Chapter 4: Predicting and Evaluating Impacts

Espejo de Tarapacá

Región de Tarapacá, Chile

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4. PREDICTION AND IMPACT ASSESSMENT

4.1. Introduction

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

The project consists of the installation and operation of a reversible hydraulic plant, i.e. the same machines function as pumps in a sense of water circulation or as turbines in the other direction, are the modes pumping and generation respectively. Likewise, regardless of the mode of operation in which the plant is operating, the same surface works, the water canalizations, the underground and the submarine will be used.

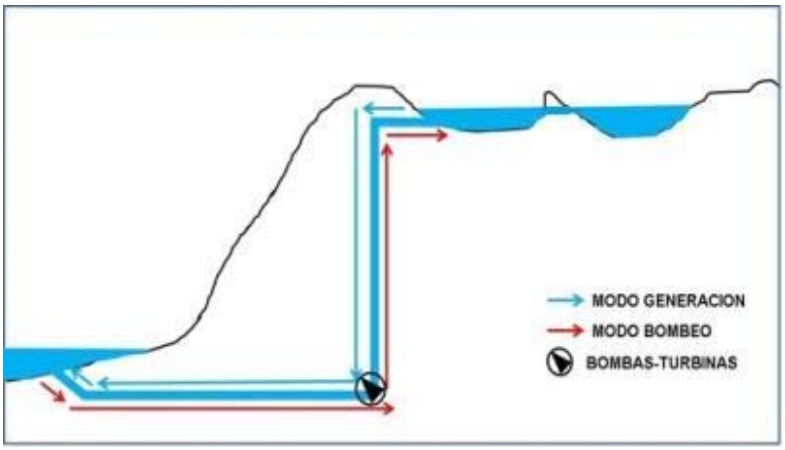
The installed power will be of 300MW and It will have three reversible hydraulic turbines of the Francis type of 100 MW each.

In its operation, during the day it'll pump seawater through Pumping Equipment-generation Which will be carried through a tunnel to Natural concavities located at 585 M.A.S.L. These concavities will be covered by a bituminous membrane and the reservoir of seawater to be generated will have an area of approximately 375 ha, at an approximate height of 609 M.A.S.L. This reservoir will accumulate seawater pumped during the day. Then, during the night, the plant will operate in generation mode, the accumulated water in the reservoir will flow by gravity towards the sea, taking advantage of the height between the coastal border and the plateau, going through the same pump-generation equipment, this time to generate Electricity

The point of intake and discharge of water in the sea is the same, since the plant is reversible and will use the same works and machines for the circulation of seawater in pumping mode and in generation mode. All these works are in the commune of Iquique.

The following figure presents a diagram that charts the reversible operation mode of this control unit.

Figure 4-1. Representation of the Operation Reversible: Pumping/Generation.

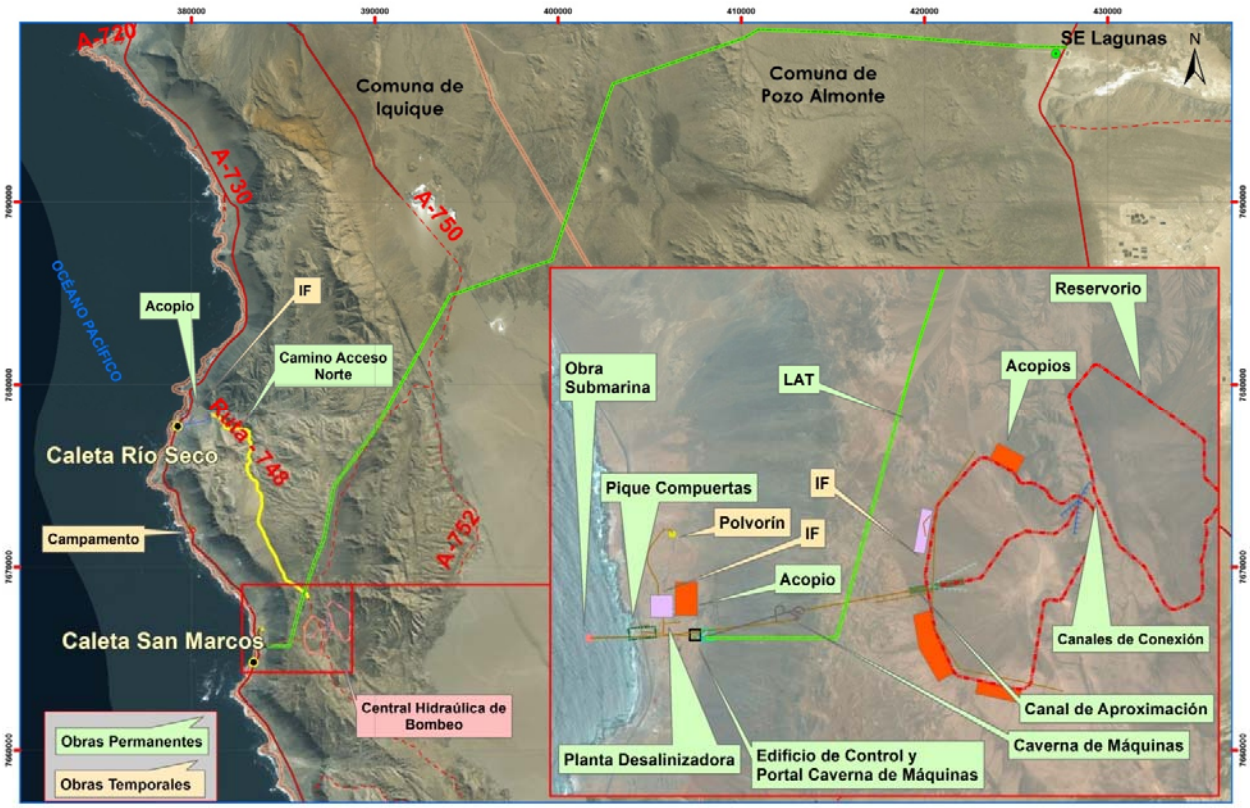


Source: Self-elaboration

An annual average generation of 1.75 GWh/day is estimated to inject electricity into the existing Lagunas substation of the large North interconnected system (SING) by means of a 65 km long power transmission line (LAT). The last 35 km approximately, of LAT are in the commune of Pozo Almonte.

In the following figure you can see the location of the works of the project.

Figure 4-2. Works of the project



Source: Self-elaboration

This chapter responds to the requirement set out in article 18 Letter FD. S). 40/12 Mma, regulation of the environmental impact assessment system. This way, sand identifies and hierarchy The environmental impacts generated by the project "Espejo de Tarapacá".

Firstly, the methodological framework for environmental impact assessment is presented. Then proceed with the evaluation itself, beginning with the assessment of environmental factors corresponding to each component, and then identify the environmental impacts and then performs the qualification and hierarchy of The same.

4.2. Methodology

The evaluation of environmental impacts is generated, making a series of steps that lead to qualify the environmental impacts generated and then prioritize them.

The steps to follow in the evaluation are described below:

Identification of activities likely to cause environmental effects

From the project description, the project activities are identified that are susceptible to be affected in each of the Phases of the same (construction, operation and closing). These activities are presented coded and listed.

Identification of components susceptible to impact

Based on the components considered in the baseline, the set of components that are susceptible to the project activities are listed in each of the Phases of it.

Identification of environmental effects caused by project activities on each environmental factor

For the identification of the environmental effects of the project, a double entry matrix is used in which the environmental factors susceptible to being affected and the activities of the project are crossed, giving rise to a causal relationship that the league and the which the expected effects are inferred.

Environmental impact Assessment

For the qualification of environmental impacts that do not are specifically Regulated by quality standards will be used a methodology Considered The value of the environmental component, the character of the impact, Its probability of occurrence, The extension, its intensity, the duration, the reversibility, The typology and opportunity of Occurrence. In the case of the components for which they have been was Lecido Standards and quality standards (noise and air quality) Environmental impact is assessed in Function of compliance with the regulations in a "project-based" scenario.

Thus, the environmental impactn unregulated variables is defined as the Product Between the value of the environmental component and the magnitude of the impact, i.e.:

$$IA = VA \cdot M$$

Where:

IA: Environmental impact.

VA: Environmental value.

M: Magnitude of impact.

- **Value ToMbiental (VA)**

The environmental value of each component or environmental factor is justified through the Environmental relevance of each of them, which is assigned by the valuation given taking into consideration the following criteria. It is worth mentioning that the valuation of each environmental factor can be granted either through the justification of all the criteria or only one. In the particular case of the human environment, specific criteria for environmental assessment have been used.

Table 4-1: Criteria QAra LA VAloration of the Environmental relevance

Rarity (Ra):	Not frequent in the environment.
Naturalness (Na):	Natural, not artificial.
Abundance (Ab):	In large quantity in the environment.
Diversity (Di):	Abundance of different elements in the environment.
Singularity (Si):	Additional value by condition of distinct or distinguished.
Irreversibility (IR):	Impossibility of any alteration being assimilated by the medium due to autopurification mechanisms.
Fragility (FR):	Vulnerability and the perishable character of the factor attribute.
Ecological Interest (IE):	Because of its ecological peculiarity.
Historical-Cultural Interest (IHC):	For its historical-monumental-cultural peculiarity.
Significance (GIS):	Importance to the area of the environment.

Source: Self-elaboration

The scale used to assess the relevance or environmental value of each environment factor is as follows:

Table 4-2: Value ToMbiental QAra Los factors ToMbientales (VA).

Relevance	Valuation
Null	0
Low	1 – 3
Moderate	4 – 6
High	7 – 8
Very high	9-10

Source: Self-elaboration

Thus, the assessment of the Environmental relevance It is obtained as an average of the relevance of each criterion considered.

$$VA = \frac{\sum (Ra, Na, Ab, Di, Si, Ir, Fr, IE, IHC, Sig)}{n^{o}\, criterios}$$

The resulting values have been approximated to the nearest integer.

- **Assessment of magnitude of environmental impact**

The Magnitude of impact Environmental (M) is defined as follows:

$$M = Ca \cdot Po \cdot \sum (Ex, I, Du, \mathrm{Re})$$

Where:

Ca:	Impact character.
Po:	Probability of occurrence.
Former:	Impact extension.
I:	Intensity.
Du:	Duration of impact.
Re:	Reversibility.

The valuation of each criterion (Ca; Po Ex I Du and Re) is carried out taking into consideration the following definitions:

Character (Ca): This criterion is qualified in:

Positive (+ 1):	Impactf an improvement of the basal condition.
Negative (-1):	Impact that implies a deterioration of the basal condition.
Neutral (0):	Impact that does not represent changes with respect to the basal condition.

Probability of Occurrence (Po): This criterion indicates the probability that an effect in the environment is manifested because of an action or source of impact. Qualifies as:

Very low (< 0.1):	When there is a very low probability that an impact manifests.
Baja (0.1 – < 0.3):	When there is a low probability that an impact will manifest.
Moderate (0.3 – < 0.6):	When an impact is likely to manifest.
Alta (0.6 – < 0.9):	When there is a high probability that an impact is manifested.
Certain (0.9 – 1.0):	When there is a very high probability that an impact manifests.

Extension (Ex): This criterion indicates the spatial distribution or coverage of the impact. Qualifies as:

Reduced (0):	When the impact is manifested only in the sector where the source is located.
Media (1):	When the impact is manifested in an immediate environment of the source.
Wide (2):	When the impact is manifested outside the immediate environment of the source or in different sectors of the area of influence.

Intensity (I): This criterion reflects the degree of alteration of an environmental factor. It is classified in:

Very low (0):	When the degree of alteration is small and it can be considered that the basal condition is maintained.
Low (1):	When the degree of alteration implies noticeable changes, but not significant in relation to the basal condition.
Moderate (2):	When the degree of alteration implies significant changes in relation to the basal condition, but within acceptable ranges (which are regulated)[1].
High (3):	When the degree of alteration in relation to the basal condition is highly significant, and in some cases it may be considered unacceptable.

Duration (Du): This criterion indicates how long the impact will be manifested. Qualifies as:

Temporal (0):	Impact that manifests only while the action that generates it lasts.
Medium-term (1):	Impact that manifests as long as the action lasts and after a time of ending the action that generates it.
Long-term (2):	Impact that is permanently manifested after completion of the action that generates it (for more than five years).

Reversibility (Re): This criterion indicates the possibility that the affected environmental factor will recover its basal condition. Qualifies as:

Naturally Reversible (0):	When after a certain time the impact is reverted in natural form, after the end of the action of the source that generates it.
Reversible (1):	When the impact is not reverted naturally after the action of the source that generates it, but can be completely reversed by corrective actions.

[1] Para aquellas variables contempladas en las normas y estándares de calidad ambiental vigente o las de referencia que sean consideradas para la calificación de los impacts ambientales, la Intensidad es calificada en función del grado de cumplimiento de la norma o estándar.

Partially Reversible (2):	When the impact is not reverted naturally after the action of the source that generates it, but can be partially reversed by corrective actions.
Irreversible (3):	An impact that is not reverted naturally after the action that generates it, and which cannot be reversed by corrective actions.

- **Impact Rating**

The impact rating is awarded according to the following scale:

Table 4-3: Classification of Impacts ToMbientales

The	Classification
0-20	Non-significant
21-40	Little significant
41-80	Significant
81-100	Highly significant

Source: Self-elaboration

Hierarchy of impacts

It consists in the ordering of environmental impacts according to the qualification given to each one of them. The ordering is carried out in descending form of qualification of the environmental impacts, in order to identify those impacts that give rise to the effects of article 11 of the law that give rise to the elaboration of the present EIA and that consequently require measures of mitigation, reparation and compensation.

4.3. Identification of environmental impact

The following describes the actions of the project that can alter or modify some environmental factor in their Phases of construction, operation and closure.

4.3.1 Construction phase

The actions of the project that have Environmental relevance In this Phase, are associated with the materialization of the required logistics and the construction works itself.

