	National Classification (CONAF ⁶)	IUCN Classification
<i>Phyllodactylus gerrhopygus</i> (bird)	Vulnerable	Least Concern
<i>Phalacrocorax bouganvillii</i> (bird)	Vulnerable	Not classified
<i>Pelecanoides garnotii</i> (bird)	Vulnerable	Endangered ⁷
<i>Leucophaeus modestus</i> (bird)	Vulnerable	Not classified

4.11. **Biological Oceanography**

Area of influence: the maximum area determined by the limits of dispersion of the thermal plume, saline and suspended solids both on the surface and on the seabed

Brief description of the baseline: The results of the studies indicate that **the intertidal Epibiota of hard bottoms, as well as that of soft bottoms** (sand) is consistent with conditions and ranges described in the literature. For the **subtidal bottom epibiota**, 6 different communities were identified, identifying 113 taxa. The specific richness recorded in all the communities is superior to other places of ecological importance on the Chilean coast. Ichthyofauna: a total of 17 taxa were recorded, the most abundant being the bilagay (*Cheilodactylus variegatus*), the burrito (*Chromis crasma*) and the cabinza (*Isacia conceptionis*). Within **the subtidal Macrofauna of sedimentary bottoms**, local conditions of severe disturbance not attributable to anthropic action are evidenced. During the **coastal vertebrate** campaigns, 22 species were identified, some of them with conservation problems. The dominant **phytoplanktonic** taxa corresponded to the chain-forming diatoms *Chaetoceros* spp. and *Eucampia* sp. The diversity of zooplankton in the study area (e.g. species richness) was comparatively lower than in similar coastal areas of northern Chile.

⁶ National Forestry Agency

⁷ It is important to point out that the evaluation of impact concluded that the Project will not affect this species.

There are videos of the intake zone that were presented in the first round of answers in this link: <http://seia.sea.gob.cl/documentos/documento.php?idDocumento=2130295547> see Anexo VIDEO, particularly Anexo Video T5 ZONA BOCATOMA.

4.12. Archaeology

Area of influence: Jobsite facility areas of the Project and for the linear works a buffer of at least 30 meters on each side of it.

Brief description of the baseline: 23 points of archaeological interest were identified:

- three traces of indeterminate ascription lacking associated diagnostic material, probably historical,
- a lithic set of medium density identified as pre-Hispanic,
- four structures / milestones of subactual or indeterminate data, a historical cemetery of the saltpeter period and platforms and imprinting of the old railway.

The remaining points correspond to landfills or accumulations of historical - sub- actual material, including the discovery of historical bottles and an accumulation of ore. No historical, anthropological or typical monuments are registered. The findings were distributed in the campsite (located in the coastal section), and in parts of the transmission line.

During the evaluation process, additional field work was done, it clarified the distance of the findings from the Project, in some cases it was over 100 m and were therefore outside of the influence area.

The following pictures are part of the public information and are presented here as reference of the findings:

Figure 4.1. Historical Findings



Figure 4.2. Historical Lineal Tracks



Figure 4.3. Pre-Hispanic Archeological Site



4.13. Underwater Archaeology

Area of influence: installation area of the intake works and discharge of the Project in the submarine sector

Brief description of the baseline: The research carried out concludes that no relevant indicators of findings were found for this component.

4.14. Paleontology

Area of influence: determined by a buffer of 50 m around the works of the Project

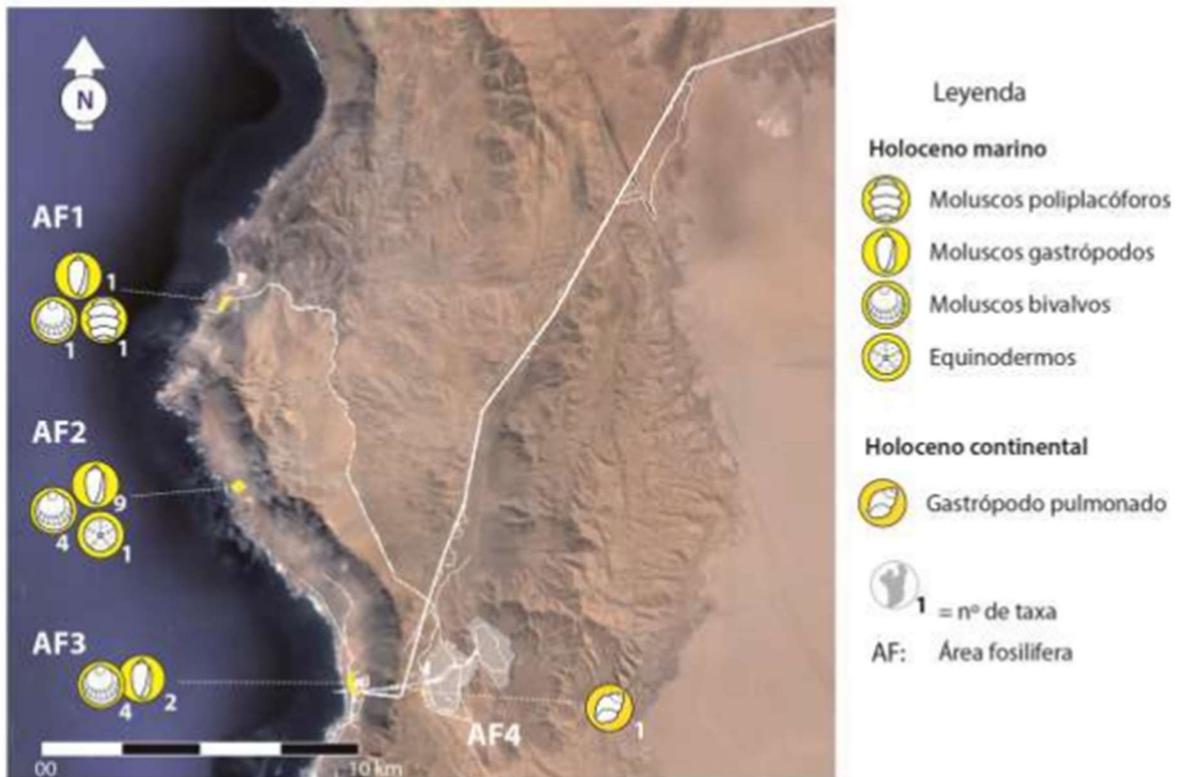
Brief description of the baseline: The presence of coastal deposits of fossiliferous material of the Holocene period, was detected in the camp area, in the coastal end of the access road and in specific points in the reservoir sector. These areas are characterized by strata with quaternary coquina in all areas (very abundant remains of potential future fossil invertebrates (in the fossilization process with different preservation qualities), in which the presence of bivalve and gastropod remains was observed. The following picture shows a general view of this layer of coquina.

Figure 4.4. Coquina Layer in the Coast



In the second round of questions (ICSARA) and answers (Adenda) a complementary study was developed considering the geological origin of the substrate in order to improve the focus on places with real fossil potential and discard areas with no potential. In the third ICSARA and Adenda round, it was deemed that there was a satisfactory characterization by the specialized regulatory agency. Remains of quaternary terrestrial gastropods of Gravas de Alta Hospicio were found on two levels. Additionally, the presence of fossil remains of Mesozoic marine invertebrates (corals and bivalves) was detected, over 100 m from the works. The following image shows the places and density of the Holocene period findings for the Project.

Figure 4.5. Paleontological Heritage Findings



4.15. Landscape

Area of influence: geographical space delimited by the visual basins of the potential observers of the Project

Brief description of the baseline: the character of the landscape is determined by the dominance of abiotic attributes, specifically geomorphological and soil elements. Landscape forms are stable and persistent so there is no great uniqueness of landscape attributes. Anthropogenic interventions are very low, being mainly dispersed roads, power lines, substation and some villages, so the landscape retains its naturalness. Visibility conditions vary greatly between the coastal sector and the pampas.

4.16. Protected Areas

Area of influence: sector where Project works will be located within the limits of the identified protected area, the Pampa del Tamarugal National Reserve, which corresponds to the interconnection of the transmission line to the existing Lagunas substation, located east of the Route 5 and inside the Reserve in a non-vegetated area. The works include two structures and 400 m of transmission line.

Brief description of the baseline: the closest protected area corresponds to the Pampa del Tamarugal National Reserve (1987), specifically in the existing Lagunas substation sector, which is located inside the Reserve. This reserve is a national plantation initiative to recover a deforested area in a desert environment; it has a surface of 134,000 ha. The main importance of this Reserve is the presence of the Tamarugo tree which develops in an extremely arid environment feeding on groundwater.

4.17. Tourism

Area of influence: Caleta Rio Seco and Caleta San Marcos, both small fishing communities, correspond to the main tourist attractions of the area, while the main routes correspond to Route 1, along the coast, and Route 5, inland.

Brief description of the baseline: The tourist services developed in the region focus on the city of Iquique, the Humberstone and Santa Laura saltpeter historic camps, the Pica oasis, the Mamiña hot springs, the Altiplano salt flats and the Isluga Volcano National Park, all of them outside the Project's area of influence. In the Coastal sector, two tourist attractions are identified mainly for local tourism: the San Marcos and Rio Seco coves, although there are no tours or standard services since there are no sanitary permits due to lack of an authorized drinking water supply. In the Pampa sector, the Pampa del Tamarugal National Reserve is identified in the Lagunas substation sector.

4.18. Landuse

Area of influence: an area of 50 meters around the works of the Project

Brief description of the baseline: Within the evaluated area, 97% of the land area is unused, it corresponds to an area devoid of vegetation, desert, with little to no anthropogenic development. The use of the remaining 3% of the surface area includes mainly residential use (houses in San Marcos and Río Seco), public spaces corresponding

to the road system (Route 5, Route 1, via A-750, A-752 and A-770), sanitary infrastructure (drinking water tanks) and energy (electric transmission line and substation Lagunas) and finally cultural equipment (ruins of the Bellavista saltpeter office transport system and salt ponds in Río Seco).

4.19. **Economic and Productive Activities**

Area of influence: San Marcos Cove

Brief description of the baseline: The main economic activity of the Region is mining. Trade and services represent the tertiary activities with the highest incidence. Fishing is another activity present in the region, both industrially and artisanal. These activities are developed mainly by men. Caleta San Marcos located near the Project area, is dedicated to the artisanal extraction of fish as well as mollusks and algae; this cove also has two AMERB (Areas of Management and Exploitation of Benthic Resources) for the production and extraction of mollusks and algae and an aquaculture concession. Only one of the AMERB works actively and there is no aquaculture development in the Chomache Bay area.

Based on the survey conducted by the Project in February 2014, the population of San Marcos is approximately 345 people, 282 of which reside permanently in the village. In accordance with the 2002 national census, only 23.4% of the population surveyed had been born in the District of Iquique.

The principal economic activity in San Marcos is fishing and two labor unions have been formed. The Union of Independent Artisanal Fishermen, Divers, Shellfish Collectors and Assistants from San Marcos is an important organization in the area. In 2014, the union had 45 active members from the village comprised principally of shellfish divers and assistants, although some of them also participate in fishing. This union was granted the management area or AMERB mentioned above. A second work organization was formed under the title Union of Kelp Gatherers and Apnea Divers in April 2014. This organization had 62 members as of June 2014.

4.20. **Infrastructure and Equipment**

Area of influence: those sections or sectors that will be intercepted by the Project and/or may be affected by its vehicular flows. In this case, the area of influence of the Project is

defined by the towns of San Marcos and Río Seco, the Lagunas electrical substation and Routes 5 and 1.

Brief description of the baseline: The basic infrastructure and equipment is concentrated in the sectors of San Marcos, Río Seco and Lagunas substation. The main road infrastructure corresponds to Route 5 and Route 1, both national highways which are paved. The energy infrastructure is provided by the Lagunas substation plus some electric transmission lines. Both the infrastructure and the equipment present in the area are of a rural nature, with basic services for the population of San Marcos and Río Seco. Río Seco has a Rural Ambulatory Health Service and a Primary Municipal School, both services cover other fishing coves. Drinking water is delivered by tank trucks from Iquique.

4.21. Human Settlements (Pampa and Plateau Sector)

Area of influence: Sectors adjacent to Project works and activities, and development of economic activities and infrastructure.

Brief description of the baseline: No human groups are identified, only economic activities linked to mining and transport. As a result of the absence of human settlement, there is no impact.

4.22. Human Settlements (Coastal Sector)

Area of influence: Sectors adjacent to Project works and activities, and development of economic activities and infrastructure.

Brief description of the baseline: The coves of San Marcos (informal settlement from the early 1980s, approx. 350 inhabitants) and Río Seco (salt port of Compañía Explotadora Salinas Punta de Lobos from early until mid-20th century, little remaining infrastructure of that period, from 1980s a small cove, approx. 300 inhabitants) are rural populated entities. They have access to public roads and regular public transportation, twice a day. There are squatter type dwellings and others which have been regularized. The large majority of the inhabitants live off of some activity linked to the sea and the exploitation of its resources (fishing, shellfish, and seaweed). Numerous social organizations are identified. An indigenous population was identified in Caleta San Marcos, of different ethnicities, coming from different regions in Chile and without ancestral or cultural relations among themselves and within this territory. In accordance with the 2013 registry from the Indigenous People National Development Commission or CONADI, the San Marcos area

has no registration of Indigenous Communities or Associations, based on information that was collected on site with the local population and leaders of regional, functional and worker organizations in the area.

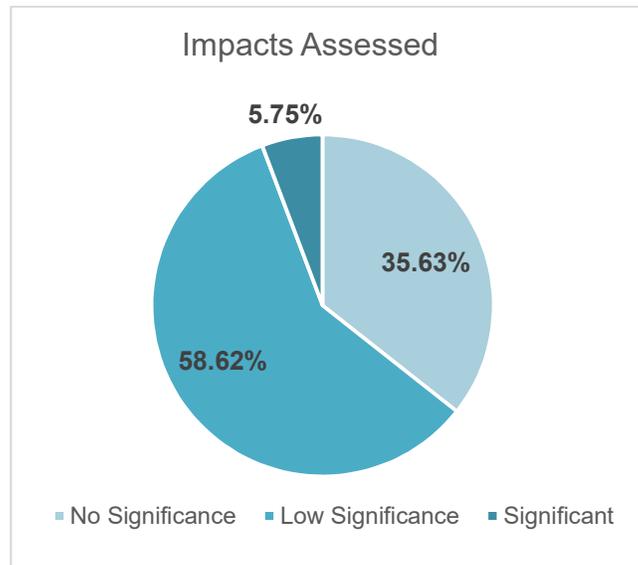
5. ENVIRONMENTAL IMPACT ASSESSMENT

The environmental impact assessment considered the identification of the activities that could generate impacts, and the following environmental components that could be affected:

- Air quality
- Noise
- Electromagnetic fields
- Geomorphology
- Chemical oceanography (water quality and marine sediments)
- Landuse
- Sites of Interest for Wildlife
- Species of fauna in conservation category
- Hard-bottom intertidal epibiota
- Intertidal macrobenthos of soft bottoms
- Subtidal benthic epibiota
- Ichthyofauna
- Subtidal macrofauna of sedimentary bottoms
- Planktonic Communities
- Coastal Vertebrates
- Archaeological Heritage
- Paleontological Heritage
- Visual Quality
- Protected areas
- Tourist attractions
- Geographical environment with social uses
- Dynamics of displacement within the territory
- Local demographic structure
- Local identity
- Local cultural expressions
- Sites of cultural significance at the local level
- Environment Assessment
- Local Economic Activities
- Economic use of space and natural resources
- Supply and demand of basic services

There were 21 activities identified in the phases of construction, 10 activities in operation and 7 activities in closure that could generate impact in the different sectors of the Project. In the end, 133 impacts were analyzed during the construction phase, 48 during the operational phase and 34 during the closure phase. The outcome was that there were 87 impacts, 5 significant impacts, 4 negative impacts and 1 positive impact. The following graph summarizes the type of impacts and the degree of significance.

Figure 5.1. Initial Impacts Assessment



The results of the impact evaluation indicate that the Project will generate "significant" impacts related to the components of terrestrial fauna, archaeological and paleontological heritage. These impacts are described below, ordered by environmental factor.

5.1. Significant Impact: "Effects of construction activities on the nesting area of *Oceanodroma markhami*".

This impact was later discarded in light of additional field work data and information presented during the evaluation process.

This species is present along the Humboldt Current on the coasts between Mexico and Chile. At a national level in Chile, this swallow is ranked as "data deficient". The site of findings was in a coastal section of the north access road. It was originally interpreted as of interest as an *Oceanodroma markhami* nesting area and could have been of high relevance due to its fragility and the importance a nesting place has for all species.

Nevertheless, during the evaluation process, additional field studies on birds, with special dedication to the identification of marine bird nesting places were required by the authorities and with this new information, this impact was discarded. The original findings were misleading and it was later confirmed that there is no *Oceanodroma markhami* nesting area on the north access road, nor in any of the other Project sectors. The Project voluntarily offered to perform a preventive field inspection prior to construction of the specific section of the access road to re-confirm the absence of *Oceanodroma markhami* in the Project sectors.

Originally, this impact was evaluated as negative and significant for the construction phase, while for the operation phase the impact has been evaluated as negative and of low significance. Ultimately, this impact was rejected by the authorities based on the specific field campaign findings.

5.2. Significant Impact: "Loss of sensitive reptiles as a result habitat destruction and vehicular transit"

The loss of individuals lizard specimens of *Liolaemus stolzmanni* (IUCN status *endangered*) and *Phyllodactylus gerrhopygus* (IUCN status *least concern*), could occur during the construction phase, due to Project activities involving land preparation for construction and assembly of structures and land work after the removal of the temporary facilities in those sectors where there were findings of reptiles, not throughout the entire project site. Additionally, potential losses could occur during the operation phase, due to the transit of vehicles intended for maintenance and transport of personnel and during the closure phase for Project activities involving earthworks and removal of facilities.

This impact has been evaluated as negative and significant for the construction phase, specifically in initial soil preparation and movement activities, while for the operation and closure phases, the impact has been evaluated as negative and of low significance given the minor intensity of the activities to be carried on the ground.

5.3. Significant Impact: "Disruption of archaeological sites".

This impact was better defined during the evaluation process and is related to Project intervention on isolated findings, linear tracks and one site.

The estimated impact for the 23 points of archaeological interest identified in the baseline is primary, as it is considered to be a direct consequence of the construction activities of the Project.

The identified effects of construction on archaeological points of interest will occur in the short term, i.e., during the construction phase. They can be organized in three groups: impact on site, impact on isolated objects or linear tracks and, proximity. In order to minimize possible effects in the medium and long term, management and protection measures will be implemented on the most sensitive points of archaeological interest.

This impact has been assessed as negative and significant, given that in accordance with Chilean law, all archeological findings are determined to be significant regardless of their quality and quantity. This estimate reflects a general and global evaluation of the total of 23 identified points of archaeological interest, ranging from isolated findings to one pre-Hispanic and historical archaeological sites.

5.4. Significant Impact: "Partial intervention of fossiliferous levels".

A more precise impact definition was determined during the evaluation after considering the geological information and additional field work.

Given that fossils and the places where they are found are protected by the Ministry of National Monuments Law (17.288) and that any impact is irreversible, the environmental valuation of this factor was determined to be high. However, none of the fossiliferous findings are exclusive to the recognized sites in the Project area of influence; they are abundant in the northern coast of the country. What was most significant during the impact assessment was the definition of geological places with no fossil potential, and the clarification of the kind of material that was found in the coastal section and in a punctual places in the plateau. The material is of the Holocene period, and therefore, rather in the process of becoming fossils.

During the construction phase, all effects are caused by activities related to intervention of the surface (earthworks or surface constructions) or in excavations of substrate with geological fossil potential.

Sites will be intervened directly by specific activities in the construction phase. However, most of the fossiliferous levels that emerge at these sites are large and it has been corroborated that the works will not affect all of the outcrops of these fossiliferous levels. They are also found kilometers from the Project area of influence, considering that only in the Project area, the same fossiliferous material is found in a range of 14 km along the coast, in the Río Seco sector, the camp sector and the San Marcos sector.

Bearing in mind the environmental assessment for this factor and the magnitude of the impact, it is evaluated as negative and significant.

5.5. Significant Impact: "Effects on basic services present in the area of influence". Positive significant impact during operation phase.

The analysis of the potential impact on the supply and demand of basic services was carried out in the area of influence of the Project where the community could be affected, corresponding to Coastal sectors: Caleta San Marcos and Caleta Río Seco. In the Coastal sector: Caleta Río Seco, only one potential impact was identified in the construction stage, as all the services for the workers will be provided by different suppliers, to intentionally avoid interfering with existing services.

The main positive impact will be the operation of the Project's desalinization plant that will supply water to the future authorized drinking water system for Caleta San Marcos, the supply will start during the construction phase and continue throughout the operational phase. It should be noted that after the EIA was submitted and the RCA was approved, the Project also entered into a community agreement for the supply of drinking water from the Project's desalination plant to the Río Seco Rural Water Council which will also start during the construction phase and continue throughout the operational phase.

In the construction stage, the actions of the Project susceptible of causing positive identified impacts are the hiring of temporary labor, the installation of jobsites and camp, the transportation of materials and the construction and improvement of access roads. During the operational phase, activities that could generate an impact are considerably reduced, and they are related to the hiring of labor for the maintenance of roads and the operation of the Project. These are isolated works that, in general, require fewer and qualified workers.

The impact on the construction phase of the Project in the Coast: Caleta San Marcos sector is considered of low significance. In the operation phase the impact is considered as significant and positive. As detailed in Section 11 below, the Project has entered into six community agreements with various organizations from San Marcos and Río Seco, which aim to share the benefits of successful Project development and completion with these communities and which are expected to induce significant positive impacts during the operation phase.

The impact during construction on the Coast sector: Caleta Río Seco sector is considered of low significance. In the operation phase, the occurrence of the impact is not anticipated to occur.

6. DISMISSAL OF POTENTIAL RISKS TO THE HEALTH OF THE POPULATION REFERRED TO IN ARTICLE 11(A) OF LAW 19.300.

The reason for submission of an EIA in the SEIA by the Project was explained above. The Project did not submit to the SEIA based on the provisions of Article 11(a) of Law No. 19,300 in relation to Article 5 of the SEIA Regulations, since it does not generate or present effects, characteristics or circumstances that imply risks for the health of the population.

7. MITIGATION MEASURES PLAN AND MONITORING OF ENVIRONMENTAL VARIABLES

7.1. Environmental Impact Mitigation Measures

The measures proposed to mitigate significant adverse impacts resulting from the development of the Project on the fauna component are presented below.

Table 7.1. Fauna Measures Plan. Impact: Loss of Fauna Specimens

Measure	Follow-up
Affectation of the nesting area of <i>Oceanodroma markhami</i>	Restriction on the start-up of construction of the northern access road in the area where remains of the Black Sea Swallow (<i>Oceanodroma markhami</i>) were found. Micro routing prior to construction.
Loss of specimens from the reptile group	Rescue and relocation plan for the species <i>Liolaemus stolzmanni</i> and <i>Phyllodactylus gerrhopygus</i> , moving them from the reservoir area to an area not intervened by the Project in order to avoid reduction and deterioration of the species. The plan will be implemented by area prior to the start of construction in each area.

Table 7.2. Archaeological Measures Plan. Impact: Intervention of Archaeological Findings

Measure	Follow-up
Distant findings will be identified with signs. This will consist of installation of a vertical sign that notifies of the finding with identification and provides a warning about its legal protection.	The presence of signs and the state of conservation of the signs will be verified monthly at each control point during construction in order to appropriately maintain and replace, if necessary, all the informative and safeguard signs installed.
The Archaeological Management Plan includes: <ol style="list-style-type: none"> 1) Site on Camp; rescue an analysis of scattered materials, before construction. 2) Site on Camp, the isolation of any area identified as more sensitive and no intervention at all. 3) Other isolated findings: rescue and analysis 4) Lineal tracks: topography and description of the track 1 km further, on each end of the area to be intervened. The rescue of findings will be implemented by specialists and the material will be delivered to the regional museum, in accordance with the decision of the Council of National Monuments, CMN.	Reports will be prepared with results and proof of final destination of the materials collected.
Permanent archeological monitoring, an archeological specialist will be available during the entire construction phase of the Project.	The inspection of specialists in protected historical and cultural heritage will be carried out on a monthly basis, while excavation and site preparation activities are carried out for the installation of the Project works. In the case of recording the progress of works involving excavations, it will be carried out daily by the site staff.
Training in the care of cultural heritage through induction and educational talks on the archaeological findings present in the Project area and their due protection, to all those who enter the work areas for the first time.	Maintenance of records with attendance to induction and evaluation talks.