In Table 4-4, The project actions are presented with Environmental relevance In the Phase of construction:

Table 4-4: Project Actions with Environmental relevance In the Phase of construction

FC-01	Hiring temporary workforce
FC-02	Preparation of the Terrain
FC-03	TranMaterials, supplies, Waste and personal
FC-04	Installation slaughter, camps, collection centers, waste storage, fuel tank, polvorines and working fronts
FC-05	Ground movement
FC-06	Construction and improvement of access roads
FC-07	Portal Construction
FC-08	Construction Of TunnelES, piques and Cavern of machines
FC-09	Building construction
FC-10	Reservoir Waterproofing
FC-11	Assembly of equipment
FC-12	Testing and commissioning of the plant
FC-13	LTE Construction
FC-14	Potable Water supply system
FC-15	Billets of excavation material
FC-16	Liquid Waste Management
FC-17	Solid Waste Management
FC-18	Handling of PTAS
FC-19	Construction Take and unload Underwater
FC-20	Brine Discharge Piping Installation
FC-21	Removal of facilities for slaughter and cleaning

FC: Phase of construction.

Source: Self-elaboration

4.3.2 Operation phase

The actions of the project that have Environmental relevance In the Phase of operation are mainly associated with the operation of the Hydroelectric Plant and Line of transmission Electric. In Table 4-5, the project actions are presented with Environmental relevance In the Phase of operation.

Table 4-5: Project Actions with Environmental relevance In The Phase of operation

FO-01	Hiring of Manpower
FO-02	Underwater Take and unload
FO-03	Hydraulic Central operation
FO-04	Electric power transmission
FO-05	Transportation of supplies, waste and Personal
FO-06	Maintenance of The Central and desalination plant
FO-07	Desalination plant operation
FO-08	Maintenance Lte
FOr09	Solid Waste Management
FOr10	Liquid Waste Management

FOr: Phase of operation.

Source: Self-elaboration

4.3.3 Closing phase

The actions of the project that have Environmental relevance In this Phase, are associated with the closure and removal of the project facilities. In Table 4-6, the project actions are presented with Environmental relevance In the Phase of closing.

Table 4-6: Project Actions with Environmental relevance In the Phase of closing

FCI-01	Hiring temporary workforce
FCI-02	Slaughter Installation
FCI-03	Transfer of Waste, materials and Personal
ECI-04	Disarmament and removal of land structures
FCI-05	Cleaning in the area of structures and removal of slaughter facilities
FCI-06	Solid Waste Management
FCI-07	Liquid Waste Management

FCi: Phase of closing.

Source: Self-elaboration

4.4. Identification of components and factors ToMbientales

The components and environmental factors What They are susceptible to Affected By the project They have been identified in Chapter 2 by definition of the area of influence and have been described in their baseline in Chapter 3. These are presented as a summary in the Table 4-7

Those components and environmental factors raised on the baseline that are not susceptible to being affected by the project's works and activities are not considered in the impact assessment. This information has been used to contextualize the baseline in components that if they need to be evaluated.

Table 4-7: Identification of the Components and Factors to Mbientales Sssceptibles to be IMpactados by the Project

Middle	Environmental component	Environmental Factor
Physical	Atmosphere	Air quality
		Noise
		Electromagnetic fields
	Lithosphere	Geomorphology
	Marine Hydrosphere	Chemical Oceanography (water quality and marine sediments)
Terrestrial ecosystems	Soils	Ability to use
	Fauna	Sites of interest to the Fauna
		Species of fauna in conservation category
Marine ecosystems	Biological oceanography	intertidal Epibiota of hard backgrounds
		intertidal soft-bottomed Polybentos
		Epibiota of subtidal background
		Ichthyofauna
		Subtidal Macroinfauna of sedimentary funds
		Planktonic communities
		Coastal vertebrates
Cultural Heritage	Archaeology	Archaeological heritage
	Paleontology	Paleontological Heritage
Landscape	Landscape	Visual Quality
Protected areas	Protected areas	Protected areas

Middle	Environmental component	Environmental Factor
Natural or cultural attractions	Tourism	Tourist attractions
Human	Geographic dimension	Geographic environment with social uses
		Displacement dynamics within the Territory
	Demographic dimension	Local demographic structure
	Anthropological Dimension	Local identity
		Local Cultural Expressions
		Cultural significance sites at the local level
		Environment assessment
	Socio-economic dimension	Local Economic Activities
		Economic use of space and natural resources
	Basic Social Welfare dimension	Supply and demand for basic services

Source: Self-elaboration

4.5. Evaluation of the Impacts To Cumulative and/or synergistic, who QOdrían QRovocarse by the Development of projects in the Area of influence

As set out in DS N ° 40/12, art. 18, letter F), "*For the evaluation of synergistic impacts should be considered projects or activities that have an environmental qualification in force in accordance with the indicated in the literal E. 11*". On the other hand, in paragraph E. 11 of the same article indicates that "projects or activities that have a current environmental qualification resolution, when they are not operating. For these purposes, all projects or activities related to the environmental impacts of the project under evaluation shall be considered, contemplating the terms in which such projects or activities were approved, in particular as regards their Location, emissions, effluents and waste, the extraction, exploitation or use of environmentally authorized renewable natural resources and any OTA relevant information to define the baseline of the environmental impact study. "

To give prompt to the foregoing, it should be noted that In section 3.11 of Chapter 3 of this EIA, all projects with favorable RCA that are close to the project site area were identified.

Sand identified 9 Projects close to the project site area, Which are identified in the Following table:

Table 4-8. Projects with RCA in the Zone

n °	Name	Holder	Investment (MMU $)	Presentation Date	RCA Date	Productive Sector	Lifespan (years)	Description
1	Day extraction of aggregates for improvement of Route A-760, DM 13,500.000 to DM. 34,400.000, and other roads. Ex-Office Sector Victoria, Pozo Almonte commune, Tamarugal Province, Tarapacá region	Constructora SALFA S. A	0.1980	14-Dec-11	10-Apr-12	Other	0.8	The project corresponds to the extraction of aggregates in Pozo Almonte commune, specifically on the internal boundary of the Pampa del Tamarugal National Reserve. It considers a total area of 4 hectares, 3 of them for the exploitation of aggregates, with a total extraction volume of 45,000 m3 of material (4,500 m3/month) in a period of 10 months.
2	Conservation Day Caleta San Marcos	Ministry of Public Works	3.5382	10-Nov-10	09-Mar-12	Hydraulic infrastructure	20	The project will be run in the commune of Iquique, sector Caleta San Marcos, approximately 105 kilometers south of the city of Iquique in the Bay of Chomache. It is considered the extraction of approximately 7,500 m3 of marine sediment, accumulated in excess on a surface of 2,147 m2. Subsequently, a maintenance dredging of the same characteristics will be carried out every 5 years, so a total volume of 37,000 m3 of sediment will be extracted.

n °	Name	Holder	Investment (MMU $)	Presentation Date	RCA Date	Productive Sector	Lifespan (years)	Description
3	Day Project modification Salt Exploitation of the Salar Grande	Mining company Cordillera Chile SCM	10.1832	15-Oct-09	13-Apr-10	Mining	15	The project corresponds to a modification of the mining company Project Cordillera "Salt exploitation of the Salar Grande", currently in operation, through which it has an authorization of exploitation of 1 million tons/year of salt. The modification is to increase the production level from 1 million ton/year to 3 million ton/year.
4	Day commercial cultivation of North Oyster (Argopecten purpuratus) and fleeing Black (Lessonia nigrescens) in the Sector of Caleta San Marcos, Iquique-I region (request N º 207012005)	SOCIEDAD PANMAR LIMITADA	0.2500	06-Jul-09	20-Nov-09	Fisheries and Aquaculture	30	The project consists of the installation, start-up and subsequent operation of a cultivation center in the sea for commercial fattening of North oyster seeds and newly sprouted plants (seedlings) of the resource fleeing black. The installation of the center of cultivation will be placed on a surface of portion of water and bottom of sea, in the sector called Caleta San Marcos.
5	Day commercial cultivation of oysters from the north of Caleta San Marcos, Iquique-I region (Application No. 207012003)	Private Corporation for the development of UNAP	0.2700	13-May-09	05-Sep-09	Fisheries and Aquaculture	30	The project consists of the installation and subsequent operation of a cultivation centre at sea for the Fattening North Oyster Seed Commercial. The installation of the cultivation center will be located on a portion of water and sea bottom, in the northern sector of Caleta San Marcos.

n °	Name	Holder	Investment (MMU $)	Presentation Date	RCA Date	Productive Sector	Lifespan (years)	Description
6	DIA fattening of North Oyster in the Sector of Caleta San Marcos, Iquique-I region (request N º 207012002)	Private Corporation for the development of UNAP	0.3500	13-May-09	25-Sep-09	Fisheries and Aquaculture	30	The project consists of the installation and subsequent operation of a sea cultivation center for commercial fattening of North Oyster seed. The installation of the cultivation center will be placed on a portion of Water and bottom of the sea, in the northern sector of the Caleta San Marcos.
7	Day commercial cultivation of North Oyster in the Sector of Caleta San Marcos, Iquique-I region (request N º 206012005)	Juan Domingo Bruna Bruna	0.1400	06-Mar-08	17-Jul-08	Fisheries and Aquaculture	30	The project consists of the installation and subsequent operation of a sea cultivation center for commercial fattening of North Oyster seed. The installation of the cultivation center will be located on a portion of water and sea bottom, in the sector called Caleta San Marcos, located 110 Km south of the coastal coast of Iquique.
8	DIA commercial fattening of North Oyster in the Sector of Caleta San Marcos, Iquique-I region (request N º 206012006)	Raúl Edson Canales Zabala	0.3200	06-Mar-08	17-Jul-08	Fisheries and Aquaculture	30	The project consists of the installation and subsequent operation of a sea cultivation center for commercial fattening of North Oyster seed. The installation of the cultivation center will be located on a portion of water and sea bottom, in the sector called Caleta San Marcos, located 90 Km south of the coastal coast of Iquique.

n °	Name	Holder	Investment (MMU $)	Presentation Date	RCA Date	Productive Sector	Lifespan (years)	Description
9	EIA New Victoria Mine zone	SQM S.A.	14.400.00	24-09-07	22-May-08	Mining	11	The project is located in Pozo Almonte commune and consists of the incorporation of 140.01 km2 of new mine areas to support the current production of iodine from the new Victoria plant.

Source: Self-elaboration

The detail of RCA projects in the area is presented in annex 3.7 of the baseline cap. Notwithstanding the foregoing, the following is presented The same The history of emissions and effluents of such projects.

of the projects mentioned In the table above, 5 projects related to the cultivation and fattening of oysters were identified mainly. With respect to the **Atmospheric emissions**, they are not significant and correspond only to the gases generated by the engines of the boats. With respect to the **Emissions of noise**, they have no permanent sources of noise, Only in certain periods of the day, those generated by the outboard engines used by the boats. With respect to the **Effluents**, none of these projects contemplate the discharge of effluents to the sea and, because they correspond to crops in natural environment, do not consider the use of antibiotics baths or preventive treatments of diseases. With respect to the **Waste**, these projects do not consider the generation of hazardous waste, only generation of small volumes of industrial waste corresponding to remainders of corporals, mono-filaments and elements of the Assembly of the Llines; and also of household waste, which will be arranged in receptacles equipped with cover on the work platform. On the other hand these projects do not contemplate any alteration of **Flora and fauna** In conservation categories.

For its part, the project of extraction of aggregates for improvement of the route A-760, with respect to the **Atmospheric emissions**, are not significant and correspond to emissions of gases by vehicles and particulate matter. With respect to the **Noise emissions**, it does not consider close receivers. With regard to effluents, does not generate **Liquid effluents** In any phase. With respect to the **Waste**, domestic waste will be generated from workers ' activities and no hazardous waste will be generated. The project area presents bare soils, without the development of **Vegetation**.

Regarding the project conservation Caleta San Marcos, Atmospheric emissions are not significant and are associated with engine gases. Respectsto the **Effluents**, There will be generation of wastewater during construction which will be removed by a truck Clean pits. With respect to the **Waste**, will generate hazardous waste less than 12 tonnes/year. It will also generate industrial waste, both construction and dredging material; and household waste.

Regarding the project modification of salt of the Salar Grande project, Generates **Atmospheric emissions** Not significant in the operation. With respect to the **Effluents**, there will be generation of sewage and RILes product of washing machinery. With respect to the **Waste**, the project will generate hazardous waste and accumulate it at an authorized storage site. It will also generate 10 ton/year of industrial waste and are handled according to the procedure approved by the authority. It also generates household waste and accumulates in an authorized landfill site. This project is It develops in an area with totally abiotic conditions, determined by the extreme aridity, absence of rainfall and great saline concentration, so there is no **Greeneryand fauna.**

With respect to the new Victoria mine zone, the **Atmospheric emissions** Will eventually be during the operationÓn. Regarding the **Noise** During construction it will be imperceptible at the edge of SQM's facilities and during the operation the mine's exploitation activities are carried out in sectors far from populated centres. With respect to the **Effluents**, consider the generation of wastewater to be treated by PTAS. With respect to the **Waste**, hazardous waste will be generated in an existing landfill or authorized destination. It will also generate industrial waste and household waste which are collected and deposited in existing landfills. The project is developed in an area that has absolute desert conditions so it is completely devoid of **Vegetation, flora and fauna.**

4.5.1 Impacts To Cumulative and/or Synergistic

It is concluded that the project Espejo de Tarapacá does not have cumulative and/or synergistic effects with the projects analyzed present in the area, given the characteristics in terms of emissions and residues and the distances to which they are of the project.