Table 7.3. Paleontology Measures Plan. Impact: Partial Intervention of Fossiliferous Levels

Measure	Follow-up
The paleontological rescue plan will be carried out before the start of the execution of the construction works, including the collection of significant samples by specialists, with the respective geographical and stratigraphic positioning, curing of the paleontological samples collected in the laboratory, preparation of a catalogue of samples and their addition to the collection or museum indicated by the CMN.	Application for corresponding authorizations and submission of compliance report to the Superintendencia of Environment, with copy to the CMN, two months after completion of the construction phase.
Talks to promote the valuation of paleontological heritage to all those who enter the work areas for the first time.	Maintenance of records with attendance to induction and evaluation talks

7.2. Voluntary measures: Monitoring of Relevant Variables

The Project includes various voluntary measures aimed at monitoring the evolution of relevant environmental variables, which, without being the object of significant impacts, should be followed up in order to verify that they evolve as forecasted. The following correspond to the marine environment:

- Water quality component. Construction and operation phases
- Subtidal sediment quality component. Construction phase
- Intertidal sediment quality component. Construction phase
- Benthic communities. Construction and operation phases
- Planktonic communities. Construction phase
- Water quality for verification of dispersion model (T and OD). Operation Phase
- Water quality for verification of dispersion model (current dir.). Operation phase
- Subtidal sediment quality. Operation Phase
- Intertidal sediment quality. Operation Phase

In addition, the Project will monitoring of the water quality in the Reservoir and the meteorological conditions of the site.

Additionally, the Project will supply desalinized water from its plant to future drinking water system of Caleta San Marcos, an authorized project that will be developed by the Caleta and the Public Works Ministry. The Project will also supply drinking water to the Rio Seco Rural Water Council. It should be noted that after the EIA was submitted and the RCA was approved, the Project entered into a community agreement for the supply of drinking water from the Project's desalination plant to the Rio Seco Rural Water Council.

With regard to the community, the Project presented to the SEA the executed community that had been executed with the San Marcos Neighborhood Council, Fishermen's Union, and Kelp Gatherer's Union, all of which include a transparent and competitive development-oriented project funding system. It should be noted that after the RCA was granted, the Project also executed community collaboration agreements with the Rio Seco Neighborhood Council and Fishermen's Union following the same development-oriented principals. The agreement with the San Marcos Fishermen's Union also considers a protocol to study eventual negative impacts when formally declared and established by the environment compliance authority (as an independent third party), in their AMERB. The study is also required to include identification of the causes, a proposal and implementation of measures to recover from the impact and compensation based on the estimate negative impact in their incomes due to the reduction in production caused by the Project.

Finally, the Project will voluntarily monitor its intervention on the discarded nesting area of the *Oceanodroma markhami*, by implementing a micro-routing before the start of construction of the northern access road in the area where remains were found. The information gathered during the monitoring will be analyzed to avoid intervening in the nesting activity of the species in the sector.

8. CONTINGENCY AND EMERGENCY PREVENTION PLAN

The Contingency and Emergency Prevention Plan is presented in a specific chapter of the EIA which identifies potential natural and anthropogenic risks and describes the prevention and management system to be implemented. The contingency and emergency prevention plan identifies as potential natural hazards the flows of mud and avalanches, landslides and rockslides, tsunamis, earthquakes and waves. The plan also identifies the potential anthropogenic risks of: spillage of fuel, lubricant or dangerous substances in the sea, spillage of fuel, lubricant or dangerous substances on land, fire in the work area, traffic accidents, use of equipment and heavy machinery, use of transport, storage and handling of explosives, earthmoving, dismantling of equipment and immersion risks. For each of these situations, the operational and/or management measures that will be applied for handling of the situation are defined, avoiding the generation of impacts on the environment, people and equipment and facilities.

A contingency plan is proposed in the event of an increase in the temperature of the discharge from the reservoir. The operation is expected to discharge mainly during the night hours and with a temperature differential under 3°C (see figures in Section 13 below). The objective of contingency management is to protect the marine environment in the event that the discharge temperature differential is maintained over time and could fall in exceptional cases. For its implementation, it has been determined that the triggering limits are over 6°C in the field near to the surface and 4.5°C on the surface at 75 m from the discharge in the direction of AMERB B. In this case, the production capacity of the power plant in generation mode will be limited in order to stabilize the temperatures measured at sea within the accepted limits.

The emergency plan establishes the responsibilities, actions and procedures, in addition to the registration and communications systems that will be implemented in case of an emergency in the plant.

9. PLAN FOR COMPLIANCE WITH APPLICABLE ENVIRONMENTAL LEGISLATION

The applicable environmental regulations and their means of compliance are presented below.

Table 9.1. General Environmental Regulations Applicable to the Project

Regulations	Means of compliance
Supreme Decree N° 1.150 Political Constitution of the Republic of Chile	The constitutional guarantee is respected through compliance with current environmental legislation that requires the entry of the Project into the SEIA, and recognition of the institutional formalities created for this purpose. In this sense, when the Project is submitted to the SEIA, the obligations indicated are fulfilled, because the State, in the use of its powers and through its administrative bodies, with competence in the matter, will evaluate the Project environmentally, ensuring that the right to live in an environment free of pollution is not affected.
Law N° 19.300 Law of General Bases of the Environment	The Project Owner complies with the provisions of Law No. 19,300, by registering with the Environmental Assessment System (SEIA) through this EIA. In turn, the purpose of entering the SEIA is to evaluate its impact prior to its implementation, as provided in Article 8. As for the compliance indicator, the latter will be the RCA, and Espejo de Tarapacá SpA will proceed to what is established in the same, allowing the State to inspect it and thus ensure that the right to live in an environment free of pollution is not affected.
Supreme Decree No. 40/12 MMA, Regulation of the Environmental Impact Assessment System	The Project Owner is within the typologies that require mandatory entry to the SEIA. In addition, it generates effects whose forecast and evaluation, in accordance with articles 6 to 10 of the Regulation, require the submittal of an Environmental Impact Study. The EIA presented by Espejo de Tarapacá SpA, deals with these effects, through the measures described in article 97 and subsequent. All of the above, with the purpose of submitting the Project to the environmental assessment and qualification in the SEIA, aiming at obtaining a favorable Environmental Qualification Resolution.
Resolution No. 1518/13 SMA, establishes the consolidated, coordinated and systematized text of Resolution No. 574 of 2012. Requires information to the owners of projects that have a favorable RCA; instructing the form and mode of presentation.	If favorable RCA is obtained, it shall be uploaded to the platform http://snifa.sma.gob.cl/SistemaRCA within 15 working days from the date of notification. The compliance indicator, understood as a means of verification, is made up of the register provided as proof by the platform set up for such purposes by the Superintendence of the Environment.
Resolution No. 844/12 SMA, issues and instructs general rules on submission of conditions, commitments and measures established in environmental qualification resolutions	

Table 9.2. Specific Environmental Regulations Applicable to the Project

Regulations	Means of compliance
Air	
S.D. N° 144/61 MINSAL, establishes standards to avoid fumes or atmospheric pollutants of any nature.	The Project has incorporated emission control measures into its design, which allows it to adequately mitigate the impacts resulting from the construction and operation of the Project. Particulate matter released during the construction phase is mitigated through road wetting, mixing processes, and transfer of materials. Truck bodies will be sealed to prevent material from falling. Windbreak meshes will be used at the jobsites. Atmospheric emissions generated in combustion engines will be minimized by rigorous maintenance of the equipment, which will have their permits up to date. During the Operation Phase of the Project, emissions into the atmosphere will correspond to gases resulting from the circulation of vehicles. To mitigate this effect, vehicle travel speeds will be restricted and they will be required to keep technical revisions up to date.
S.D. N° 20/13 MMA, Establishes Primary Quality Standard for Breathable Particulate Material MP-10, especially the values that define emergency situations.	The Project has incorporated emission control measures into its design, which allows for adequate control of the impacts resulting from the construction and operation of the Project. Consideration is given to the wetting of roads throughout construction. Likewise, engines and machinery will be periodically reviewed and adjusted in order to minimize emissions generated by incomplete and inefficient combustion.
S.D. N° 12/11 MMA, Primary Environmental Quality Standard for Fine Breathable Particulate Material MP 2,5	The Project has incorporated emission control measures into its design, which allows for adequate control of the impacts resulting from the construction and operation of the Project. Consideration is given to the wetting of roads throughout construction. Likewise, engines and machinery will be periodically reviewed and adjusted in order to minimize emissions generated by incomplete and inefficient combustion.
S.D. N° 114/02 SEGPRES, Primary Air Quality Standard for Nitrogen Dioxide (NO ₂)	The Owner shall comply with these regulations, trying to perform adequate maintenance of equipment, machinery and vehicles to be used during the construction and operation stage, so as to minimize atmospheric emissions. A duly updated record of such activities will be kept.
S.D. N° 115/02 SEGPRES, Primary Air Quality Standard for Carbon Monoxide (CO)	
S.D. N° 4/94 MTT, Establishes contaminant emission standards applicable to motor vehicles and establishes procedures for their control.	The emission standards shall be complied with and all motor vehicles involved in the development of the Project shall be required to comply with these standards during all phases of the Project, which shall be verified by means of an up-to-date technical inspection and gas certificate. An up-to-date register shall be kept, the responsibility of which shall lie with the site manager. It will indicate the plate number of the authorized vehicles, according to the previous paragraph. In addition, the owner shall require that the transport of bulk materials through urban areas be carried out with the loading section of lorries covered with tarpaulins, in order to prevent the dispersion of dust and the fall of materials.
S.D. N° 75/97 MTT Establishes conditions for the transport of loads that indicate	
S.D. N°54/94 MTT, Emission standard for medium motor vehicles that indicate	
S.D. N°55/94 MTT, Emission standard for heavy motor vehicles that indicate	
S.D. N°138/05 MINSAL, Establishes an obligation to report emissions that indicate	The Owner will declare these emissions annually, through the RETC System of the Ministry of the Environment, web portal to enter the different sectorial systems of declaration in force. The compliance indicator, understood as a means of verification, is made up of the declaration register associated with the portal mentioned above.
Liquid Wastes	
S. D. N°594/00 MINSAL, Regulation on basic sanitary and environmental conditions in workplaces.	By means of contractual clauses, the supplier of the chemical toilets will be responsible for carrying out all the necessary steps to guarantee the sanitary cleaning of the area where they were located. With respect to the WWTP, this EIA provides the background for the granting of PAS 138, which describes the technical and environmental

Regulations	Means of compliance
	characteristics of wastewater management and plant operation. Once the favorable RCA is obtained, the permit will be processed by the Health SEREMI.
S.D. N°90/00 SEGPRES, Emission Standard for the regulation of contaminants associated with the discharge of liquid wastes to marine and continental surface waters.	The discharge of water from the Desalination Plant will take place outside the Coastal Protection Zone, thus applying the maximum concentration limits established in Table 5 of the standard under analysis. The Project's Environmental Vigilance Plan provides for monitoring measures, the reporting and compliance of which will allow the accreditation of compliance in situ.
Drinking water and waste waters	
NCh N°409/1 Of 2005 INN Chilean Drinking Water Standard	Since drinking water is purchased from third parties during the construction phase, it will be purchased from companies that have a valid authorization resolution, whose registry will be available to the inspection authority. The drinking water produced in a desalination plant will have the quality indicated.
S.D. N°236/26 Min. of Hygiene, Assistance, Prevision and Work, General Regulations of Particular Sewers, Septic Tanks, Filtering Chambers, Contact Chambers, Absorbent Chambers and Household Latrines.	The treatment system and other works required for the management and disposal of waste waters shall comply with each of the requirements stipulated in this decree, there being a record of the parameters set by the same. For such purposes, the technical and formal contents of PAS 138 are presented in the Sectoral Environmental Permits Chapter.
D.F.L N°1/89 MINSAL, Establishes matters that require express sanitary authorization.	This EIA provides the technical and formal background information for the granting of PAS 138, where the technical-environmental characteristics are described regarding wastewater management and plant operation. Once the favorable RCA is obtained, the sectoral processing of the permit will proceed before Health SEREMI.
S.D. N° 735/69 MINSAL, Regulation of water services intended for human consumption	The supply of drinking water shall be sufficient, easily accessible and available at any time to its workers with a minimum supply of 150 liters of water per person/day. The system of treatment and distribution of drinking water will ensure, at all events, the potability of the water for consumption. The drinking water treatment and distribution system will have the applicable sectorial permits, especially that of article 71 letter a) and of the final paragraph, both of the Health Code, in relation to D.F.L N° 1/89 of the Ministry of Health (which require express sanitary authorization).
S.D. N°4/09 SEGPRES, Regulations for the Management of Sludge from Waste Water Treatment Plants	The Waste Water Treatment Plant will have an engineering project approved by the corresponding health authority, as required by Article 9 of the Regulation. The sludge generated in the WWTP will be periodically removed by a third party with express sanitary authorization for this purpose. By means of contractual clauses, the Owner shall require the contractor to comply with these Regulations. In addition, there shall be a register evidencing the removal of the sludge and its frequency, which shall be available to the inspection authority.
Solid Wastes	
D.F.L N° 725/61 Health Code	Non-hazardous industrial wastes will only be stored in a salvage yard, which corresponds to a specially conditioned area (area with compacted soil and fenced) in the Project facilities. Those generated in work fronts will be transported daily to these salvage yards, which will have the technical and formal requirements indicated in PAS 140. Hazardous wastes generated during the construction phase shall be stored in accordance with the provisions of D.S. No. 148/2003, in a storage warehouse specially prepared for such purposes, in accordance with the technical and environmental requirements of PAS 142.
S.D. N° 594/00 MINSAL, Regulation on basic sanitary and environmental conditions in workplaces.	

Regulations	Means of compliance
	Prior to the start of activities, a statement will be submitted to the Health Authority indicating the quantity and quality of industrial wastes generated, clearly differentiating hazardous industrial wastes.
S.D. N°148/03 MINSAL, Health Regulations on the Management of Hazardous Wastes	Hazardous wastes generated during the construction phase will be stored in warehouses located in the waste management areas of the Project facilities for which PAS 142 is requested, the technical and formal contents of which are presented in the respective chapter. These warehouses shall comply with the design measures and requirements contained in Title IV (Articles 29 et seq.) of the Regulations in question. They shall have signage in accordance with Chilean Standard NCh 2.190 Of 93.
Hazardous Substances	
S.D N°78/09 MINSAL, Regulation on the Storage of Hazardous Substances	The warehouses will have a dividing wall when the type of substances requires it. They will have proper ventilation and signage. When the quantity of hazardous substances to be stored exceeds 10 flammable tons or 12 tons of another class of non-flammable hazardous substances, the owner will process the corresponding sanitary authorization according to the requirement of Article 5 of the standard under analysis.
S.D N°298/95 MTT, Regulates the transport of dangerous cargo on streets and roads	Given that the Project includes the transportation of fuel and explosives, the owner will request prior authorization from Carabineros de Chile. Vehicles of less than 15 years of age will be used in the transportation, and they will be required to comply with the corresponding technical revisions. Likewise, the rules contained in Articles 7 and following of the Regulations shall be observed in stowage, unloading and handling.
S.D. N° 209/06 MINSAL, Sets toxicity values of substances for the effects of health regulations on hazardous waste management	Hazardous wastes shall be classified according to this standard, where applicable. Their classification will allow determining the scope of application of the S.D. N° 148/04 in situ.
Territorial Planning	
D.F.L N° 458/76 MINVU, General Law of Urbanism and Constructions	The Project shall apply to the competent Authority for the necessary building permits for the works of the Project, submitting all the background information established in the regulations.
S.D. N°47/92 MINVU, General Ordinance of the Law of Urbanism and Constructions	The Technical Industrial Qualification will be processed, whose technical and formal contents are accompanied in this EIA through the request of the statement of article 161 of S.D. N°40/2012. Once environmentally qualified, the sectorial authorization will be obtained, operating as a means of verification the respective Sanitary Resolution.
Noise	
S.D. N° 38/12 MMA, Establishes standard for the emission of noises generated by sources that indicates, prepared from the revision of Decree N° 146, of 1997, of the Ministry of Secretariat General of the Presidency.	The standard is met in evaluated receivers.
Fuels and Equipment	
S.D. N° 160/09 MINECON, Safety regulations for facilities and operations of production and refining, transport, storage, distribution and supply of liquid fuels.	The tank shall comply with the design, construction and operation requirements of Title IV of this Regulation. In addition, the owner shall proceed to registration and certification in accordance with the technical requirements established by the Superintendency of Electricity and Fuel in Ex. Res. No. 1146-2008 or the one that replaces it.

Regulations	Means of compliance
	Finally, in the event of any accident, the Superintendency and the environmental authority shall be informed in accordance with the rules and procedures of articles 32 and following of this Regulatory body.
Roads and Transport	
D.F.L N°850/98 MOP, Establishes the consolidated, coordinated and systematized text of Law No. 15,840 of 1964, Organic Law of the Ministry of Public Works, and D.F.L No. 206 of 1960, Law on Roads.	To control the weight of the load, a record will be kept of the guides for dispatching the load to be transported, indicating the trip made, date and time, and the associated truck, indicating its plate number. In the event that overweight and/or oversized equipment needs to be transported, the owner shall request the corresponding authorizations from the Regional Direction of Roads. If third party transportation is required, such authorization shall be required by the owner. In cases where crossing or access to public roads is required, the owner shall request authorization from the Directorate of Roads, in accordance with the provisions of Articles 42 and 40 respectively.
S.D. N°158/80 MOP, Establishes Axle Weight Limits and Total Gross Weight Limits	The Project, through its contractors, will comply with the maximum dimensions for the circulation of vehicles on public roads, as well as with the maximum weight of vehicles that can circulate on public roads. The corresponding permits will be requested when a load exceeding the maximum weight limits established in the applicable regulations is required to be transported.
S.D. N°75/87 MTT, Establishes Conditions for the Transport of Cargoes that indicates	Contractor companies will be required to transport materials that prevent their dispersion into the air and to this end they should consider fully and effectively covering materials with appropriate sized tarpaulins, or other system so as to achieve this objective.
Resolution N° 1/95 MTT, Establishes maximum dimensions to vehicles that indicates	The trucks to be used in the Project will conform to the maximum dimensions established in this regulation. The corresponding permits will be requested when it is required to transport a load that exceeds the maximum weight limits established in the applicable regulations.
Marine Environment	
S.D N°430/92 MINECON, Establishes the consolidated, coordinated and systematized text of Law No. 18,892 of 1989, as amended, General Law on Fishing and Aquaculture.	The Project will take all the measures of protection and security provided by the rule, so as not to incur in the criminal type established in Article 136 of this legal body.
S.D. N°1/92 Min. of Defense, Regulations for the Control of Aquatic Contamination	Compliance with the standard under analysis is directly related to the application for PAS 115, whose technical and formal contents are enclosed for environmental assessment. The facilities associated with the discharge of seawater, its location and characteristics, as well as the characteristics of the place of discharge and of the receiving marine environment, are part of the content of the aforementioned permit. Once the innocuousness of the water to be discharged has been environmentally proven, prior to obtaining the PAS in the SEIA, it will be processed by the sector before DIRECTEMAR. On the other hand, the EIA is accompanied by an Emergency Plan, complying with the aforementioned standard, the contents of which are presented in Chapter 11 "Risk prevention and accident control measures".
S.D N°296/86 MINREL, Enacts the Agreement for the Protection of the Environment and the Coastal Zone of the Southeast Pacific	The sea discharge corresponds to the same water captured for power generation in the hydroelectric plant. The Project Description explains this system, which considers a Desalination Plant to treat seawater. Notwithstanding the foregoing, the Project considers periodic monitoring at individualized sampling points in the Marine Environment Monitoring Plan, included in the EIA, in annex 9.1.
National Monuments	

Regulations	Means of compliance
Law Nº 17.288 Legislation on National Monuments	If on the occasion of the excavations to be carried out or any other work to be carried out during the construction and operation stages of the Project - both on land and at sea - any archaeological site or site with cultural value not identified in the baseline is discovered, the owner commits to interrupt the work that gave rise to the finding and immediately inform the Regional Governor, Chilean Police and the Council of National Monuments, in order to adopt the necessary measures for the conservation of the site.
Ex. Decree Nº 311/99 MINEDUC, Declares Historical Monument Underwater Heritage that indicates, which is older than 50 years	
Protection of Terrestrial Fauna	
Law No. 19.473 Replaces Text of Law No. 4.601 on Hunting and Article 609 of the Civil Code	Prior to the construction of the Project, the owner will carry out a Rescue and Relocation Plan for the species <i>Liolaemus Stolzmanni</i> and <i>Phyllodactylus gerrhopygus</i> . For the foregoing, PAS 146 of D.S Nº 40/2012 MMA is requested, in Chapter 10. Together with the foregoing, the Owner shall instruct and prohibit its workers and contractors from hunting in all places where the Project will be developed.
S.D. Nº 5/98 MINAGRI, Hunting Law Regulations	
Protection of marine fauna	
Ex. Decree Nº 225/95 MINECON, Establishes a ban on hydrobiological resources that indicates	Awareness training will be provided to the staff regarding the biological importance of marine species and their conservation. Workers will be warned that non-compliance with species protection regulations is punishable by law and will not be permitted by the owner.
Ex. Decree Nº 1.892/09 MINECON, Establishes an extractive ban for the common sea lion resource in the area and period that indicates	Awareness training will be provided to the staff regarding the biological importance of marine species and their conservation. Workers will be warned that non-compliance with species protection regulations is punishable by law and will not be permitted by the company.
S.D. Nº179/08 MINECON, Establishes a prohibition on the capture of cetacean species indicated in waters under national jurisdiction.	Awareness training will be provided to the staff regarding the biological importance of marine species and their conservation. Workers will be warned that non-compliance with species protection regulations is punishable by law and will not be permitted by the company.
Law Nº 20.293 Protects cetaceans and introduces modifications to Law Nº 18.892 General Law of Fishing and Aquaculture.	Awareness training will be provided to the staff regarding the biological importance of marine species and their conservation. Workers will be warned that non-compliance with species protection regulations is punishable by law and will not be permitted by the company.