4.6. Identification of effects Environmental caused by the activities and the Project Work Component and environmental factor

The environmental effects caused by the activities and works of the project are presented In the tables below:

Table 4-9. Identification of Impacts of the Project in the Phase of construction

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
Atmosphere	Air quality		X	X	X	X		X	X	X				X		X				X		X	Increased emissions of particulate matter and gases	Costa and Pampa
	Noise		X	X	X	X		X	X	X				X		X				X		X	Increased noise level	Costa and Pampa
	Geomorphology															X							Modification of the topography	Coast and Plateau
Marine Hydrosphere	Chemical oceanography Water quality																			X			Alteration of the quality of the sea waters	Submarine
	Chemical Oceanography Marine Sediments																			X			Alteration of the physical chemical properties of marine sediments.	Submarine
Soils	Ability to use Non-Arable soil		X		X	X	X			X	X	X		X		X						X	Soil compaction degradation	Coast, Plateau and Pampa
			X		X	X	X			X	X	X		X		X						X	Irreversible soil loss	Coast, Plateau and Pampa

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
Fauna	SItios of interest to the Fauna				X	X	X															X	Affectation Nesting Area *Oceanodroma Markhami*	Plateau and Coast
	Species of fauna in conservation category			X	X	X	X															X	Loss of specimens from the reptile group	Coast, Plateau and Pampa
	Species of FaunA in conservation category				X				X					X									Loss of specimens from the birds group	Coast, Plateau and Pampa
Biological oceanography	intertidal Epibiota of hard backgrounds																			X			Alteration of hard-bottomed marine intertidal communities	Submarine
	intertidal soft-bottomed Polybentos																			X			Alteration of soft-bottom marine intertidal communities	Submarine
	Epibiota of subtidal background																			X			Alteration of soft-bottom marine intertidal communities	Submarine
	Ichthyofauna																			X			Loss of individuals	Submarine

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
	Subtidal Sedimentary-fund fauna																			X			Affecting subtidal, soft-bottomed biological communities	Submarine
	Planktonic communities																			X			Planktonic Biomass loss	Submarine
	Coastal vertebrates																			X			Affectation of species in conservation category (mammals)	Submarine
Archaeology	Archaeological heritage					X	X			X				X		X							Archaeological sites Intervention	Coast and Plateau
Paleontology	Paleontological Heritage					X	X			X													Partial intervention of the fossil levels.	Coast, Plateau and Pampa
Landscape	Coastal Edge Unit		X		X	X	X	X	X	X		X		X		X				X		X	Visual incompatibility and loss of biophysical attributes	Coast
	Coastal Cliff Unit		X			X			X					X									Visual incompatibility and loss of biophysical attributes	Coast

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
	Mountain Cord Unit		X			X	X							X									Visual incompatibility and loss of biophysical attributes	Pampa
	Unit Pampa del Tamarugal		X			X	X							X									Visual incompatibility and loss of biophysical attributes	Pampa
Protected areas	Pampa del Tamarugal National Reserve													X									Intervention in protected Area	Pampa
Tourism	Tourist attractions		X	X	X	X	X			X				X		X				X		X	Alteration of tourist attractions	Coast
Geographic dimension	Geographic environment with social uses						X							X									Alteration of the connectivity flows of human groups within and outside the Territory	Coast
	Displacement dynamics within the Territory			X	X		X							X									Potential impactn local festivities	Coast

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
Demographic dimension	Local demographic structure	X													X								Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)	Coast
Anthropological Dimension	Local identity	X		X	X					X										X			Affecting the local culture of the human group	Coast
	Local Cultural Expressions	X		X	X					X										X			Potential impactn local festivities	Coast
Socio-economic dimension	Local Economic Activities			X	X		X						X							X			Impactn local resources and economic activities and their associated dynamics.	Coast
		X																					Potential generation of local employment	Coast

Environmental component	Factor Environmental	Project activities (Construction phase)																					Impact	Sectors in which the impact is manifested
		FC-01	FC-02	FC-03	FC-04	FC-05	FC-06	FC-07	FC-08	FC-09	FC-10	FC-11	FC-12	FC-13	FC-14	FC-15	FC-16	FC-17	FC-18	FC-19	FC-20	FC-21		
Basic Social Welfare dimension	Supply and demand for basic services	X																			X		Affecting basic services present in the area of influence	Coast

Source: Self-elaboration

Table 4-10: Identification of Impacts of the Project in the Phase of operation

Environmental component	Environmental Factor	Project activities (Operation phase)										Impact	Sectors in which the impact is manifested
		FO-01	FO-02	FO-03	FO-04	FO-05	FO-06	FO-07	FO-08	FO-09	FO-10		
Atmosphere	Air quality					X			X			Increased material emissions Particulate and gases	Costa and Pampa
	Noise					X			X			Increased noise level	Costa and Pampa
	Electromagnetic fields				X							Radio interference	Pampa and Plateau
Marine Hydrosphere	Chemical Oceanography (water quality)		X									Alteration of the quality of the sea waters	Submarine
	Chemical Oceanography (marine sediments)		X									Alteration of the physical chemical properties of marine sediments	Submarine
Fauna	SItios of interest to the Fauna					X						Affectation Nesting Area *Oceanodroma Markhami*	Plateau and Coast
	Species of fauna in conservation category			X								Loss of specimens of the Reptile group	Plateau and Pampa Coast
	Species of fauna in conservation category				X							Loss of specimens of the Birds group	Plateau and Coast
Biological oceanography	Epibiota Intertidal of hard funds		X									Alteration of marine communities Intertidal of hard funds	Submarine
	Macrobenthos Intertidal of soft funds		X									Alteration of marine communities Intertidal of hard funds	Submarine

Environmental component	Environmental Factor	Project activities (Operation phase)										Impact	Sectors in which the impact is manifested
		FO-01	FO-02	FO-03	FO-04	FO-05	FO-06	FO-07	FO-08	FO-09	FO-10		
	Epibiota Subtidal background		X									Alteration of marine communities Intertidal of soft funds	Submarine
	Ichthyofauna		X									Loss of InDISawDuos	Submarine
	Macrofauna Subtidal sedimentary funds		X									Affecting subtidal, soft-bottomed biological communities	Submarine
	Planktonic communities		X									Planktonic Biomass loss	Submarine
	Coastal vertebrates		X									Affectation of species in conservation category (mammals)	Submarine
Landscape	Coastal Edge Unit			X	X				X			Visual incompatibility and loss of biophysical attributes	Coast
	Coastal Cliff Unit				X				X			Visual incompatibility and loss of biophysical attributes	Coast
	Mountain Cord Unit				X				X			Visual incompatibility and loss of biophysical attributes	Pampa
	Unit Pampa del Tamarugal				X				X			Visual incompatibility and loss of biophysical attributes	Pampa
Protected areas	Pampa del Tamarugal National Reserve								X			Intervention in protected Area	Pampa
Tourism	Tourist attractions		X	X	X	X		X	X			Alteration Of Tourist attractions	Coast
				X								Generation of tourist attraction	Plateau
Geographic dimension	Geographic environment with social uses			X								Alteration of the geographical environment with social uses	Coast
	Displacement dynamics within the Territory					X			X	X	X	Alteration of the connectivity flows of human groups within and outside the territory, both in their daily life and in festivities or rituals	Coast
Demographic dimension	Local demographic structure	X										Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)	Coast

Environmental component	Environmental Factor	Project activities (Operation phase)										Impact	Sectors in which the impact is manifested
		FO-01	FO-02	FO-03	FO-04	FO-05	FO-06	FO-07	FO-08	FO-09	FO-10		
		X										Alteration of the fundamental characteristics of the local demographics of the human group	Coast
Anthropological Dimension	Local identity			X								Affecting the local culture of the human group	Coast
	Local Cultural Expressions			X								Affecting the manifestations of local culture of the human group	Coast
	Cultural significance sites at the local level			X								Affecting culture through the agglutinating and iconic sites of identity Local	Coast
Socio-economic dimension	Local Economic Activities	X										Impactn local economic activities and their associated dynamics.	Coast
												Potential generation of local employment	Coast
	Economic use of space and natural resources		X	X								Impactn space with economic use and natural resources	Coast
Basic Social Welfare dimension	Supply and demand for basic services							X				Increase in demand on the basic services present in the area of influence.	Coast

Source: Self-elaboration

Table 4-11. Identification of Impacts of the project in the Phase of closing

Environmental component	Environmental Factor	Project activities (Closing phase)							Impact	Sectors in which the impact is manifested
		FCI-01	FCI-02	FCI-03	FCI-04	FCI-05	FCI-06	FCI-07		
Atmosphere	Air quality			X	X	X			Increased material emissions Particulate and gases	Costa and Pampa
	Noise			X	X	X			Increased noise level	Costa and Pampa
Soils	Non-Arable land use capacity		X			X			Soil compaction degradation	Plateau and Pampa Coast
Fauna	Sites of interest to the Fauna		X	X	X	X			Involvement of nesting area Of *Oceanodroma Markhami*	Plateau and Coast
	Species of fauna in conservation category		X	X	X	X			Loss of specimens of the Reptile group	Pampa, Plateau and coast
	Species of FaunA in conservation category		X	X	X	X			Loss of specimens of the Birds group	Plateau and Coast
Landscape	Coastal Edge Unit		X		X	X			Visual incompatibility and loss of biophysical attributes	Coast
	Coastal Cliff Unit				X	X			Visual incompatibility and loss of biophysical attributes	Coast
	Mountain Cord Unit				X	X			Visual incompatibility and loss of biophysical attributes	Pampa
	Unit Pampa del Tamarugal				X	X			Visual incompatibility and loss of biophysical attributes	Pampa
Protected areas	Pampa del Tamarugal National Reserve				X	X			Intervention in protected Area	Pampa
Tourism	Tourist attractions		X	X	X				Alteration of tourist attractions	Coast

Source: Self-elaboration

4.7. Environmental impact Assessment

4.7.1 Middle FBESEEC Suoond

4.7.1.1 Quality of Tolre

The impactn this Environmental component lies in the direct effect it has on the health, well-being and quality of life of the population, which Is cautious through Standards, which is why your CAliFixing is done by comparison with the regulations, as well as, with the application of the evaluation methodology presented in Title 4.2 of this chapter.

The analysis of the IM potentialAir quality Pact is RealiZará In The area of influence ofL Project, corresponding To Geographic space comprising sensitive receptors, CaleTa San Marcos, Caleta Río Dry and OROffices and workshop pErteneciente to Mina TernaDita (Km 33 aprox. Route A-750)I mean to the area comprising The Coast Sector and Pampa Sector of the project

Valuation Environmental

The Valuation Of this factor, was assessed in relation to the significance (Gis) or importance representing air quality for communities located within the project's area of influence. In the area of influence of the project, in general the air quality of the coastal sector is good. Because of the above, the significance has been considered high (Gis= 8).

Consequently, the environmental assessment of this factor has a RElevation **High (8).**

Identification of the Impact

Factor: Air quality

Impact: "Increased material emissions Particulate and gases"

The emissions Generated during the Phase of construction CorrespondsRán Mainly to material Particulate Breathable (MP10) generated by: excavations, loading and unloading of material, and transportation of building materials and personnel. In addition to gases (CO, Nox, and HC) and material Particulate Breathable (MP10) from combustion of vehicles and MaquinAria used in the project. Total emissions for the Phase of construction are as follows:

Table 4-12: Emissions Total Phase of construction.

Activity	MP10 (Ton)	MP 2.5 (ton)	CO (Ton)	NOX (Ton)	SO2 (Ton)	HC (Ton)
Ground movement	103.40	22.49	-	-	-	-
Vehicular Traffic	1,750.40	247.72	98.53	390.95	-	18.45
Combustion machinery	153.45	153.45	515.02	1,900.22	-	199.45
Backup generators	19.81	19.81	60.02	277.94	18.48	-
Lte	0.09	0.01	-	-	-	-
Total	**2,036.16**	**443.48**	**673.57**	**2,569.11**	**18.48**	**217.90**

Source: Own Elaboration.

NOTE: LTE Electric transmission line

During the Phase of operation The only emissions generated Be Product of maintenance work. These are isolated works that generally require low mobilization and deployment on site.

In the Phase of closing, emissions to the atmosphere are of the same type as those generated in the Phase of construction, but of lesser magnitude. So, as in the Phase of construction, compliance with air quality standards will be complied with.

Magnitude of impact

Sand considers That the impact identified in the previous point, during the Phase of construction and closing, Will have a Negative character **(Ca =-1)**, Because it implies a deterioration of the basal condition of air quality, while During the Phase Operation the impact will be of character neutral **(Ca =0)** they correspond to The Circulation Of A low amount of Vehicles.

The Probability of Occurrence is True **(Po =1)** For The Phase of construction and closing By The activities and works that will generate emissions, and very low **(Po=< 0.1)** For the Phase of operation Of the project, considering for this Phase Only the transfer of person and equipment maintenance and LAT.

The extent of the impact is measured by the Space coverage of the Same, which would be limited to Immediate source Environment, I mean Extension for this impact will be average **(Ex =1)** In Phase of construction and closing; While for the Phase of operation The extension will be reduced **(Ex =0).**

The greatest amount of emissions will be generated in the Phase of construction, producing alteration Within acceptable ranges (see To Nexus 1.5 emission estimation, table 25); By It is considered that the Intensity for this Phase Is Moderate **(I =2).** In the Phase of operation Is

Consider low intensity **(I=1),** Since emissions and The majority will be given by the transport of the staff, maintenances of equipment and LAT, being all those activities less intensive than during the construction (see annex 1.5 emission estimation, table 36).

The time in which the impact will be manifested depends on the duration of the phases. In the case of the Phase of construction Be **(Du =1** Just like In The Phase of closing; While That in the case of the Phase of operation, the impact will be long-term **(Du =2)**. Once the activities or works that generated the impact are completed, The quality of the air Recover the basal condition naturally. Therefore, it is considered that the impact is Naturally Reversible For the construction phases, Operation and closing **(Re=0)**.

The summary is shown in the Table 4-13 Following:

Table 4-13: Magnitude of the environmental effect "Increased Emissions of Material culculated And GAces

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Costa and Pampa	Construction	-1	1	1	2	1	0	**-4**
	Operation	0	0.1	0	1	2	0	**-0.3**
	Closing	-1	1	1	2	1	0	**-4**

Source: Self-elaboration

Rating of the impact

The impact **"Increased material emissions Particulate and gases "** In the Phase of construction And Closure Of Project of Consider **Little Significant (-32)**And **Non-significant (-2.4)** For the Phase of operation, which corresponds to the fact that it complies with legislation in force in this area.