Table 9.3. Sectoral Environmental Permits (PAS) Applicable to the Project

PAS	Description	Request
PAS 115	Permit to introduce or discharge harmful or hazardous materials, energy or substances of any species into waters under national jurisdiction.	The Project includes the discharge of seawater in the power generation process.
		The Project considers the installation of a desalination plant, whose effluent will consist of rejection brine that will be discharged to the sea.
PAS 119	Permit to carry out research fishing	The Project needs to carry out exploratory type research fishing to monitor the condition of populations of hydrobiological species.
PAS 126	Permit for the construction, repair, modification and extension of any facility designed to manage sludge from wastewater treatment plants.	The Project requires the granting of this sectoral permit since activated sludge will be generated from 3 wastewater treatment plants.
PAS 132	Permit to carry out archaeological, anthropological and paleontological excavations.	The Project requires this sectoral environmental permit since works will be carried out in areas where there are archeological findings.
		The Project requires this sectoral environmental permit since works will be carried out in areas where there are paleontological findings.
PAS 138	Permit for the construction, repair, modification and extension of any public or private work intended for the evacuation, treatment or final disposal of drains, wastewater of any nature.	The Project will generate wastewater that will be managed through a particular sewage system, connected to 3 modular plants of activated sludge type.
PAS 139	Permit for the construction, repair, modification and extension of any public or private work intended for the evacuation, treatment or final disposal of industrial or mining wastes.	The Project considers the installation of a desalination plant, whose effluent will consist of rejection brine that will be discharged to the sea.
		The Project includes the installation of 2 batch plants, located in the San Marcos and Reservoir jobsite facilities, which will have sectors for washing the discharging chutes and mixing drums of the trucks used.
PAS 140	Permit for the construction, repair, modification and extension of any rubbish and waste treatment plant of any kind or for the installation of any place intended for the accumulation, selection, industrialization, trade or final disposal of rubbish and wastes of any kind.	The Project includes the temporary storage of non-hazardous household and industrial wastes.
		The Project includes the implementation of 5 stockpiles of excavation material, whose main objective is to collect the wastes from the extracted sand and rocks and the excess materials from the excavations and surface works carried out.
PAS 142	Permit for any site intended for the storage of hazardous wastes	The Project includes the temporary storage of hazardous wastes.
PAS 146	Permit for the hunting or capture of specimens of animals of protected species for research purposes, for the establishment of breeding centers or farms and for the sustainable use of the resource.	The Project includes the capture of specimens of protected species for the implementation of the Rescue and Relocation Plan for specimens belonging to this group.
PAS 155	Permit for the construction of certain hydraulic works	The Project includes for its operation to implement works whose water storage capacity will be greater than fifty thousand cubic meters and the associated aqueducts will have a flow greater than two cubic meters per second.
PAS 156	Permit to carry out modifications of the watercourse	The Project requires the granting of this mixed sectoral environmental permit, due to the fact that it must have the approval of the General Water Directorate (DGA) to build roads. It should be mentioned that watercourses are not permanent and the level of rain is low.
PAS 157	Permit to carry out regularization works or defense of natural watercourses.	The Project requires the granting of this mixed sectoral environmental permit, due to the fact that it must have

PAS	Description	Request
		the approval of the General Water Directorate (DGA) for the affectation of two natural ravines by the development of a new planned road. It should be mentioned that watercourses are not permanent and the level of rain is low.
PAS 160	Permit to subdivide and develop rural land or for constructions outside urban limits.	The Project considers the construction of works located outside urban limits.

10. RELATIONSHIP BETWEEN THE PROJECT AND REGIONAL AND DISTRICT DEVELOPMENT POLICIES AND PLANS

At the regional level, the pumped storage hydro Espejo de Tarapacá Project is part of a combined investment project⁸ which consists of the generation of baseload 24/7 electricity through the use of Non-Conventional Renewable Energies (NCRE). The energy generated by the Project will be supplied to the SEN.

Based on this, it can be concluded that in relation to the Policies, Plans and Programs of Regional and District Development, the Project will:

- Contribute to the sustainability of the region's water resources with the 5 l/s desalination plant to supply the Project and Caletas San Marcos and Rio Seco.
- Encourage the development of public awareness of environmental protection, by delivering environmental information to the community and through participatory monitoring.
- Contribute to the improvement of the communities' quality of life, with job training and hiring of local labor and supply drinking water to Caletas San Marcos and Rio Seco.
- Improve the availability of basic services by injecting 1.75 GWh/day of electricity into the Lagunas substation of SEN and constructing a local desalination plant.
- Evaluate potential environmental impacts and propose the necessary measures to avoid impacts.
- Collaborate with information on key components of biodiversity in the sector through baseline studies presented in the EIA.
- Contribute to the exercise of involving civil society in participation in environmental issues.

In conclusion, the Project is consistent with the instruments analyzed, inserting itself in a harmonious way with its strategic guidelines and objectives, especially with regard to contributing to the development of renewable energies in the region and building of a

⁸ EdT is being developed together with the photovoltaic solar Cielos de Tarapacá Project (which also submitted an EIA to the SEIA). The two projects will commercially integrate solar generation with pumped storage hydro generation in order to provide renewable 24/7 energy supply.

public awareness of environmental protection. It will make an important contribution to the sustainable development of the local economy through the construction and operation of NCRE. It will also facilitate the development of local companies and productive industrial growth through the supply of electricity in the SEN. In Caletas San Marcos and Rio Seco, it will also contribute to the diversification of economic activities by providing a stable supply of drinking water, as well as other significant benefit-sharing measures as part of the Project's community commitments. The Project is positively related to various aspects of the instruments reviewed and does not conflict with any of the regional and district guidelines, orientations and strategies considered in this analysis.

11. COMMUNITY ENGAGEMENT

The Project has also prioritized the establishment of an early, transparent, meaningful and inclusive relationship with the local communities.⁹ EdT's plant is located approximately 100 km south of Iquique, adjacent to the Caleta San Marcos fishing village with a population of around 300 inhabitants. A portion of the main works for the Espejo de Tarapacá Project, including the entrance to the powerhouse cavern, the ocean intake and the reservoir, are located close to the village. Most of the economic activities in San Marcos are related to the ocean, primarily fishing, and as a result, the community's principal concern relates to a potential impact from the Project on their livelihood. Interaction with the San Marcos community was initiated in 2012, approximately 2 years prior to submission of the environmental permit for the PSH plant, in order to address community concerns in early development.

In 2012, initial contact with community representatives from San Marcos was made by Valhalla's founders, who explained the Project and expressed their desire to establish an open dialogue with the community and involve them throughout project development, by identifying and addressing concerns and finding opportunities for mutual collaboration. Valhalla also engaged external local and international advisors to assist in the community

⁹ Annex 3 of the Gender Action Plan (included as Annex 5 to the Funding Proposal) contains a summary of the community engagement process prepared by the Consensus Building Institute entitled, "The San Marcos Community and the Espejo de Tarapacá Project, a History of the Community Engagement Process" prepared by the Consensus Building Institute.

See also video documental of the community engagement process prepared by Consensus Building Institute at: <https://vimeo.com/176207738>

engagement process, including the Consensus Building Institute, an international NGO dedicated to promoting dialogue and effective stakeholder engagement, in order to help design and facilitate a collaborative and interactive process. In early 2013, three open meetings were held with the community and a separate meeting was conducted with the local fisherman's union. During these meetings the team presented the Project and listened to the concerns of community members. In October 2013, the team organized face to face visits to every house in San Marcos in order to introduce the Project on a more personal level.

Upon commencement of the environmental studies, Valhalla established and implemented a formal work methodology with San Marcos, which included joint working table sessions (mesas de trabajo). One of the outcomes of these sessions was the creation of a special commission focused on addressing issues related to ocean studies and impacts. By August 2014, more than 20 meetings had been held resulting in a series of measures taken by the Project development team, including improved communication lines with community representatives, joint visits to existing power plants, and the hiring of a special consultants to support the community with its analysis of the EIA. In August 2014, prior to submission of the PSH EIA to the authorities, two working plan agreements (planes de trabajo) were executed, one with representatives of the general community and another with the fishermen's union. Both agreements constitute a commitment to maintain a constant dialogue between the community and the Project.

In March 2015, individual collaboration agreements were executed with the Neighborhood Council (Junta de Vecinos) and the Fishermen's Union of San Marcos (Sindicato de Pescadores) to govern the interaction with the community during development, construction and operation of the Project. It should be noted that both organizations implemented voting processes in order to decide whether or not the community agreements should be approved. The Company later signed similar agreements with the Kelp Gatherers' Union (algueros) of San Marcos (April 2016) and the Neighborhood Council, Fishermen's union and Rural Water Authority of Rio Seco (October 2016), another fishing community located relatively close to certain minor Project works.

The agreements executed with local community organizations, which includes the neighborhood council, fishermen's union, and kelp gatherers' union, includes the stipulations listed below which aim to share the benefits of successful Project advancement and completion with those affected.

- Creation of a development fund for the San Marcos Fishermen's Union to help them implement economic development projects (~\$100K USD/year) upon start of construction;

- Creation of a social fund for Caleta San Marcos to support economic development projects and student scholarships throughout the operation of the PSH plant (~\$95K USD/year);
- Creation of a development fund for the Kelp Harvesters' to build a meeting space and other economic development projects (~\$70K USD one-time payment with \$10K USD/year for the first 5 years of operation);
- Creation of a development fund for the Rio Seco Fishermen's Union to help them implement economic development projects (~\$100K USD/year for seven years);
- Creation of a social fund for Caleta Rio Seco to support economic development projects and student scholarships (~\$45K USD/year for four years);
- Provision of potable water for Caletas San Marcos and Rio Seco at a fraction of the current cost (potable water is currently trucked in from Iquique), which will help to significantly improve their quality of life and health;
- Incentive for construction contractors to hire local labor.

It should be noted that the community agreements will be managed by a non-governmental entity (*Fundación Espejo de Tarapacá*) formed by the Project, which will also include directors from the community. Additional information related to the community and a summary of the provisions of all six community agreements executed can be found in the Gender Assessment and Gender Action Plan, respectively, included in Annexes 4 and 5 to the Funding Proposal.

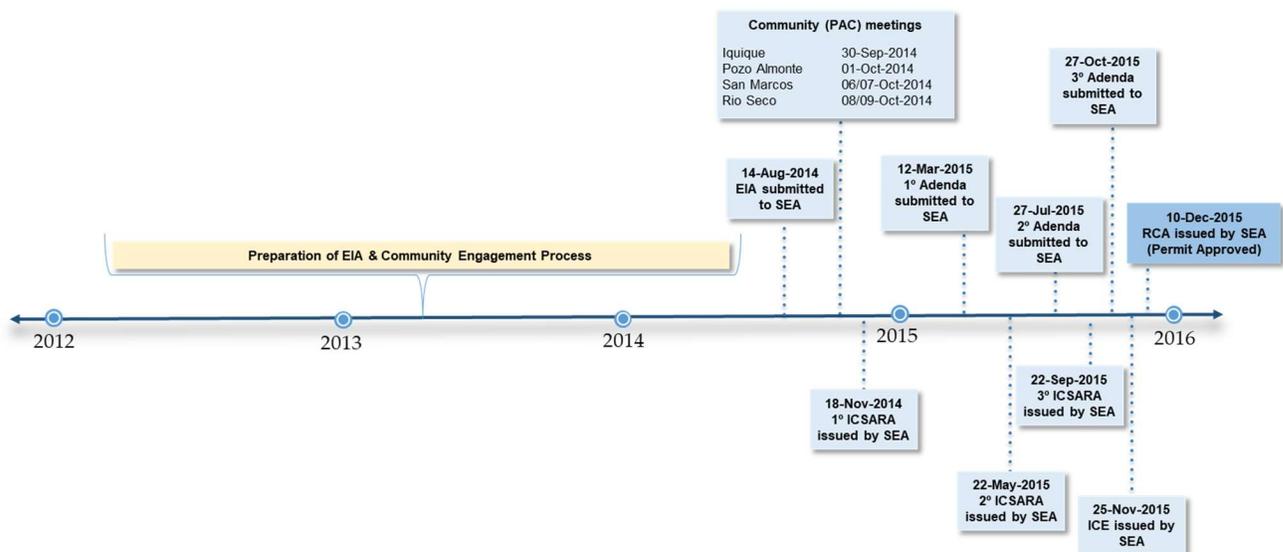
The Project's commitment to establishing a sustainable, transparent and mutually collaborative relationship with the community, as demonstrated with the team's time and active presence, has helped build a trustworthy relationship which was fundamental in reaching and addressing difficult issues and reaching constructive agreements. The Project continues to actively participate in the community. In May 2015, the San Marcos office was expanded to include a Public Connectivity Centre, a public internet space, for use by students and other residents, who previously did not have access to the internet. It should be noted that paper copies of the EIA are available for review at the Public Connectivity Centre. The Project has implemented other community initiatives such as an education programs to assist adults in finishing high school and surveys to determine the specific areas of interest for establishing technical training.

The social license to operate has been obtained from the communities who are positively considering the Project and expecting its realization. Community engagement efforts will continue throughout all the Project phases to maintain trust and social acceptance.

12. TIMELINE

The figure below details the major milestones in EdT's EIA process. The EIA processing period including the community participation process, consultations and the submission of complementary information was approximately one year and four months. The EIA was submitted on August 14, 2014 and unanimously approved by authorities on December 10, 2015 without complaints or observations.

Figure 12: EIA Process Timeline



Terms & Acronyms:

EIA	Environmental Impact Study
SEA	Environmental Authority (<i>Servicio de Evaluacion Ambiental</i> or SEA)
PAC	Community Participation
ICSARA	Consolidated Report of Request for Clarification, Revision and/or Extension of the EIA issued by the SEA
Adenda	Complementary EIA Addendum submitted by the Project in response to ICSARA
ICE	Consolidated Evaluation Report prepared by SEA
RCA	Resolution of Environmental Qualification (Permit Approval)

13. MAIN ISSUES

During the EIA process three requests for clarification or ICSARAs were issued by the SEA which were each responded to by EdT with the submission of complementary information or Adenda. The main topics that the authorities asked to clarify, complement or confirm in each ICSARA by each specific Public Service Agency are summarized in the following table.

Table 13.1. ICSARA Observations by Public Service Agency

Services	Observations ICSARA 1	Observations ICSARA 2	Observations ICSARA 3
CONADI (Indigenous people National Development Commission)	Complement the baseline on indigenous people.	As there is no evidence of protected indigenous community or area, no further observations.	No observations
SAG (fauna) CONAF (vegetation), Agriculture SEREMI , Housing Ministry SEREMI	<p>Clarify works and impact in the RN Pampa del Tamarugal. Complement base line searching for tilandsiales.</p> <p>Describe the medium voltage pole, consider all the transmission infrastructure and its impacts on sea birds. Monitor during three years the effect on wild fauna.</p> <p>Describe works in the coast related to the Desalinization Plant and its impacts on wild fauna.</p> <p>Complement field work, between December and April, in all the Project area for the species of sea swallows (<i>Oceanodroma markhami</i>, <i>Oceanodroma hornbyi</i>, <i>Oceanites gracilis</i>) for they are classified as "Data Deficient" and more information is needed to assess the baseline and impacts. Adapt the measures according to that new information.</p> <p>Complement information for the release of the relocated reptiles, PAS 146, and present kmz plans for the PAS 160.</p> <p>Complement layout information for the PAS 160</p> <p>Must monitor wild fauna every three months in the reservoirs. Keep a register on any incident with wild fauna.</p> <p>Provide information about protected and endangered species to the workers.</p>	<p>Regarding the sea swallows field study, improve the methodology description and the cartography of the findings in relation with the Project works.</p> <p>Regarding the absence of fauna at the Laguna Substation, justify with field work.</p> <p>Complete the information for PAS 146</p> <p>Complement measures to avoid night lighting impacts on birds</p> <p>Present the cartography of the sectors with flight deterrents for birds</p> <p>Present the noise monitoring plan.</p>	
DGA (Water General Direction), DOH (Hydraulic Works Direction), SERNAGEOMIN (National Service of Geology and Mining), Transport and Telecommunications Ministry SEREMI, Roads Direction	<p>Provide more details of the works on natural (river) beds.</p> <p>Explain where the treated water will be disposed.</p> <p>Detail the volumes of water that will be used and its origin.</p> <p>Review the hydrogeological influence area, particularly in the reservoir sector.</p> <p>Regarding PAS 155, as it looks after the continental water quality, analyze its relation with the marine water. Review the application of PAS 156 and 157.</p> <p>Complete all the geological information to determine the stability of the underground works.</p> <p>Include the prevention of leaking system for the reservoir and the membrane maintenance program and repair protocol. Present the Contingency and Emergency Plans for the reservoir.</p> <p>The works related to public roads must comply with sectorial regulation.</p> <p>Clarify access roads and signals, as well as geometric design of junctions.</p>	<p>Review the hydrogeological influence area.</p> <p>DOH establishes conditions to the delivery of desalinized water for Caleta San Marcos (<i>note: there was a previously signed agreement between the Caleta and the Project</i>)</p> <p>Complement the geological information.</p>	<p>Provide information about the feasibility of the Project to deliver desalinized water to the Caleta San Marcos drinking water system.</p> <p>Requirement to survey the groundwater in the coastal section, near the tunnel.</p>

<p>SERNAPESCA (National Fishing Service), SUBPESCA (Fishing Undersecretary), Iquique Marine Authority</p>	<p>Explain the disposal of the marine duct of the power plant in a closing phase (<i>note: there is no duct, there is a tunnel</i>)</p> <p>Confirm the suction velocity and present the discharge velocity.</p> <p>Present the maintenance program for the intake.</p> <p>Complement the marine baseline and give the geographic coordinates of the points characterized.</p> <p>Clarify aspects of the discharge modeling.</p> <p>Complement the marine monitoring program, include a calculation to estimate the impact on economically relevant fish and the larvae recruitment.</p> <p>Provide the geographic coordinates of the intake/discharge.</p> <p>Present the compensation measures in the event the AMERB might be affected.</p> <p>Present a security protocol to prevent harming fauna during the submarine works.</p> <p>Regarding the Desalinization Plant, inform the geographic coordinates, the use of chemicals and the characteristics of its discharge.</p> <p>During the operation phase the discharge of the desalinization plant and the power plant must be assessed together (<i>note: the discharge of the desalinization plant will flow into the tunnel, and therefore be combined with the reservoir discharge, and the proportion is such that when discharging in the sea, the water quality is the same as the reservoir's water quality. Proportion: saline discharge 7.9 l/s versus 28.000 l/s in average and 56.000 l/s maximum discharge form the reservoir.</i>)</p> <p>Complete information for PAS 115, discharge.</p> <p>The PAS 119 will be approved once these observations are resolved.</p> <p>Explain the balance of energy generation.</p>	<p>The Survey Plan for the marine component must be implemented during the entire duration of the Project, and include protected species.</p> <p>The Security Protocol to prevent harming fauna during the submarine works has to include communication with SERNAPESCA.</p>	
<p>Environment Ministry SEREMI, SEC (Electricity and Fuels Superintendence), Public Property SEREMI, Energy Ministry SEREMI, SERNATUR (National Tourism Service)</p>	<p>Present kmz of the Project.</p> <p>Clarify the relation of the Project with the photovoltaic plant.</p> <p>Explain the average hourly flow presented for the power plant.</p> <p>Describe the transmission infrastructure and the measures to avoid bird electrocution and collisions with it.</p> <p>Fully describe the precise place at the bottom of the sea (<i>note: approx. 25 m²</i>) where the tunnel will emerge.</p> <p>Consider in the marine model extreme weather conditions.</p> <p>Include specific vegetation in the base line of the cliff.</p> <p>Consider the impact of submarine blasting, noise and vibrations. Include measures, if necessary.</p> <p>Describe the desalinization plant construction and operation with more detail, present geographic coordinates.</p> <p>Explain impacts at 14 km distance from the discharge, in the sea (<i>note: there are no such impacts</i>)</p> <p>Although the Project has unlimited life, present a closure phase description (<i>note: it was included in the initial presentation</i>).</p> <p>Justify the air quality data used in the base line and present all the data.</p> <p>Update housing data in the Project area and evaluate noise impact.</p>	<p>The impact assessment should consider impact on fauna at the reservoir for the (<i>note: hypothetical</i>) closure phase.</p> <p>Include images of the transmission line, with and without the Project.</p>	

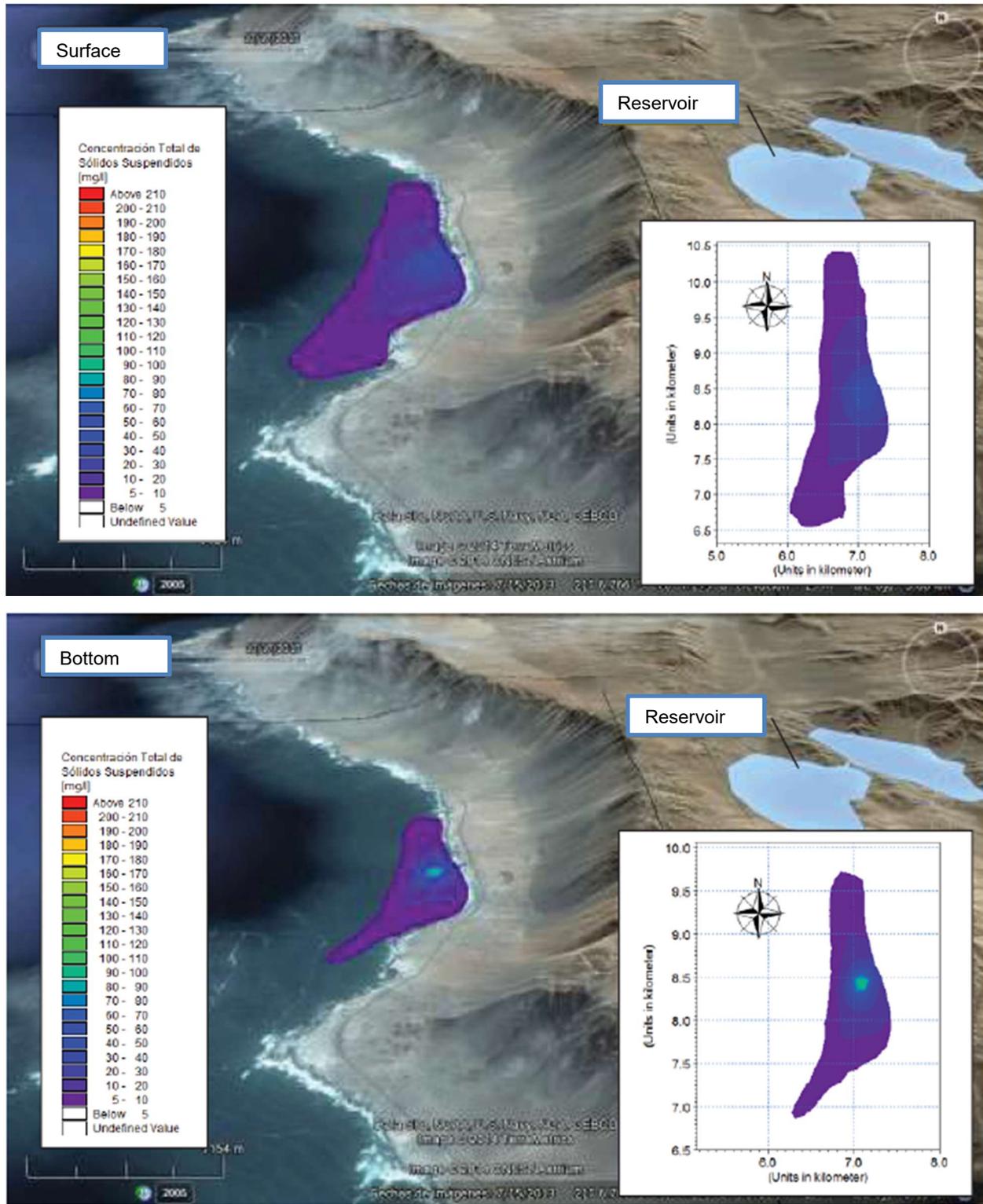
	<p>Include a reservoir monitoring plan.</p> <p>Include management of fuel spill inland in the Contingency and Emergency Plan.</p> <p>Include images of the Project and the impact of the Project area in tourism.</p> <p>The lookout points and signals must be presented to sectorial authorities.</p>		
Health Ministry SEREMI, Sanitary Services Superintendence	<p>Identify chemical products that will be applied to the sea water and the treatment before the discharge.</p> <p>For waste deposits describe the treatment, management and final disposal.</p> <p>Describe the concrete plant and the measures to control PM emissions</p> <p>For industrial liquid waste, describe the treatment, management and final disposal.</p> <p>Justify the air quality data used in the baseline.</p> <p>PAS 138, complete the information on the water treatment system</p> <p>Complete information on liquid waste from cleaning the Desalinization Plant filters</p>	Include the emissions from the Concrete Plant in the estimations for the Project.	
CMN (National Monument's Council)	No observations	<p>Must complement the base line with field work.</p> <p>Must consider the geological characteristics of the Project placement for the paleontological base line.</p> <p>Must clearly relate each finding with its measure.</p> <p>The CMN defines measures for archeology and paleontology.</p> <p>The CMN establishes in situ monitoring of an archeologist and a paleontologist.</p>	<p>Present all the information concerning two probing.</p> <p>The CMN defines measures for archeology and paleontology.</p> <p>The CMN establishes in situ monitoring of an archeologist and a paleontologist.</p>

It should be noted that some of the topics raised by the authorities were included in the original presentation but probably were not easy to find (for instance, the coordinates, the joint operation of the power plant and the desalinization plant, the closure phase description), and as a result, some answers indicated where to find the information in the original documents submitted.