In The Table 4-14 The summary of The impact rating

Table 4-14: Impact rating for The Factor CDeity of Tolre

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
All sectors	Construction	8	-4	Increased material emissions Particulate and gases	-32 (Little significant)
	Operation		-0.3		-2.4 (not significant)
	Closing		-4		-32 (Little significant)

Source: Self-elaboration

4.7.1.2 Noise

The impactn this Environmental component lies in the direct effect it has on the health, well-being and quality of life of the population, which Is cautious through regulations (Emission standards), which is why your CAliFixing is done by comparison with the regulations, as well as, with the application of the evaluation methodology presented in Title 4.2 of this chapter. In annex 4.2, the project's noise study is extensively presented.

The analysis of the potential impact in noise levels is realized In The area of influence of Project determined by Sensitive receptors Closer To the works of the same, CaleTa San Marcos, Caleta Rio Seco and Offices and workshop belonging to Mina Ternardita (Km 33 aprox. Route A-750), ie to the area comprising The Costa and Pampa sector of the project

Valuation Environmental

The Valuation Of this factor, was assessed in relation to its significance (Gis) or importance that it represents within the area of influence of the project.

It should be mentioned that rural areas generally have low levels of existing background noise, so they are highly sensitive to increases in noise levels, especially during the night period. Consequently, noise has a very high significance (Gis= 9).

Therefore, the environmental assessment of this factor has a relevance **Very High (9)**.

Impact identification

Factor: Noise

Impact: "Increased noise level"

In the Phase of construction There will be a temporary increase in the levels Basal of noise Due to Constructions in the coastal Sector such as area of operations, Portals coast, installation of tasks, roads of access, With respect to the underground Sector the lower and Upper tunnel, cavern of Máquin. For the plateau Sector, Works associated with the reservoir and LAt. Finally for the Pampa Sector the main work is the construction of the LAt. To take these Works various types of Heavy machinery. These machines usually do not work simultaneously but sequentially in time or in small working groups. Notwithstanding the foregoing, in order to consider a conservative scenario, it was considered the simultaneous operation of this and the simultaneous construction of a large part of the aforementioned works. Other activities will be associated with Material transportation activities and the transfer of staff, with the most common, the loading and unloading of materials, the execution of excavations and the emptying of concretes among others.

During the Phase of operation Only the performance of the LAT and the mobile sources of the project, associated with personnel transportation and maintenance They could lead to an increase in baseline noise levels.

In the Phase of closing Project activities that could lead to an increase in baseline noise levels will be the DArming and removal of land structures and transport of dismantled personnel and equipment. These activities will be considered to be similar to those of the Phase of construction.

Magnitude of impact

This impact is considered negative PaRA LA Phase of construction and closing **(Ca =-1),** Since it involves the deteRioro of the basal condition of the Sectors and neutral in nature **(Ca = 0)** During the Phase of operation. The probability of occurrence is considered certain For The Phase of construction and closing **(Po =1)** and low for the Phase of operation **(Po=0.1),** By the activities and works that will generate emissions. To define the impact extension, the Made A noise modeling. The results indicate that in the Phase of construction and closing, the spatial coverage of the impact would be limited to the immediate environment of the Source **(Ex = 1);** And for the Phase of operation will have a reduced extension **(Ex = 0).** The intensity is Considered As moderate for the Phase of construction and closing **(I =2)** Since the alteration implies significant changes in relation to the basal condition but within acceptable ranges. For the Phase of operation, it is Considered A low intensity **(I =1)** Since the alteration implies noticeable but not significant changes in relation to the basal condition of the sector. The time the impact will be manifested depends on the duration of the phases, so that the Phase of construction And close the duration will be medium Term **(Du = 1);** While in the case of the Phase of operation, the impact will be Long-term **(Du = 2)**. A Time the Activities or works that will generate The impact, Base noise levels will return to their natural form. Therefore, it is considered that the impact is Naturally Reversible For the construction and operation phases **(Re = 0)**.

The summary is shown in the Table below:

Table 4-15: Magnitude of the environmental effect "Increase NIvel RUid"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Costa and Pampa	Construction	-1	1	1	2	1	0	-4
	Operation	-1	0.1	0	1	2	0	-0.3
	Closing	-1	1	1	2	1	0	-4

Source: Self-elaboration

Rating of the impact

The impact **"Increased noise level"** In the Phase of construction And closing of Project Sand considers **Little significant (-36)**And **Non-significant (-2.7)** For the Phase of operation, which corresponds to the fact that it complies with legislation in force in this area.

As a result of the preceding analyses, the following is presented in the Table 4-16 The summary of the qualification of the Impact.

Table 4-16: Impact rating for Component RUID and Vibrations

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Costa and Pampa	Construction	9	-4	Increased noise level	-36 (Little significant)
	Operation		-0.3		-2.7 (not significant)
	Closing		-4		-36 (Little significant)

Source: Self-elaboration

4.7.1.3 Electromagnetic fields

The impact to theironmental factor "Electromagnetic Fields" Also is regulated (standards International reason why its classification is done by comparison with the regulation, as well as, with the application of the evaluation methodology presented in Title 4.2 of this chapter.

This impact is only evaluated for the Pampa and plateau sector which is where the LAT will be located.

Valuation Environmental

The Valuation Of this factor, was assessed in relation to the significance (Gis) or importance that represents for the communities the radio reception within the area of influence of the project and the fragility (Fr) that present the weak radio frequencies in remote areas of the country against the interference produced by the presence of Electromagnetic fields.

Because the radio represents one of the forms of entertainment and means to stay informed more important for people living in isolated rural areas, the significance has been considered high (Gis=7).

Because they It has been estimated that the electrical lines could have an eventual affectation to the radio signals within a strip of 10 m on each side of the line, and considering that The populated sectors are at a greater distance to that mentioned, Fragility has been considered Low (Fr =1).

Consequently, the environmental assessment of the Factor has a relevance **Moderate (4, 5).**

Impact identification

Factor: Electromagnetic fields

Impact: "Radio-interference"

During the development of the Phase of construction and closing No sources of impact are anticipated Radio interference in the Phase of operation because to the performance High voltage and medium voltage line there may be interference in the reception of radio signals in the populated sectors. In annex 1.6 is the study of radio interference in extensive.

Magnitude of impact

This impact has been described as negative **(Ca =-1)**, Because the electromagnetic field will imply interference over radio broadcast waves. of certain probability **(Po = 1)** Because in the in this Phase The lines are energized by automatically generating electric and magnetic fields around the conductors. Reduced extension **(Ex = 0)** Because the radio interference is manifested in a strip of 10 m around the axis of the lines. Very low intensity **(I = 2)** Because it is expected that, because of the distance to which the populated sectors are located, the degree of alteration is minimal. of temporary duration **(Du = 0)**, because the radio interference is manifested only while conditions of high ambient humidity are present. Naturally Reversible **(Re = 0)**, because the radio interference effect is reverted naturally after ambient moisture conditions disappear. As a result of the above, the magnitude of the impactf **-2**.

The summary is shown in the following table:

Table 4-17: Magnitude of the environmental effect "Radio Interference"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa and Plateau	**Operation**	-1	1	0	2	0	0	**-2**

Source: Self-elaboration

Rating of the impact

Bearing in mind that the Environmental relevance For this environmental factor is 4.5 and that the magnitude of the impact is-2, this impact has been evaluated as **Negative, non-significant (-9)**.

As a result of the preceding analyses, the following is presented in the Table 4-18 The summary of the impact rating.

Table 4-18: Impact rating for The Factor Camps Electromagnetics

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Pampa and Plateau	**Operation**	4.5	-2	Radio interference	9Nor significant)

Source: Self-elaboration

4.7.1.4 Geomorphology

The implementation of 5 excavation material collection sectors is considered, two of them will be located in the coastal sector and 3 in the plateau sector, so the environmental evaluation of this component will be carried out in these sectors.

Valuation Environmental

Geomorphology is considered in terms of the possible modifications of the topography, to through changes in the basal situation of morphological indicators (altitude, slope, exposure) of an area.

In terms of geomorphological units, the project will be located in sites that do not present singularities at the local level So what are widely distributed in the northern region of Chile; These They correspond from west to east, to the coastal plains, the coastal cliff and the Cordillera de la Costa. The camp is located on the coastal plains (Coastal Sector). The Sector of the It crosses the Salar Grande in the Cordillera de la Costa and reaches at its extreme east the Salar de Bellavista in the Pampa del Tamarugal. (Plateau and Pampa Sector)

It is then evaluated that The site of the project will be carried out in sites that do not present Greater Singularities at the local level (yes =3) and What Are Abundantly In the northern region of Chile (Ab =3).

Because of the above, the assessment Environmental of this component Has a relevance **Low (3).**

Impact identification

"Modification of the topography"

In the Phase of construction of the project, the local topography can be affected, mainly by the installation of Billets of excavation material. The installation of Billets Both in the plateau sector and in the coastal sector could Alter the original topography of the terrain.

In Phase of operation and closing No sources of impact are foreseen for the Component Geomorphology, involving Modification of the topography.

Magnitude of impact

This impact has been described as negative **(Ca =-1)**, Since it will alter the original forms in the sites where the dumps of excavation material are located. of certain probability **(Po = 1)**, Due To be Require the dumps to deposit the material that will leave the excavation of the tunnels. Reduced extension **(Ex = 0)**, because the effects will only be on those sectors where They will install the dumps mentioned. of intensity High **(I = 3)**, because changes to the baseline condition are significant, the Natural condition. Long-term **(Du = 2)**, because the impactn the Topography It will be maintained after the construction is finished. Irreversible **(Re = 3)**, because the impact It will not be possible to reverse it.

The summary is shown in the Table Following:

Table 4-19: Magnitude of the environmental effect "Modification of the TOpografía"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast and Plateau	**Construction**	-1	1	0	3	2	3	**-8**

Source: Self-elaboration

Rating of the impact

The impactn Geomorphology It was assessed for the entire area of concern, taking into account that the Environmental relevance For this environmental factor is 3, and that the magnitude of the impact is-8, this impact has been evaluated as negative, Little Significant (-24).

As a result of the preceding analyses, the following is presented in the Table 4-20 The summary of the impact rating.

Table 4-20: Impact rating for The Geomorphologic Factor

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast and Plateau	**Construction**	3	-8	Modification of the topography	-24 (Little significant)

Source: Self-elaboration

4.7.1.5 Sea water Quality

Valuation Environmental

The baseline made, It allows to classify the body of water in the category Class 1 According to the reference values given in the "*Guide for the establishment of environmental quality secondary standards for shallow and marine continental waters*", I mean, of very good quality As

far as neutrality is concerned it is assigned a value of (10). The quality of the resource is very common in the area so it is given a value of (5). The resilience of the medium to disturbances is high so it is assigned a value of (7), with its fragility reduced (5). From the point of view of ecological interest. Water quality is the key to maintaining the balance of marine ecosystems, so it is given an assessment of (8) and a significance in the human field of (10).

Consequently, the environmental assessment of this component is **8**I mean A Relevance **High.**

Impact identification

"Alteration of the quality of seawater"

During the Phase of construction, the physical-chemical quality of the water Could be seen Altered Due to the Increase in suspended solids product of seabed removal, determined by the activities of Construction and assembly Of Maritime works (intake of adduction and discharge and emissaries of capture of seawater for the desalination plantdischarge of brine), which they consider activities of Local background cleaning, Norwegian shot opening, plant intake pipe Installation Desalination e Installation of brine discharge piping.

On the other hand, in the Phase of operation, Water discharge Retained in reservoirs through the underground tunnel Generates a thermal different of organic matter due to the primary production of reservoirs, as well as a Resuspension Marginal Of the sediment particles in the seabed, so that the characteristics of the water column in the scattering area of the pen will be modified, altering The quality of the water. On the other hand, the discharge of the brine from the desalination plant will be carried out through the same tunnel of the main discharge from the reservoir.

During the Phase of closing is considered Sources of Impact as it Underwater jobs are not considered Have Finalized Adduction and discharge of seawater.

Magnitude of impact

This impact is considered negative **(Ca =-1)**, with a Probability of a certain occurrence **(Po = 1)** For the Phase of construction, while for moderate operation **(Po = 0,8).**

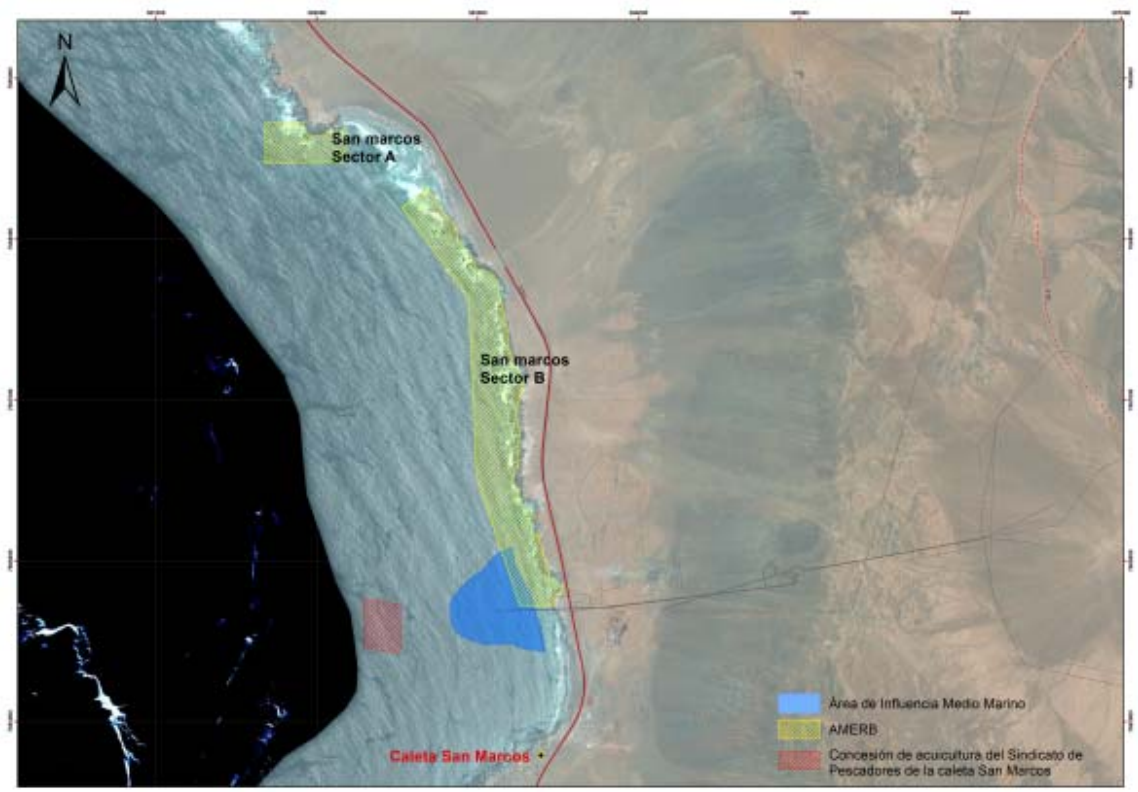
Since the particles do not immediately settle and disperse in the environment of the underwater work fronts, for the Phase of construction, the Extension is considered Can be found in the environment of the source **(Ex = 1)**. While in the Phase of operation The extension is wide **(Ex = 2)**, the highest concentrations of suspended solids on the surface (26 mg/l) and bottom layer (18 mg/l) in the Caleta San Marcos sector decrease as the feather moves northward, up to 2.6 mg/l

on the surface and 1.5 mg/l on the bottom layer. The Resuspension Eventual sediments considered as initial condition equal to 300 mg/l For the purposes of the evaluation, corresponding to the environmentally most unfavorable scenario, which corresponds to the maximum Allowed Outside the littoral protection Zone, established in DS N ° 90/2000 MINSEGPRES (see Annex 4.3, Download modeling Studio)

On the other hand, During The operation Average of the system As Sample Modeling and under conditions Extreme, In 96% of the Download events you will have a Temperature differential Between downloading and the environment Marine Less than 3 °c, Approximately And 99% of the time under the 4 ° C at the point of discharge Submarine. Under these conditions, the download Submarine allows the proper diffusion of over-temperature modeling for The normal operating scenario, reducing the Temperature difference of the Pen Below 3 °c at the time of this Could reach The surface of the sea. The thermal differential Modeling For FAR Field delivers a Maximum What will be of the order of 1.5 °c In the surrounding water at the starting point of the intake (As indicated in annex 4.3), gradients that in reality turn out to be lower than expected, especially compared to the experience of projects that have reported higher temperature gradients in their discharges (between 7 and 10 °c) (eg. Quintero LNG, Ventana thermoelectric complex, Central Tocopilla).

In the following figure, the celestial area corresponds to the thermal dispersion pen, considering at its limit a temperature differential in surface of approximately 0.3 °c.

Figure 4-3 Area of influence of the thermal boom on surface



Source: Self-elaboration

For the Phase of construction It is considered that the impact will have a Intensity Moderate **(I = 2),** While for Operation Will be low **(I = 1).**

The duration of the impact Be Temporary **(Du = 0)** Since the impact will be manifested only for the duration of the construction and installation of underwater works. During the Phase of operation The duration of the impact is long-term **(Du = 2)** Considered that this activity will be extended during The lifetime of the project. The impact is considered Naturally Reversible **(Re = 0)** During the Phase of construction, as the particles suspended They will naturally sediment once the source of impact is completed. While in operation it is It's a reversible impact **(Re = 1)**, since the marine communities will be able to return to their original state once the action that causes the impact is completed (download of water).

The summary is shown in the Following Table:

Table 4-21: Magnitude of the environmental effect "Alteration of sea water quality"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	1	1	2	0	0	**-3**
	Operation	-1	0.8	2	1	2	1	**-3.8**

Source: Self-elaboration

Rating of the impact

Bearing in mind that the Valuation Environment for this component has been qualified as high (8And that the magnitude of the impact is-3, this impact has been evaluated For the Phase of construction As negative, **Little Significant (-24).** During the Phase of operation Environmental assessment It has been qualified as high (8) And the magnitude of the impact is-3.8, this impact has been evaluated as negative, **Little Significant (-30.4).**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-22: Qualification of the Impact to The Factor CDeity of ToGua de MAr

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Construction**	8	-3	Alteration of sea water quality	-24 (Little significant)
	Operation		-3.8		-30.4 (Little Significant

Source: Self-elaboration

4.7.1.6 Marine sediment quality

Valuation Environmental

The vast majority of the chemical parameters evaluated in subtidal sediments, showed concentrations lower than the limits established by the international standards consulted, and defined as suitable for the protection of aquatic life. Marine. Regarding the chemical characterization of sediments Intertidal, it is possible to establish that of the totality of elements or metals evaluated, only the arsenic recorded a punctual value on the Canadian norms ISQG/TEL but inferior to the limit of probable effects on the biota, all the rest of heavy metals evaluated showed lower levels than The limits set by the consulted regulations, As far as naturality is concerned it is assigned a value of (8). The quality of the resource is very common in the area so it is Gives you a value Of (5). The resilience of the environment to physical disturbances is High so it is assigned a value of (7), being its fragility reduced (5). From Point DE

View of the ecological interest The quality of the sediments is important for maintaining the equilibrium of marine ecosystems, so it is given an assessment of (8) and a significance in the human field of (10).

Consequently, the environmental assessment of this component Is **7**, that is to say, a relevance **High.**

Impact identification

"Alteration of the physico-chemical properties of sediments"

During the Phase of construction, the physical-chemical quality of the sediments will be altered due To the removal of the seabed Determined by the activities of Construction and assembly Of Maritime works (intake of adduction and discharge and emissaries of capture of seawater for the desalination plant discharge of brine), which they consider activities of Local background cleaning, Norwegian shot opening, plant intake pipe Installation Desalination and installation of the pipe Brine Discharge And Suction of seawater for filling the reservoir.

In the Phase of operation suction and subsequent discharge of the retained water in the reservoirs through the intake will generate an increase in the turbulence that can suspend The surrounding sediment, modifying the original particle size of the area, since fine sediment would be transported by turbulence outside the area and part of it could be aspirated into adduction. Later part of this sediment would return to the sea with the turbine water. It is important to note that the implementation of a concrete ring above the substrate involves a significant reduction in potential sediment disturbance.

On the other hand, due to the increase of organic material Particulate Discharged due to the primary production produced in the reservoirs, the quality of the sediments in the vicinity of the discharge will be modified.

During the Phase of closing is considered Sources of Impact as it are not considered work submarines and Have Completed Adduction and discharge of seawater.

Magnitude of impact

Considering the local removal of sediments, this impact is considered to be of a negative nature **(Ca =-1)**, with a probability of occurrence Moderate **(Po =0.6)** In both phases of the Project (Construction and operation, since according to the modeling report presented in annex 4.3, there are expected to be no events of Resuspension Relevant to Sediments.

The Extension is considered reduced to the source environment **(Ex = 0)** During the Phase of construction, that cleanliness The seabed is confined to the de intake. While in the Phase of

operation The extension is wide **(Ex = 2)**, the highest concentrations of suspended solids on the surface (26 mg/l) and bottom layer (18 mg/l) in the Caleta San Marcos sector decrease as the feather moves northward, up to 2.6 mg/l on the surface and 1.5 mg/l on the bottom layer. The Resuspension Eventual sediments considered as an initial condition equal to 300 mg/l, corresponding to the environmentally most unfavourable scenario, which corresponds to the maximum outside the littoral protection Zone, established in DS N ° 90 (see Annex 4.3). Moderate intensity **(I = 2)** In Phase of construction, associated exclusively with the Punctual activities of Cleaning and Anchoring structures as well as mounting and anchoring of grates and pipes and low **(I = 1)** During the operation only for maintenance and cleaning of structures.

The duration of the impact During the Phase of construction it is Temporary **(Du = 0)** and Long-term **(Du = 2)** During the Phase of operation since will be extended throughout the lifetime of the project

The Impact Be Naturally Reversible Under construction **(Re = 0)**, because due to the dynamics of the sector, once the disturbance is over the place will be re-covered with TR sediments ansportados by the currents. While in operation It is of a reversible impact **(Re = 1)**, since the sediments will be able to return to their dynamics once the action that causes the impact (water suction and discharge) is finished.

The summary is shown in the Table Following:

Table 4-23: Magnitude of the environmental effect "Alteration of the physico-chemical properties of sediments"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	0.6	0	2	0	0	**-12**
	Operation	-1	0.6	2	1	2	1	**-36**

Source: Self-elaboration

Rating of the impact

Bearing in mind that the Environmental relevance For this component it has been qualified as high (7And that the magnitude of the impact is-2, this impact has been evaluated as **Negative, not significant (-8.4)**. Bearing in mind that the Environmental relevance For this component it has been qualified as high (7And that the magnitude of the impact is6, this impact has been evaluated as negative, **Little Significant (-25.2).**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-24: Qualification of the Impact to The Factor CDeity of marine sediments

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Construction**	7	-12	Alteration of the physico-chemical properties of sediments	-8.4 (not significant)
	Operation		-36		-25.2 (Little Significant)

Source: Self-elaboration

4.7.2 Middle Biotical

4.7.2.1 Soils

The class Of use capacity VIII, predominantly in the area of study No It has the capacity to be plowed and In consPerating The activities of the project do not affect the agricultural productivity of the area.

This impact will be assessed for the coast, plateau and Pampa sectors

Valuation Environmental

For the present project, the environmental factor to be evaluated corresponds with the type of capacity of use of non-Arable land, considering that they are the only kind of soils affected by the project.

To determine the Environmental relevance of this factor (CCUS not Arable), is valued in relation to the criteria of **Abundance**; **Fragility** And **Significance**, Whose methodology is presented in the Annex 4.1 "Methodologies for the environmental assessment by components" of this chapter, the Valuation Environmental Shown below:

Table 4-25: Evaluation Criteria

Criteria	Value
Abundance	0
Fragility	2
Significance	1
Relevance	**1**

Source: Self-elaboration

Impact identification

Factor: Ability to use

Impact: *"Loss Irreversible soil "*

In the Phase of construction Of the project, soil properties will be impacted by most activities. During the preparation of the terrain, pre-construction activities are envisaged, aimed at facilitating access to the work areas, such as leveling and compacting. The activities Temporary and Previously mentioned permanent impacts physical and biological soil properties. The deterioration is generated by the compaction of the Pedón And the removal of the soil at different depths (being able to include The most Subsurface associated with different activities of this Phase, such as the construction of roads, which will be maintained throughout the later phases of the project or as Earth movements, which generate a loss of the intrinsic characteristics of the soil matrix, whose development when given on a geological scale, return Irreversible (on a human scale) the impact.

The soils present In the study areas, they have a Class of Cap Of use VIII, that is to say, No TIene ability to be plowed and Consequently, the activities of the project do not affect the agricultural productivity of the area.

In the Phase of operation and closing No Sources of impacts are foreseen for the soil component, which implies soil losses

Magnitude of impact

This impact has been described as negative **(Ca =-1)**, Because it will involve both PéLoss of soil, as of their properties at the local level. of certain probability **(Po = 1)**, because access roads will be built and structures and conductors will be installed, for which it is necessary to excavate for foundations, and therefore soil properties are altered when removed. Reduced extension **(Ex = 0)**, because the effects on soil properties will be only on those sectors where the above mentioned activities are carried out. High intensity **(I = 3)**, because the changes in relation to the basal condition are significant, changing the natural condition and the productive possibility of this soil has been lost. Long-term **(Du = 2)**, because the impactn soil properties will be maintained after construction is completed. Irreversible **(Re = 3)**, because the impact cannot be reversed, since the soil will not be able to return to its basal state.

The summary is shown in the following table:

Table 4-26: Magnitude of the environmental effect "Loss Irreversible of the Lure"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast, Plateau and Pampa	**Construction**	-1	1	0	3	2	3	**-8**

Source: Self-elaboration

Rating of the impact

The impactn soil properties was assessed for the entire area of involvement, for permanent works, taking into account that the Environmental relevance For this environmental factor is 1, and that the magnitude of the impact is-8, this impact has been evaluated as **Negative, non-significant (-8).**

As a result of the preceding analyses, it is presented in the following table The summary of the impact rating.

Table 4-27: Impact rating for The Factor Capacity Of UOs del Lure

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast, Plateau and Pampa	**Construction**	1	-8	Irreversible soil loss	-8 (not significant)

Source: Self-elaboration

Impact identification

Factor: Ability to use

Impact: *"Soil compaction degradation"*

During The Phase of construction, The preparation of the terrain includes pre-construction activities, aimed at facilitating access to the work areas, such as leveling and compacting. The above activities impact Soil properties, as Structure. The deterioration is generated by the soil compaction, associated with different activities of this Phase, such as temporary transit at the time of the installation of works, which only produce superficial damage, without affecting to a greater extent The most Deeper

In the Phase of operation No Sources of impacts are foreseen for the soil component, which involve losses of soil

The activity of closing Involves the installation of slaughter and removal of land structures can create an impactn physical and biological soil properties. The deterioration is generated by the

compaction of the Pedón that generates a loss of the intrinsic characteristics of the soil matrix, generating a focus of erosion.

Magnitude of impact

Both for the Phase of construction As Close, The impact has been described as negative **(Ca =-1)**, because it will involve loss of soil properties at the local level. of certain probability **(Po = 1)**, because it will be transited through certain areas for the construction and closing of works. Reduced extension **(Ex = 0)**, because the effects on soil properties will be only on those sectors where the above mentioned activities are carried out. Low intensity **(I = 1)**, because changes to the basal condition are notorious, but not significant, because the damage is only occurring in the Gema Surface. Of Long-term **(Du = 2)**, because the impactn the Propiedades of the soil will be maintained after completion Both phases. As for the reversibility, this will be Reversible Arcialmente **(Re = 2)** In the Phase of construction, because the impact No It is naturally reversed, But it can be partially reversed with corrective actions And Reversible **(Re = 1)** In the Phase of closing, Because the impact cannot be reverted naturally, but it does apply corrective actions.