With regard to the impact from the discharge of the hydro pumped storage plant into the sea: based on the data accumulated from the four field work campaigns performed to characterize the marine environment, one for each season, and the modeling of the operation during a period of 20 years, the EIA determined that the impact is not significant. The design of the intake aims to avoid vertical flows and its dimension and components consider the design goal of an average speed of 0.15 m/s for the intake and the grid spacing is 19 mm.

The differences in sediments, temperature and salinity in the discharge were modeled and analyzed, showing low ranges of difference. The outcomes of the saline differential showed that they were under 5%, the limit recommended by Australian standards. To analyze sediment dispersion, the data indicated that there would not be a relevant difference in the discharged water, nevertheless, the discharge value that was modeled was the maximum allowed by regulation, in order to cover the worst scenario, but not because it was expected to occur. The maximum differentials at the bottom and surface of the sea are shown in the following figures.

Figure 13.1. Maximum Area of Sediments Differential



The temperature of the discharge was modeled with the maximum areas on the surface and bottom of the sea. The assumption that the discharge results in a differential of 0.3°C are shown in the following figures. A 0.3°C change is in the range of the temperature differences that any organism in the influence area would experience under natural conditions, therefore the impact is specific and low.

Figure 13.2. Maximum Area of Discharge Temperature Differentials on the Surface

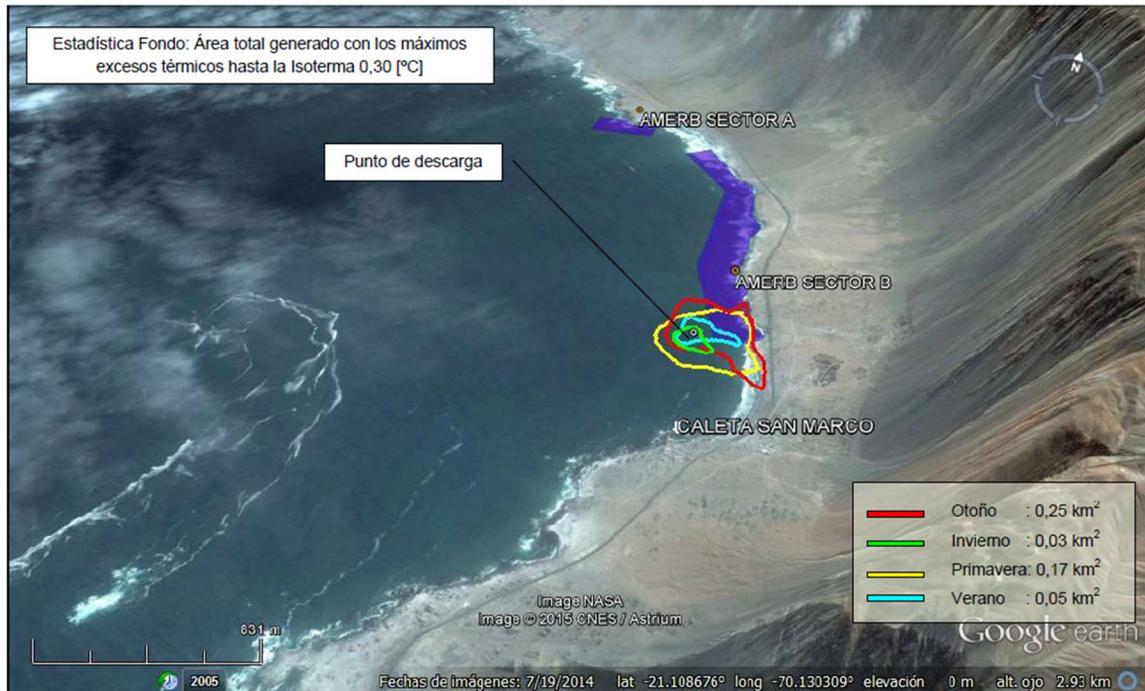
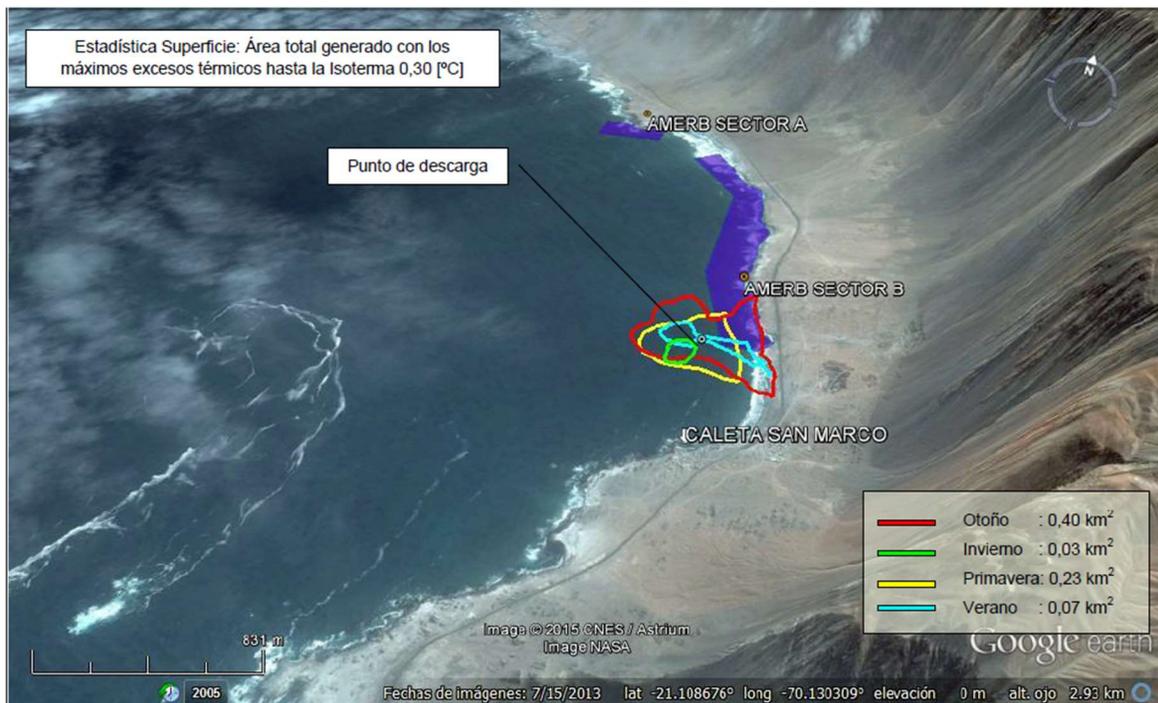


Figure 13.3. Maximum Area of Discharge Differentials at the Bottom of the Sea



The suction impact was modeled, considering the 0.15 cm/s velocity, the top cover of the intake and the sea movement; the results concluded that vertically the suction may have an impact up to five meters over the cover, and horizontally within 15 m and 25 m.

Regarding the community socioeconomic activities: The roads will not be blocked nor cut off by the Project and the activities have considered a first stage of preparation of the necessary infrastructure, including a new road to the reservoir, prior to start of construction. It should be noted that the existing roads have sufficient capacity for incorporation of the Project. The works in the sea, which is the main source of economic income for the community, is in a very specific and small area near Caleta San Marcos that has no economic importance, and the AMERB will be monitored during construction of the intake. Security measures will be a coordinated with the community. During operation, there are no significant impacts expected, nevertheless the Project will continue to monitor water quality and marine life.

The Desalination Plant uses an osmosis system.

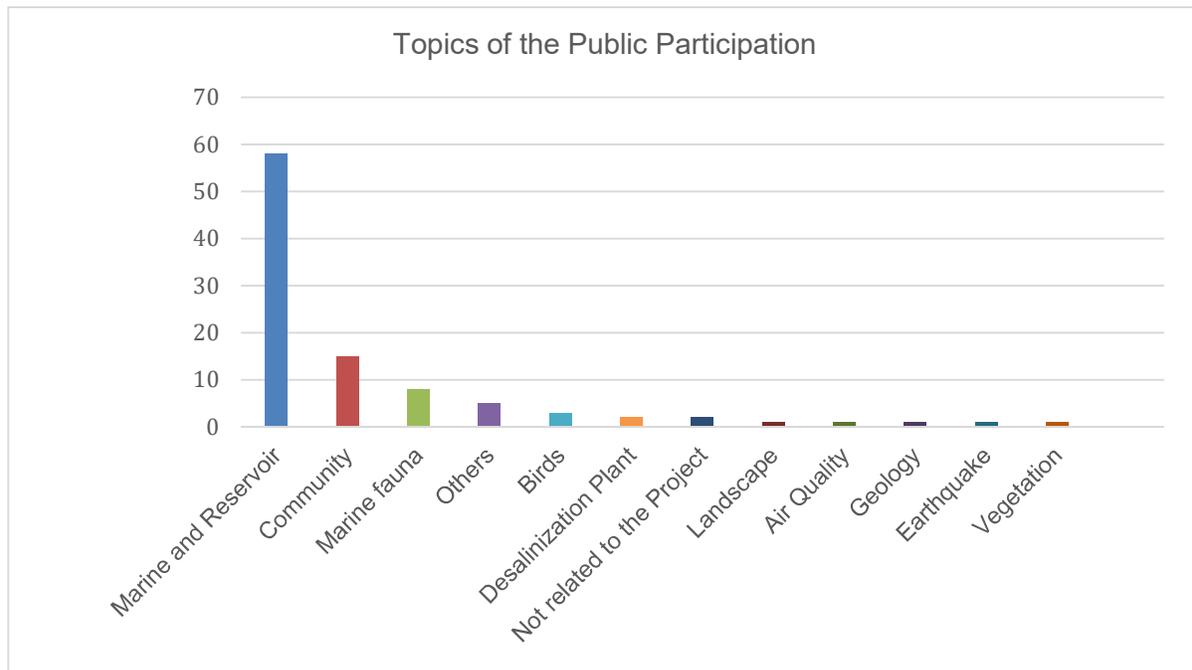
14. PUBLIC PARTICIPATION PROCESS

Chilean SEIA regulations require implementation of a mandatory public participation process as part of all EIA processes. This process is organized by the SEA and anyone from the public can present questions or observations, at the SEA's office, on the SEA's web page or during the scheduled public meetings. At the public meetings, the project company makes a descriptive presentation of the Project and its environmental consultant presents the EIA. The Project provided the community of San Marcos with a draft of the EIA prior to submission in July 2014 and after it was filed, on August 12, 2014, it provided paper copies to the Neighborhood Council and Fisherman's Union, and deposited one copy for public viewing in the Public Connectivity Centre. In addition, the EIA and all related information is publicly available on the SEA website from the date on which it is originally submitted to the SEA.¹⁰

The questions from the public related to the Project and the environmental components detailed in the regulation are received by the SEA and the Project has to answer each question in a formal document which is registered in the EIA process. The answers are publicly available at the SEA's office and published on its website. Participation in this process enables any person to present an administrative appeal requesting consideration of its specific issues and questions in the final approval conditions for the environmental permit.

As detailed in Figure 13, five public participation meetings were held during the EIA process, in addition to the numerous meetings and working groups held with the community located close to the Project (as explained in Section 12 Community Engagement). The principal concerns of the community were related to the impacts on the marine environment and reservoir. The following figure shows the distribution of the questions received in the public participation process by issue.

¹⁰ http://seia.sea.gob.cl/expediente/expedientesEvaluacion.php?modo=ficha&id_expediente=2129687968

Figure 14.1. Topics of Interest to the Community


The Project formally responded to all questions received during the process and submitted this information to the SEA together with the agreements that had been executed with the existing community organizations from Caleta San Marcos, at the time, the Fishermen's Union and Neighborhood Council.

15. FINAL CONDITIONS OF THE ENVIRONMENTAL PERMIT (RCA)

The RCA or environment permit which was unanimously granted on December 10, 2015 summarizes the Project description, the EIA studies presented, applicable regulations, potential impacts, the contingency and emergency plan, applicable agency permits and finally, the conditions and mitigation measures which must be followed for implementation of the Project.