The summary is shown in the Table Following:

Table 4-28: Magnitude of the environmental effect "Degradation by COmpactación of the SLure"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast, Plateau and Pampa	**Construction**	-1	1	0	1	2	2	**-5**
	Closing	-1	1	0	1	2	1	**-4**

Source: Self-elaboration

Rating of the impact

The impactn soil properties was assessed for the entire Area of affectation, For temporary works, Considering that the Environmental relevance For this environmental factor is 1, and The magnitude of the impact is-5This Impact has been evaluated as negative, **Non-significant (-5** For the Phase of construction. While for the Phase of closing, bearing in mind that the Environmental relevance For this environmental factor is 1, and the magnitude of the impact is-4, this impact has been evaluated as negative, **Non-significant (-4).**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-29: Qualification of the Impact to The factor Capacity Of UOs del SLure

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast, Plateau and	**Construction**	1	-5	Soil compaction degradation	-5 (not significant)
	Closing		-4		-4 (not significant)

Pampa					

Source: Self-elaboration

4.7.2.2 Fauna

The results obtained from the survey conducted in the field campaigns, within the area of study, indicate the presence of 24 species, of which nine have some category of conservation according to the national legislation in force.

The species In conservation category, in The Sector It's Pampa, Plateau and Costa are presented in the following table

Table 4-30: Category of Conservation by Group Species present in the Project Area

Group	ESpecies	Sector	Conservation Category
Birds	*Oceanodroma Markhami*	Plateau and Pampa	Insufficiently known
	Sula Variegata	Coast	Insufficiently known
	Phalacrocorax Gaimardii	Coast	Insufficiently known
	Leucophaeus Modestus	Coast	Vulnerable
	Phalacrocorax Bouganvilii	Coast	Vulnerable
	Pelecanoides Garnotii	Coast	Vulnerable
Reptiles	*Liolaemus Stolzmanni*	Plateau and Pampa	Insufficiently known
	Phyllodactylus Gerrhopygus	Plateau and Pampa	Vulnerable
	Microlophus Quadrivitattus	Coast	Insufficiently known

Source: Self-elaboration

Between The sectors Plateau and Coast It was identified the existence of a site of interest for the fauna within the project area, corresponding to the sector in which signs of nesting of the species were recorded *Oceanodroma Markhami*. Among the findings, there are remains of birds (mainly wings and skulls) and cavities with signs of having been occupied as nests (sand with printed traces, traces of down and traces of fish). Spatially, the site of interest seems to be bounded to the ravines closest to the coast, although given the complexity of recording the signs of reproduction, it is not possible to define exactly the limits of the area Of total nesting, but yes in relation to the project.

Environmental assessment

The environmental factors considered in the present evaluation were those entities belonging to the fauna component, capable of demonstrating in a differentiated way the effects of the different activities derived of the project execution. So it's considered To Those species that have some category of conservation according to The national legislation in force, grouped in the classes of birds and reptiles (See Table 4-30). As well as The sites of interest for the fauna described in The Chapter 3 "LOnline base".

The value or Environmental relevance Of the environmental factors was calculated on the basis of the criteria; naturalness, Singulari Fragility and significance. in annex 4.1 "Environmental assessment methodology by component",(TA) The analysis of each criterion for species in conservation category.

The Environmental factors considered and the valuation given to each one of them is as follows:

a) **Site of Interest**

- **Area of Nesting Of *Oceanodroma Markhami***

The site of Interest Area of Nesting Of *Oceanodroma Markhami* Presents a Moderate State of Conservation (Na= 6) and is very little represented (yes = 10). This site is without legal protection and with latent threats (Fr = 10). As for your Significance, it has a high degree of dependence on The Species that is associated with this (YesG= 8).

For the above this site of interest presents a relevance **Very high (9).**

b) Species of fauna in conservation category

- **Group Reptiles**

In the group of Reptiles The Three Species Registered in the study area (see Table 4-30 Corresponds (a) native species (Na= 5), Two of the species is recorded In a very Little Frequent in the region And the other is often recorded in the region so it is considered (if =8). These species PResettle conservation states "Insufficiently known" And Vulnerable According to the Hunting Law (19,473) (Fr = 8). As to its significance, Whereas there is a species within the group whose Distribution is restricted The group is assigned (Gis= 8).

For the above ESTE Group (Reptiles) Presents a relevance **High7).**

- **Birds Group**

In the group of birds, all the species of the Table 4-30 Correspond(e) Native species (NaOne of the species is recorded in the region in a moderately Frequent, so the group is assigned singularity (yes = 5). Present state of conservation "Insufficiently known" According to the Hunting Law (19,473) (Fr = 8). The species of the group Is Very widely distributed (Gis= 2).

For the above this group (birds) Presents a relevance **Moderate (5).**

Impact identification

Factor: Site of interest

Impact: "Involvement of nesting area Of *Oceanodroma Markhami*"

In the plateau and coast sectors, during the Phase of construction The Involvement of nesting areas of the species *Oceanodroma Markhami*For activities involving land preparation, transport, transportation, and construction of a section of the North access road and vehicular flow through construction in the plateau and Pampa sectors. While in the Phase of operation Could occur The Involvement of nesting areas Of *Oceanodroma Markhami,* By the activities that involve The circulation by the North access road of vehicles for the monitoring of the reservoir and maintenance of the electrical lines of the project. In the Phase of closing not be PREvén Sources of impacts that involve The Involvement of nesting areas Of *Oceanodroma Markhami*

Magnitude of impact

During the Phase of constructionEL Impact has a **Character** Negative **(Ca =-1)** Because the Affecting a nesting area Of a species in conservation category Insufficiently known Supposes a DISMInución of his basal condition. The **Probability** It was considered high **(Po = 0.8)** Because the project considers the execution of works in the vicinity of the sites where the nesting of The species. The **Extension** It was valued as broad **(Ex = 2)** Due to The effects of the deterioration of a site Nesting Of this insufficiently known species. The **Intensity** It was considered high **(I = 3)** Since a possible scenario is the abandonment Total of the nesting site. The **Duration** is long-term **(Du = 2)** Since the deterioration of the site of Nesting could be definitive. It is worth mentioning that there was no evidence of reuse of nests in different seasons, however being an insufficiently known species, a conservative impact assessment is chosen. Finally, the **Reversibility** Impact was considered irreversible **(Re = 3)** Due to the unknown management actions that could restore the basal condition of the site once impacted.

Yet the magnitude of the impact During the Phase of construction is from **-8.0.**

For the Phase of operation valuation is equal to the Phase of construction With the exception of the criterion **Probability**, which is considered moderate **(Po =03)** Because the intervention will be Minor during the project operation. Considering that, the magnitude for the Phase of operation is from **-30.**

The summary is shown in the Table Following:

Table 4-31: Magnitude of the environmental effect "Affectation of 'Area of Idificación Of *Oceanodroma Markhami*"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Plateau and Coast	Construction	-1	0.8	2	3	2	3	**-8.0**
	Operation	-1	03	2	3	2	3	**-3, 0**

Source: Self-elaboration

Rating of the impact

In attention to the Environmental assessment For this environmental factor is 9 and that the magnitude of the impact is-8 For the Phase of construction, this impact has been assessed as **Negative and significant-72.** While for the Phase of operation The Impact has been assessed as **Negative and Little Significant -27**In Attention that relevance to this environmental factor is 9 and that the magnitude of the impact is3.

As a result of the preceding analyses, the following is presented in the Table 4-20 The summary of the impact rating.

Table 4-32: Qualification of the Impact for the factor sites Interest

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Plateau and Coast	Construction	9	-8	Involvement of nesting area Of *Oceanodroma Markhami*	-72 (significant)
	Operation		-3		-27 (Little Significant

Source: Self-elaboration

Impact identification

Factor: Species of fauna in conservation category

Impact: "Loss of specimens from the group Reptiles In a state of conservation *Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus*"

The Loss of specimens Of *Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus* Could Occur Mainly by crushing or trampling. During The Phase of construction, For project activities involving land preparation, transportation, construction and assembly of structures and removal of facilities. During the Phase of operation Due to the transit of vehicles destined for maintenance and monitoring in the plateau and Pampa sectors and During the Phase of closing By Project activities involving land movement and removal of facilities

Magnitude of impact

In the Pampa and plateau sector during the Phase of construction The Impact has a **Character** Negative **(Ca =-1** Because the death of specimens of species In conservation category implies a DISMInución of his basal condition. The **Probability** It was considered high **(Po = 0,8** Because The two species registered are Extremely crypticS. The **Extension** was valued as low **(Ex =0** Because the population effects of the mortality of specimens should be manifested only within the Area directly impacted. The **Intensity** It was considered high **(I =3** Since the occurrence of the impact substantially modifies the Condición basal of the impacted specimen. The **Duration** is long-term **(Du =2** Since the occurrence of the oddCTO is permanent in time. Finally, the **Reversibility** Impact was considered irreversible **(Re =3** Because it is not possible to return to the basal condition once the impact has occurred.

However, the **Magnitude** of the impact During the Phase of construction For the Pampa and Plateau sector is from **-6.4.**

In relation to the Phase of operation In the Pampa and Plateau sector, LA valuation is equal to the Phase of construction With the exception of the criterion **Probability**, which is considered moderate **(Po = 0.4)** Because the execution of actions that could cause the death of specimens of the species will be much lower than in the Phase Precedent. Considering that, the **Magnitude** For the Phase of operation is from **-3.2.**

For the Phase of closing In the sectors listed above, lA valuation Of the magnitude of the impact is equal to that made for the Phase of construction, Except for the probability that it is moderate **(Po = 0.4)**, resulting in a **Magnitude** Of **-3.2**.

On the other hand, En the coast sector In All phases of the project Impact has a **Character** Negative **(Ca =-1** Because the death of specimens of species In conservation category implies a DISMInución of his basal condition. The **Probability** was considered Moderate **(Po = 0.4)** During the Phase of construction and Close and Low **(Po =0,2** During the Phase of operation Because the Occurrence is limited to the coastal edge, in which it isTempers a minimal intervention. The **Extension** was valued as low **(Ex =0** Because the population effects of the mortality of specimens should be manifested only within the Area directly impacted. The **Intensity** It was considered high **(I =3** Since the occurrence of the impact substantially modifies the Condition basal of the impacted specimen. The **Duration** is long-term **(Du =2** Since the occurrence of the oddCTO is permanent in time. Finally, the **Reversibility** Impact was considered irreversible **(Re =3** Because it is not possible to return to the basal condition once the impact has occurred.

However, the **Magnitude** of the impact In the Phases of construction and closure of the project In the coast sector is from **– 3.2** and of **-1.6** For the Phase of operation.

The summary is shown in the Table Following:

Table 4-33: Magnitude of the environmental effect "Loss of Exemplars of the Group Reptiles"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa and Plateau	**Construction**	-1	0.8	0	3	2	3	**-6.4**
	Operation	-1	0.4	0	3	2	3	**-3.2**
	Closing	-1	0.4	0	3	2	3	**-3.2**
Coast	**Construction**	-1	04	0	3	2	3	**-3.2**
	Operation	-1	0.2	0	3	2	3	**-1.6**
	Closing	-1	04	0	3	2	3	**-3.2**

Source: Self-elaboration

Rating of the impact

LTo Environmental assessment For this environmental factor is **7** And the magnitude of the impact In the Pampa and plateau sector during the Phase of construction Is **-6.4**, this impact has been assessed As **Negative and Significant -45**. For The Phase of operation and closing, The magnitude of the impact is **-3.2** So the Impact has been assessed as **Negative and not significant -22**.

In the coastal sector, the environmental assessment for this factor is 7 and the magnitude of the impact for the phases of construction and closure Of the project was determined **-3.2**, this impact has been assessed as **Negative and Little Significant -22**. While That for the Phase of operation The environmental assessment is 7 and the magnitude of the impact is **-1.6**, this impact has been assessed as **Negative no significant-11**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-34: Qualification of the Impact For the Factor Species of Combined in Category Conservation (Group Reptiles)

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Pampa and Plateau	**Construction**	7	-6.4	Loss of specimens Of *Liolaemus Stolzmanni* And *Phyllodactylus Gerrhopygus*	-45 (Significant)
	Operation		-3.2		-22 (Little significant)
	Closing		-3.2		-22 (Little significant)
Coast	**Construction**		-3.2		-22 (Little significant)
	Operation		-1.6		-11 (not significant)
	Closing		-3.2		-22 (Little significant)

Source: Self-elaboration

Impact identification

"Loss of specimens from the birds group"

The Loss of specimens of the Birds group Could Occur Mainly by crushing or assaulting or collision with structures. During The Phase of construction, By the activities of the project involving land preparation, transfer, Personnel Transportation, Construction and assembly of structures and removal of facilities. During the Phase of operation Due to the transit of vehicles for monitoring, maintenance and transportation of personnel and during the Phase of closing By Project activities involving the Earth movement, Personnel transportation and removal of facilities

The sectors of the project that could be affected by this impact correspond to the plateau, Pampa and Costa sector.

Magnitude of impact

In the plateau sector, Pampa and Cost, in all phases of the project, and Impact has a **Character** Negative **(Ca =-1** Because the death of specimens of species In conservation category implies a DISMInución of his basal condition. The **Probability** It was considered moderate **(Po =0,4** For the Phase of construction and Close and **(Po = 0.2)** For the Phase of operation. The **Extension** Was valued as a mean **(Ex =1** Because the population effects of the mortality of specimens could be manifested in the Immediate Project lathe. The **Intensity** It was considered high **(I =3** Since the occurrence of the impact substantially modifies the Condition basal of the impacted specimen. The **Duration** is long-term **(Du =2** Since the occurrence of the oddCTO is permanent in time. Finally, the **Reversibility** Impact was considered irreversible **(Re =3** Because it is not possible to return to the basal condition once the impact has occurred.

However, the **Magnitude** of the impact In the plateau sector Pampa and coast during all phases of the project is from **-3.6.**

The summary is shown in the Table Following:

Table 4-35: Magnitude of the environmental effect "Loss of E.gEmplares of the Group ToSee"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Plateau, Pampa and Coast	Construction	-1	0.4	1	3	2	3	-3.6
	Operation	-1	0.2	1	3	2	3	-1.6
	Closing	-1	0.4	1	3	2	3	-3.6

Source: Self-elaboration

Rating of the impact

In attention to the Environmental assessment For this environmental factor is **5** And that the magnitude of the impact For The phases of construction and closure of the project Is **-3.6**, this

impact has been assessed as **Negative and Non-significant -18**. While for the Phase of operation The environmental valuation is 5 and the magnitude of the impact-1.6, so the impact has been evaluated as **Negative and not significant-11**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-36: Impact Rating For the factor and Species of Combined in Category Conservation (Group ToSee

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Plateau and Coast	Construction	5	-3.6	Loss of specimens from the birds group	-18 (not significant)
	Operation		-1.6		-11 (not significant)
	Closing		-3.6		-18 (not significant)

Source: Self-elaboration

4.7.2.3 Oceanography Biological

a) Epibiota Intertidal of hard funds

This component contemplates the analysis of the communities Intertidal of rocky bottoms. Habitat alteration will affect these communities, although These organisms are expected to rapidly repopulate the intervened sectors and fix the substrate removed and the new structures once completed Construction works.

According to the results of baseline studies, The intertidal fauna is developed in an environment intervened by the brown algae collectors operating in the sector, who remove individuals from *Lessonia Berteroana* Leaving patches devoid of vegetation, passing To Be bleached low-biodiversity funds.

Environmental assessment

As mentioned in the Line Base, the Epibiota Intertidal of hard funds form communities and populations that are common to all the central-north of Chile, so they are very common environments and are rare (3). However, the species register (94 Taxa) in the Intertidal of Caleta San Marcos was higher than those described by Gaymer *et al.* (2006, 2008) and Broitman et al. (2011) For Island Chañaral, the marine reserve Islands Choros-Damas, the area Marine and coastal protected of multiple uses large island of Atacama, the shaker and the Arrayán, which makes this component has a high (8) an ecological interest.

In the Intertidal Hard, stresses the low abundance of fleeing (*Lessonia Berteroana*), a species characterized by a continuous strip in the lower part of the Infralittoral, a situation that is mainly due to the exploitation by means of the technique of the Barret, described by Vásquez (2007) in the region of Atacama, so that naturality refers to it is granted a moderate relevance (4), although its significance is very high (10) due Precisely to the harvesting activities of this algae. These formations have a low reversibility against disturbances, such is the case of its extraction from fleeing by Barret, where the communities do not recover again. Due to the foregoing, it is given a high rating (9) in terms of irreversibility and FragiDeity (9) As far as fragility is concerned.

According to the above assessment Environmental Of Factor Epibiota Intertidal of hard funds is of relevance **High7).**

Impact identification

"Current voltage of the Marine Communities Intertidal of hard funds "

The construction work of the intake of adduction and discharge of seawater, and the construction of the pipes for the desalination plant will imply a modification of the habitat in which the Epibiota Intertidal associated with the rocky substrate of the area Intertidal, product of the conditioning of the sector and compaction of the substrate for the incorporation of new elements like concrete, pipes, and elements of construction. The source of impact identified is the construction of the Submarine shooting and discharge work, especially in works related to the installation of work area on the beach.

In the Phase of operation Of the project there will be no activities in the coastal border, nor in the Intertidal. As noted above, the discharge of the turbine waters will generate an increase in temperature and turbidity in the water surrounding the exit point of the intake submarine. In the Resuspension Of the sedimented particles in the seabed, so that the physical characteristics-and consequently the habitat of the marine communities-in the area of feather dispersion will be modified, altering the Marine communities that develop there. It is important to note that the implementation of the design of the intake and its location A-15, 5 Meters deep, below the thermocline and about 340 M from the coast, implies a significant reduction in the spatial distribution of the pen and the effect on The Marine communities of the Intertidal. The sources of impact identified are the activities related to Burden of Seawater from the reservoir.

No new sources of impact are considered in the Phase of closing since Submarine work will not be carried out and will have ended Adduction and discharge of seawater.

Magnitude of impact

The impact is considered negative **(Ca =-1)**, with a Probable True Occurrence **(Po = 1)** For the Phase of construction and low **(Po = 0.2)** In the Phase of operation. Its extension in Phase of

construction is reduced **(Ex = 0)** Because this impact will be focused on the area of works and a half **(Ex = 1)** In the Phase of operation Since the scatter pen would not reach the Intertidal, The intensity In construction and operation of the project is Moderate **(I = 2)**. The duration of the impact is medium-term **(Du = 1)** Because it will remain during the construction activities and Whereas the operation activity will be extended throughout the project's lifetime, the duration of the impact is long-term **(Du = 2).** In Both phases of the project the Impact Is Reversible **(Re = 1)** Since the marine communities will be able to return to their original state once the action that originates the impact

Consequently, the magnitude of the impact During the Phase of construction Is **-4** And **-1.2** For the Phase of operation

The summary is shown in the Table Following:

Table 4-37: Magnitude of the environmental effect "Alteration of the Communities Marinas intertidal Of hard backgrounds"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	1	0	2	1	1	**-4**
	Operation	-1	0.2	1	2	2	1	**-1.2**

Source: Self-elaboration

Impact Rating

Bearing in mind that the Valuation Environmental for this Factor has been qualified as high 7 And that the magnitude of the impact is-4 In the Phase of construction, the impactn the Epibiota Intertidal of hard funds has been assessed as **NegAtional, little significant (-28).** While in Phase of operation The magnitude of the impact is-1.2, this impact has been assessed as **Negative, non-significant (-7.2).**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-38: Impact Rating For the Factor EPibiota intertidal Of hard backgrounds

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Construction**	7	-4	Alteration of the Marine Communities Intertidal of hard funds	-28 (Little significant)
	Operation		-1.2		-7.2 (not significant)

Source: Self-elaboration

b) Macro benthos Intertidal of soft funds

Considering both campaigns, a total of 12 species were obtained In the 8 Transects Evaluated. The richness of observed species is within the range of the number of species described in the literature for central and northern Chile, with the majority of the species that characterize the Intertidal of sand, both globally (Dahl, 1953), as for northern Chile (Jaramillo, 1987).

Environmental assessment

The results obtained suggest that the analyzed sector is in a condition of disturbance. However, it is not possible to associate this disturbance with the effects of a anthropic character, since in general the high dynamics present in sandy beaches characterize these environments as environments that are in constant disturbance, so it is assigned a value Of (8) in terms of naturalness. When comparing the results of diversity, with the values suggested by Alcolado (1992), it is observed that almost all of the sampling stations would be classified as strong and constantly severe environments, a situation that is common in the beaches of the area. In this way it is given a value of (5) as far as rarity is concerned. These communities are exposed to natural physical disturbances so they have a high resilience, giving it a value for the irreversibility of (5) and a fragility of (5).

The Macroinfauna Intertidal of soft funds attracts numerous species of birds and fish that feed on their species they are of a high interest from the point of view of their ecological interest (7), although their significance for the human environment is rather relative (5).

According to the above assessment Environmental of this factor is of relevance **Moderate (6).**

Impact identification

"Alteration of marine communities Intertidal of soft funds"

The work of Construction of underwater works Will involve a modification of the habitat in which it develops The MAcrobentos Intertidal of soft funds In the area of beaches, Product of the conditioning of the sector As a shuttle for construction De la intake And In the Substrate compaction By the occasional transit of machinery. The sources of impact identified are the works related to the Installation Work Area

In the Phase of operation Of the project there will be no activities in the coastal border, nor in the Intertidal. As noted above, the discharge of the turbine waters will generate an increase in temperature and turbidity in the water surrounding the exit point of the submarine intake by the Resuspension Of the sedimentary particles in the seabed, although it is important to point out that the implementation of the intake design and its location A-15.5 Meters deep Approx., below the thermocline and about 340 M from the coast, implies a significant reduction in the spatial distribution of the feather and the effect on the marine communities of the Intertidal.

The sources of impact identified are the activities related to the discharge of seawater from the reservoir and the discharge of brine.

is not considered New sources of Impactn the Phase of closing since Submarine work will not be carried out and will have ended Adduction and discharge of seawater.

Magnitude of impact

EThe impact is considered negative **(Ca =-1)**, with a probable Occurrence **(Po = 1)** In Phase of construction and low **(Po = 0.1)** In operation. Its extension is reduced **(Ex = 0)** Because this impact will be focused on the area of works of construction and media **(Ex = 1)** In the project operation Since the Scatter feather not get's To Intertidal. To intensity Is Low **(I = 1)** In construction and operation. The duration of the impact is medium-term **(Du = 1)** Because it will remain during construction activities and considering What The Activity will be extended throughout the lifetime of the project, the duration of the impact is long-term **(Du = 2)**. Is It awaits the start of the repopulation of the area intervened to the cessation of the activities, so it is a reversible impact **(Re = 1).**

Consequently, the magnitude of the impact In the Phase of construction Is **-3** And **-0.5** In Phase of operation.

Table 4-39: Magnitude of the environmental effect "C alteration Omunidades marine inertial Of soft background"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	1	0	1	1	1	**-3**
	Operation	-1	0.1	1	1	2	1	**-0.5**

Source: Self-elaboration

Impact Rating

Had That the environmental assessment for this factor has been Se hA rated as moderate 6 And that the magnitude of the impact is-3 In Phase of construction Y-0.5 in Phase of operation, the impactn the Macro benthos Intertidal of soft funds has been assessed For both phases As **Negative, not Significant-18** And **-3** Respectively.

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-40: Rating of the impact For the factor Macro benthos inertial of soft background

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating

Submarine	**Construction**	6	-3	Alteration of marine communities Intertidal of soft funds	-18 (not significant)
	Operation		-0.5		-3 (No signIFicativo)

Source: Self-elaboration

c) Epibiota Subtidal background

In the baseline study, 6 different communities were identified in the Subtidal study area: community of *Lessonia Trabeculata* (LT), community of Suspensívoros (CS), shallow and deep laundered community of funds (CFBS and CFBP, respectively), soft-fund Community (CFblandos) and a community of erect algae (CAE). In the spring Campaign (2013), 5 of the 6 communities were registered, except for CAE, which was described during the summer campaign. During the summer (2014) The CFBS and CFBP communities were not registered. These changes in the communities can be due to the spatial variation of the sampling and/or seasonal variations product of biotic and/or abiotic factors, such as the water temperature, competences by space, predation, availability of food, between Other Witman and Dayton 2001).

The specific richnesses registered in all the communities are superior to other places of high ecological importance of the Chilean coast. The soft-fund community had a final record of 56 species, higher than reported Gaymer et al. (2006) in Damas Island (33 Taxa) The taxonomic groups and species described for this community are similar to that described by Gaymer et al (2006).

The alteration of the habitat will affect these communities, although according to previous experiences it is hoped that effectively, these organisms quickly repopulate the intervened sectors and the new submarine structures once the works of Construction. It should also be mentioned that some of these communities extend in the Subtidal AMERB that is where the hydrobiological resources of commercial value are developed.

Environmental assessment

The Communities Harbor a high diversity of environments and species, and therefore communities are of high ecological interest (8). However, these communities are common in the Northern center of Chile and are common environments, so they are given a moderate rarity value (6). Because in these environments are developed the species of commercial interest that exploit the divers shellfish, and that some of these environments have been described in the AMERB are of very high significance (10). The area has a high natural state (8) Moderate fragility (6) and a relevance High (7).

According to the above assessment Environmental Of Factor Epibiota Background SUbmareal is of relevance **High (8).**

Impact identification

"Alteration of subtidal marine hard-fund communities"

The construction work of the intake of adduction, and the construction of the pipes for the desalination plant will imply a modification of the habitat in which the Epibiota Subtidal background, product of construction activities related to cleaning of the intake area, opening of the Norwegian tyre, installation and anchorage of the intake, assembly of the metal structure of the intake, installation of the pipe of the Plant Desalination e Installation of brine discharge piping.

In the Phase of operation Of the project there will be no activities in the subtidal, apart from maintenance activities and inspection of the state of the submarine structure. As noted above, the discharge of the turbine waters will generate an increase in the Temperature in the sector adjacent to the exit point of the intake submarine, so that the physical characteristics in the area of dispersion of the pen will be modified, Altering the marine communities that develop. It is important to note that the implementation of the intake design and its location15.29 Meters deep, below the thermocline and about 340 M from the coast, Outside the coastal protection zone, It implies a significant reduction in the spatial distribution of the pen and the effect on the marine communities of The Epibiota Subtidal background, which are close to the coast. The identified impact sources are Activities related to DBurden of Sea water from the reservoir, and the MAintenance and cleaning of underwater structures

is not consideredn New sources of Impactn the Phase of closing, since Submarine work will not be carried out and will have ended Adduction and discharge of seawater.

Magnitude of impact

EThe impact is considered negative **(Ca =-1)**, with a certain probability of occurrence **(Po = 1)** In the Phase of construction and moderate **(Po = 0.6)** In the Phase of operation. Its extension In the Phase of construction is reduced **(Ex = 1)** Because this impact will be focused on the area of works and during the Phase of operation The extension is average **(Ex = 2)**, as the Download from the reservoir Generate In the seabed a maximum positive thermal differential of the order of 1.54 Covered an area no greater than 0.056 ha The intensity is Moderate **(I = 2)** In both phases. The duration of the impact is medium-term **(Du =0)** Under construction and considering That this activity will be extended throughout the project's lifetime, the duration of the impact In the Phase of operation is long-term **(Du = 2)**. SE is a reversible impact For both phases **(Re = 1)**, as the marine communities will be able to return to their original state once they have finished to action that causes impact.