15.1. Final Environmental Impacts

The RCA concluded that construction of the Project will result in two significant impacts which include: 1) loss of specimens from the reptile group and 2) intervention in archeological and paleontological material.

15.2. Final Mitigation Measures, Monitoring and Voluntary Measures

The RCA establishes the following conditions to mitigate the identified significant impacts which are summarized in the following table:

Table 15.1. Mitigation Measures

Impacts	Measures
Reduction of species from the reptile group	<p>Rescue and relocation plan for the species <i>Liolaemus stolzmanni</i> and <i>Phyllodactylus gerrhopygus</i>, moving them from the reservoir area to an area not intervened by the Project in order to avoid reduction and deterioration of the species. The plan will be implemented by area prior to the start of construction in each area.</p> <p>The Project needs to apply for a capture permit with the applicable agency.</p> <p>The Project is required to notify authorities prior to starting the rescue and relocation plan.</p>
Intervention of archeological and paleontological material	<p>Archeological findings will be identified with signs. Vertical signs will be installed which provide information about the finding, including identification and a warning about its legal protection.</p> <p>The Archaeological Management Plan includes:</p> <ol style="list-style-type: none"> 1) Site on Camp; rescue an analysis of scattered materials, before construction. 2) Site on Camp, the isolation of any area identified as more sensitive and no intervention at all. 3) Other isolated findings: rescue and analysis 4) Lineal tracks: topography and description of the track 1 km further, on each end of the area to be intervened. <p>The rescue of findings will be implemented by specialists and the material will be delivered to the regional museum, in accordance with the decision of the Council of National Monuments, CMN.</p> <p>Permanent archeological monitoring, an archeological specialist will be available during the entire construction phase of the Project.</p> <p>Training in the care of cultural heritage through induction and educational talks on the archeological findings present in the Project area and their due protection, to all those who enter the work areas for the first time.</p>

	The paleontological rescue plan will be carried out before the start of the execution of the construction works, including the collection of significant samples by specialists, with the respective geographical and stratigraphic positioning, curing of the paleontological samples collected in the laboratory, preparation of a catalogue of samples and their addition to the collection or museum indicated by the CMN.
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The RCA establishes the following survey and monitoring plans during the construction phase that must be implemented and reported to the authorities:

Table 15.2. Monitoring Plan for Environmental Impacts during Construction

Environmental Impact	Preventive Measure	Frequency & Duration	Reporting Requirement
Archeological Intervention	Installation of informative signs and protective fences, as applicable, in areas when archeological findings are located	Specialists will survey the areas once a month during construction in order to verify compliance with signs and protective measures	Monthly report to be prepared during construction period
Archeological Intervention	Management plan requires rescue and transfer of all archeological findings to local museum	Every time archeological findings are located	One-time report to be prepared within 30 days of delivery of archeological findings to museum
Archeological Intervention	Permanent archeological monitoring	Qualified archeological specialist will perform monthly inspection; Project team will perform daily inspections during performance of excavations during construction	Quarterly reports to be prepared; in the event archeological findings are located, the Council of National Monuments will be notified by report within 10 days.
Paleontological Intervention	Paleontological monitoring	Qualified paleontological specialist and Project manager will coordinate bi-weekly visual monitoring during construction	Quarterly reports to be prepared
Seawater Quality	Sample measurement of numerous quality of water parameters and comparison to baseline study	Measurements to be performed every 6 months during construction	Quarterly reports to be prepared

Marine Sediment Quality	Sample measurement of numerous marine sediment parameters and comparison to baseline study	Measurements to be performed every 6 months during construction	Quarterly reports to be prepared
Abundance of Benthic Communities	Monitoring of alteration in benthic species and comparison to baseline study	Measurements to be performed every 6 months during construction	Bi-annual reports to be prepared
Loss of Plankton Communities	Qualitative and quantitative monitoring of plankton species and comparison to baseline study	Measurements to be performed during one day and one night during each of the four seasons (4 times per year)	Seasonal (4 times per year) reports to be prepared
Quantity of Marine Mammals	Quantitative monitoring of marine mammals and comparison to baseline study	Measurements to be performed every 6 months during construction	Bi-annual reports to be prepared
Quantity of Birds	Quantitative monitoring of birds and comparison to baseline study	Measurements to be performed every 6 months during construction	Bi-annual reports to be prepared
Quantity of Protected Reptiles	Rescue and relocation plan for the species <i>Liolaemus stolzmanni</i> and <i>Phyllodactylus gerrhopygus</i> , moving them from the reservoir area to an area not intervened by the Project	To be implemented by area prior to the start of construction in each area	Compliance report to be prepared within 60 days of completion of each rescue area
Noise Level	Measurement of noise affecting humans and fauna	Measurement to be performed every 30 days during construction and each time new work area is implemented	Monthly reports to be prepared
Underground Water	Sample measurement of numerous quality of water parameters and comparison to parameters prior to start of construction	Measurement to be performed every 2 weeks during construction	Quarterly reports to be prepared

The RCA establishes the following survey and monitoring plans during the operational phase that must be implemented and reported to the authorities:

Table 15.3. Monitoring Plan for Environmental Impacts during Operation

Environmental Impact	Preventive Measure	Frequency & Duration	Reporting Requirement
Reservoir Water Quality	Monitoring of physical, chemical and biological alterations via sample measurements of numerous quality of water parameters	Monthly water measurements during the 1 st two years of operation; analysis will be conducted in the 3 rd year of operation to determine in seasonal (4 times per year) monitoring is feasible; sediments will also be monitored monthly during the 1 st two years of operation and quarterly thereafter	Quarterly reports to be prepared during the 1 st three years of operation and the frequency and continuity thereafter will be evaluated
Birds Related to High Voltage Transmission Lines	Installation of anti-collision bird markers on the high voltage transmission line and measurement of live and dead birds in the transmission line area	Monthly measurements during the 1 st three years of operation of the transmission line	Annual reports to be prepared
Seawater Quality	Sample measurement of numerous quality of water parameters and comparison to baseline study and construction period measurements	Quarterly measurements to be performed during the 1 st two years of operation and bi-annually thereafter	Quarterly reports to be prepared during the 1 st two years of operation and bi-annually thereafter
Marine Sediment Quality	Sample measurement of numerous marine sediment parameters and comparison to baseline study and construction period measurements	Quarterly measurements to be performed during the 1 st two years of operation and bi-annually thereafter	Quarterly reports to be prepared during the 1 st two years of operation and bi-annually thereafter
Abundance of Benthic Communities	Monitoring of alteration in benthic species and comparison to baseline study	Quarterly measurements to be performed during the 1 st two years of operation and bi-annually thereafter	Quarterly reports to be prepared during the 1 st two years of operation and bi-annually thereafter
Loss of Plankton Communities	Qualitative and quantitative monitoring of plankton species and comparison to baseline study, construction period measurements and reservoir measurements	Measurements to be performed during one day and one night during each of the four seasons (4 times per year)	Seasonal (4 times per year) reports to be prepared

Quantity of Marine Mammals	Quantitative monitoring of marine mammals and comparison to baseline study	Measurements to be performed every 6 months during operation	Bi-annual reports to be prepared
Quantity of Birds	Quantitative monitoring of birds and comparison to baseline study	Measurements to be performed every 6 months during the 1 st two years of operation and continuity of monitoring and frequency will be analyzed after 2 nd year of operation.	Bi-annual reports to be prepared
Noise Level	Measurement of noise affecting humans and fauna	Measurement to be performed during the 1 st year of operation and every 5 years thereafter for 15 years	Quarterly reports to be prepared
Underground Water	Sample measurement of numerous quality of water parameters and comparison to parameters prior to start of construction	Measurement to be performed monthly during the entire operating period	Quarterly reports to be prepared

The RCA also incorporates the voluntary measures that were proposed by the Project, making these compliance with these measures obligatory.

Table 15.4. Voluntary EIA Commitments Proposed by the Project

Environmental Issue	Commitment	Implementation Method	Reporting Requirement
Technical Support on Marine Issues for the Community	The Project will fund the cost of a marine consultant to assist the community with review and understanding of the environmental marine studies presented by the Project. The marine expert will be independently selected by the community.	The Project will pay for the cost of the consultant during the entire evaluation period up to 30 days following the issuance of the permit or RCA.	Final one-time report to be prepared after issuance of RCA
Participatory Monitoring	All marine studies and monitoring performed and related results will be communicated to community during all stages of the Project.	Notice of the performance of any of study or monitoring activities will be provided to the legal representatives of these organizations, in written form, at	Reports will be made available to the community within 15 days of the receipt of the results by the Project. Quarterly reports with the notices and study results will be

		least 5 days in advance.	provided to the legal representatives of the community organizations.
Impact on Birds from High Voltage Transmission Line	Installation of anti-collision bird markers that can be seen at night on the high voltage transmission line and installation of aeronautical diverters in the area where collisions are deemed more probable	The Project will evaluate the effectiveness of these measures during the 1 st three years of operation of the transmission line	Annual reports to be prepared
Impact on Birds from Electric Conductors on Transmission Line	Installation of protection covers on transmission line posts in order to prevent electrocution of birds	The Project will inspect the protective covers on a quarterly basis	Bi-annual reports to be prepared
Reduction in Nighttime Lighting	The Project will avoid the use of nighttime lighting which would illuminate the sky in the entire Project area, and in particular of bird flight path areas	The Project will take photos of the area once the required lighting has been installed	One-time report with photographic evidence to be prepared
Workers Training Induction	All Project workers will receive training induction related to the environment including flora and fauna, environmental compliance requirements and induction test evaluations.	All workers will receive the environmental induction training when they initiate employment with the Project	Project will maintain records of the induction sessions which will be available for review by the authority
Visual survey Prior to Confirm Route Prior Start of Construction of North Access Road	Project to conduct visual survey along the route selected for construction of the northern access road in the Rio Seco area (area with potential sea swallow presence) prior to initiation of construction	Photos registering the survey will be taken	Specialist will prepare a one-time report upon conclusion of the survey
Controlled Intervention in Areas with <i>Microlophus theresioides</i>	Project to carefully and progressively initiate works in sectors with presence of this reptile. Natural materials removed (rocks, branches, etc.) will be transferred to close area without intervention in order to induce movement and improve habitat.	Controlled intervention to be initiated and completed no more than 3 days prior to initiation of works and must be supervised by qualified specialist.	Specialist will prepare a one-time report upon conclusion of activities
Wetting of dry material from concrete plant	Project will apply humidity to soil and dry materials used by concrete plants in order to limit particulate emissions in the air	Project to implement measure throughout construction	Project will maintain records of wetting procedure which will be available for

			review by the authority
Working Group Discussions	Working group discussions will be held in Caleta San Marcos to provide information about the Project and maintain open and transparent dialogue with the community	Community meetings to be held at least every six months during the construction phase	Project will maintain minutes of meetings which will be available for review by the authority
Desalination Plant Infrastructure	Project to construct desalination plant infrastructure which will deliver and sell at cost up to 50 m ³ /day of desalinated water in Caleta San Marcos. In accordance with other community agreements, Project will also deliver and sell at cost up to 25 m ³ /day in Caleta Rio Seco and supply free of charge up to 15/m ³ to the San Marcos Fisherman's Union for use in the processing of sea products by the union.	Delivery of the desalinated water will take place within 3 months following the completion of the construction of the desalination plant, provided the communities have the necessary infrastructure for delivery	Project to notify the community organizations of availability of water for delivery. Notices will be available for review by the authority
Installation of Tourist Lookouts	Project will install two tourist lookout points, one overlooking the reservoir and the other in the north access road sector overlooking the sea	Lookout points will be installed within one year of receiving required permits from District of Iquique and the Regional Tourism Agency.	Photographic registry of lookouts will be sent to relevant authorities
Installation of Informative Signs for Archeological Findings	Project will install informative signs in areas when archeological findings have been located	Signs will be installed during the 1 st six months of operation	Photographic registry to be prepared once complete
Training and Education of Paleontological Findings	Paleontologist will provide induction and educational talks to workers; photographic registration of fossils found by Project; preparation of educational materials with paleontological information found by Project which is to be distribution to local public high schools.	Induction talks by paleontologist to be held every 6 months during construction	Registry of inductions talks to be maintained and available for review by the authority, delivery of educational and photographic materials to be documented and available for review by the authority