Consequently, the magnitude of the impact In Phase of construction Is -4 And in Phase of operation Is **-4.2.**

Table 4-41: Magnitude of the effect Environmental Alteration of the Communicates MArinas SUbmareales hard background"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	Construction	-1	1	1	2	0	1	**-4**
	Operation	-1	0.6	2	2	2	1	**-4.2**

Source: Self-elaboration

Impact Rating

Environmental assessment For this Factor has been qualified With high relevance 8 And the magnitude of the impact As -4 In Phase of construction and4.2 In Phase of operation, So you The impactn the Epibiota Subtidal has been evaluated COMOr **Negative, little significant –32** And **Negative Little significant-33**Respectively.

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-42: Impact Rating For the factor EPibiota Of subtidal background

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	Construction	8	-4	Alteration of subtidal marine hard-fund communities	-32 (Little significant)
	Operation		-4.2		-33 (Little Significant

Source: Self-elaboration

d) Ichthyofauna

The Ichthyofauna Present in the study area was characterized by the presence of speciesuch as the Bilagay, plump, jerguilla and castañeta that commonly inhabit communities of Macroalgae, in ESPecial to forests or Fleeing Of *Lessonia Trabeculata* (Vasquez 2002, Vásquez and Vega 2004, Gaymer *et al*. 2006). The specific richness observed was higher in summer (13 species), recording a difference of 4 species with the spring campaign. Between the two campaigns counted a total of 14 fish speciesHowever, the number of total individuals (counting all Taxa) was higher in spring. In both campaigns the Bilagay Was the Taxa More abundant, concentrating their sightings in the areas where a predominance of the community of *L. Trabeculata.*

Environmental assessment

The Speciestocks Described in the previous section They are common in the central northern part of the country (Ra = 3), and the composition and populations are of a high naturalness (8). These populations are composed of common species, low irreversibility (3), moderate fragility (4). These species are of high ecological interest (8) as they can be used as indicators. From the point of view of significance, the species identified have a moderate value (6).

According to the above assessment Environmental factor Ichthyofauna is of relevance **Moderate5).**

Impact identification

"Loss of individuals"

The construction work of underwater works will imply a disturbance of the habitat in which Sarrolla part of the activity of fish in the sector which are highly mobile So you It is expected that as soon as it starts Underwater works individuals migrate to adjacent areas. The sources of impact in this Phase They are related works with cleaning of the area of intake, opening of the Norwegian shot, installation and anchorage of the intake, assembly of the metallic structure of the intake, installation of the pipe of intake of the plant Desalination and installation of brine discharge piping

In the Phase of operation Of the project the impactn the Ichthyofauna It will be produced by the adduction of seawater, and by the consequent risk of suction of the fauna Fish. As noted in the project description chapter, The suction speed to the outside of the gate will be of 0.15 m/s so it allows the fish to swim against this current and to be able to escape from the suction. EL design of the intake has a protection grille with a 5 cm passing light, which Additionally Makes it impossible for larger fish to enter the System. The discharge of the turbine waters will generate a small turbulence surrounding the starting point of the submarine intake That is estimated will not affect the Ichthyofauna of the sector. The sources of impact in this Phase Are the actions related to suction Seawater to the reservoir.

is not considered New sources of Impactn the Phase of closing since Submarine work will not be carried out and will have ended Adduction and discharge of seawater.

Magnitude of impact

This Impact is considered negative **(Ca =-1)**, with a probability of a certain occurrence **(Po = 1)** Both for the Phase of construction and operation. Its extension In Phase of construction is reduced **(Ex = 0)** Because this impact will be FOCIn the area of works and media in the Phase of operation **(Ex = 1)**, as the suction is limited to the environment of the protection bar. In any case, the suction will be at a speed of 0.15 m/s which allows that there is no affectation of the Ichthyofauna Because this speed allows you to dodge the suction. LTo intensity Is Low **(I = 1)** In construction and moderate **(I = 2)** In operation, as the Ichthyofauna It will migrate to other

adjacent sectors. The duration of the impact is medium-term **(Du =1)** In the Phase of construction Because it will remain only during construction activities And Long-term **(Du = 2)** During the operation because although it is an intermittent activity will be extended throughout the lifetime of the project. UOnce the construction and operation activities have been completed, The sector will be repopulated by the Ichthyofauna, so it is a naturally reversible impact (Re = 0).

As a result, the magnitude of the impact is **-2** For the Phase of construction And **-5** For the Phase of operation

Table 4-43: Magnitude of the effect EnvironmentalLoss of INdividuos"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	1	0	1	1	0	**-2**
	Operation	-1	1	1	2	2	0	**-5**

Source: Self-elaboration

Impact Rating

The Environmental assessment for this factor It has been described as relievingModerate Ncia 5 And the magnitude of the impact In Phase of construction As-2 and-5 in Phase of operation, So you The impactn the Epibiota Intertidal of hard funds has been assessed COmo **Negative, not significant -10** And **Negative little significant-25**Respectively.

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-44: Impact Rating Loss of Individuals

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Construction**	5	-2	Loss of individuals	10Non-significant)
	Operation		-5		25Little significant)

Source: Self-elaboration

e) Macroinfauna Subtidal sedimentary funds

According to the analyses carried out On the baseline, Groups with greater representation in the different sampling stations were Polychaeta and Crustacea. The highest average abundance was contributed by the group Nematoda, specifically by Adenophorea. The highest density was recorded in the ASP-1 station, a product of the high presence of Nematoda.

In El Monitored sector there are no industrial-type anthropic disturbances. Thus, it is probable that the observed differences may be due to disturbances caused by the high exposure to the

wave that the sector presents. Strong swell events could be causing continuous disturbance, removing individuals from the sector, avoiding the stabilization of the community over time. However, it should be analyzed with detention that is happening in the ASP-1 station, since as evidenced by the two campaigns carried out, there appears to be a condition and permanent disturbance in the sector.

Environmental assessment

The species identified are common in the Northern center of Chile (Ra = 5). According to the indexes analyzed, it appears that in the monitored sector there are no disturbances of anthropic character of industrial type (Na= 8). Strong swell events could be causing continuous disturbance, removing individuals from the sector, avoiding the stabilization of the community in time (Ir = 5), (Fr = 4). The ecological interest of these communities is moderate (4) and lies in the fact that they are diverse communities and can be indicative of human disturbances. From the point of view of significance, These Species have no value (0).

According to the above assessment Environmental Of Factor Macroinfauna Subtidal sedimentary funds is of relevance **Moderate4).**

Impact identification

"Affecting subtidal biological communities of soft funds"

During the Phase of construction, sediments will be removed due to construction and assembly activities associated with maritime works (intake of adduction and discharge and seawater catching pipes for Desalination and brine discharge). In detail the activities that can cause the impact are the same described for the component quality of the marine sediments, namely: cleaning of substrate, construction and assembly of the intake and installation of pipes.

In operation, LA suction and subsequent discharge of the retained water in the reservoirs through the intake will generate an increase in the turbulence that can Suspend The surrounding sediment, modifying the original particle size of the area, since fine sediment would be transported by turbulence outside the area and part of it could be aspirated into adduction. This disturbance would result in the loss of the Macroinfauna of the sediments. The sources of impact identified are: activities related to sea water discharge from the reservoir, and cleaning of the intake area.

In the Phase of closing Activities that could cause impacts are not envisaged.

Magnitude of impact

Whereas this activity implies the local removal of sediments, and thus the removal of its Infauna, this impact is considered negative **(Ca =-1)**, With a probability of occurring Ncia certain **(Po = 1)**

Both in the Phase of construction How to operate. Since the cleaning of the seabed During the Phase of construction It is confined to the zone of intake and installation of pipes for the desalination plant, its extension is considered reduced to the environment of the source **(Ex = 0)**. While in Phase of operation Its extension is wide **(Ex = 2)**, Being able to find Higher concentrations in surface (26 mg/l) and bottom layer (18 mg/l) in the Caleta San Marcos sector decrease as the pen is It moves northward, up to 2.6 mg/l on the surface and 1.5 mg/l in the bottom layer. (see Annex 4.3). The Intensity Is Moderate **(I = 2)** During the Phase of construction, associated exclusively with the specific activities of cleaning and anchoring of structures, As well as the mounting and anchoring of grates and pipes And it's low in operation **(I = 1)**. The duration of the impact is temporary **(Du =1)** Under construction and considering that this activity will be extended throughout the lifetime of the project, the duration of the impact In the Phase of operation is long-term **(Du = 2)**. Is It's a naturally reversible impact **(Re = 1)**Because of the dynamics of the Sector, once the disturbance is over, the place will be re-covered with sediments transported by the currents, which will later be colonized by the Macroinfauna.

Consequently, the magnitude of the impact During the Phase of construction Is -4 And-6 during the Phase of operation.

Table 4-45: Magnitude of the effect Environmental "Affecting commjnities Biological subtidal soft background

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	1	0	2	1	1	**-4**
	Operation	-1	1	2	1	2	1	**-6**

Source: Self-elaboration

Qualification of the Impact

The assessment Environmental for this component It has been rated as moderate 4 And the magnitude of the impact During the Phase of construction Is4 and-6 during the Phase of operation, this impact has been assessed as **Negative, not significant -16** And **Negative, little significant-24** Respectively.

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-46: Impact Rating For factor Macroinfauna Submareal S funds Edimentarios

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating

Submarine	**Construction**	4	-4	Affecting subtidal, soft-bottomed biological communities	-16 (not significant)
	Operation		-6		-24 (Little significant)

Source: Self-elaboration

f) Planktonic communities

The abundances of organisms Meroplanctónicos As Holoplanctónicos In spring showed signs of a state of progression of an event of Upwelling At sampling time, where the energy and biomass flow has been evidenced by low nutrient levels, which indicates a higher biomass Phytoplankton, which translates into high Abundances of the different components of zooplankton, being in evidence the Trophodynamics of the system studied.

The diversity of zooplankton in the study area (E.g. Richness of species), was comparatively lower than in similar coastal areas of northern Chile (Hidalgo et al. 2005), however, the levels of abundance recorded for some Taxa Particular characteristics of a typical system of Upwelling Strong and permanent, which is reinforced in this study by the spatial heterogeneity of the composition and abundance of Taxa. Such abundances have also been described for other equivalent areas during the same period of the year (Margalef 1978, Palma & Rosales 1995, Warwick et al. 200, Palma et al. 2006).

All zooplankton abundance analyses and Ichthyoplankton They were made with data from living organisms, because when using the technique of vital staining (Yáñez et al. 2012), it was possible to obtain concrete data of what was actually alive at the moment of sampling, and thus to avoid the overestimation of the abundance in the study site . This technique was quite effective, being the organisms Meroplanctónicos and the Ichthyoplankton Those who recorded the highest natural mortalities, a common situation in this type of organism given that the dispersive and pre-recruitment phases often present high mortality rates.

In general, the levels of abundance for both Taxa Fitoplanctónicos As Zooplanctónicos were heterogeneous or of type Parchosas Between sampling points and sampled strata. This type of pattern has been previously detected for coastal areas of northern Chile, where plankton can experience high variations at space-time scales compared to this study (Hidalgo et al. 2005, 2010, 2012, Morales et al. 2010, Escribano & Morales 2012). The distribution pattern of the Meroplancton, for example, may be due to differences in circulation patterns due to geographical accidents such as the presence of peninsulas and bays (Palma & Rosales 1995, Palma et al. 2006).

Environmental assessment

The naturalness of the planktonic communities is in line with the quality of the waters of the Bay Chomache So you are given a value of (8). In general, the levels of abundance for both Taxa

Fitoplanctónicos As Zooplanctónicos were heterogeneous or of type Parchosas Between sampling points and sampled strata. This type of pattern has been previously detected for coastal areas of northern Chile, so as far as rarity is concerned it is given a value of (3). The resilience of the medium to disturbances is high so it is assigned a value of irreversibility (7), with its fragility reduced (5) due to the rapid reproduction of the species that make up the Plankton. Given The Abundance and diversity of organisms, from the point of view of ecological interest, and maintaining the balance of the trophic plot of marine ecosystems is Gives a high rating (8) Since most of its composition are larval stages of commercial interest species.

According to the above assessment Environmental Of Factor Planktonic communities is of relevance **High6.2).**

Impact identification

"Loss of planktonic biomass"

The adduction of seawater can generate alteration of the aquatic communities, specifically in the abundance of these, due to their admission to the works of adduction. The identified impact sources are Activities related to suction (45 m3/s) and download of seawater From The reservoir, and suction (10 L/s) and brine discharge.

During the Phase of construction The main work in the marine environment corresponds to the Norwegian shot and the construction of the work of underwater taking and discharge. Both for the Phase of construction As for the Phase of the closing No sources of impact involving the loss of planktonicic biomass have been identified.

Magnitude of impact

This impact is considered negative **(Ca =-1)**, with a probability of occurrence Moderate **(Po =0.5)**.

The extension is average **(Ex =1** Due to the design characteristics and the low suction speed (around 0.15 m/s). The intensity of the impact has been rated as moderate **(I =2).** This has been determined By The results of the study Which is attached in Annex 4.3, where it has been considered the measurement of a plot of water of 500x500 m in front of the point of capture of the project water. It has been determined that on average it would capture 9.7% of the water That flows through the volume of control, assuming that the plankton is distributed homogeneously in the column and remains stationary. The period Estimated of renewal Total of the system Is of the order of 2.88 hours and, as The operation in pumping mode lasts on average 8 hours, it can be established that during the whole period of catchment the parcel of water will be replaced at least 2 times in the course of the hours of operation.

Whereas this activity will continue throughout the project's lifetime, the duration of the impact is long-term **(Du = 2)** And it's a reversible impact Since a Once the suction is complete By the operation, The Communities Planktonic can reach their abundances Basal **(Re = 1)**. As a result, the magnitude of the impact is **(-3).**

Table 4-47: Magnitude of the effect Environmental impact communities Biologicals Submarines soft background

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Operation**	-1	0.5	1	2	2	1	**-3**

Source: Self-elaboration

Impact Rating

Bearing in mind that the Environmental relevance For this component has been qualified as high 6.2 And that the magnitude of the impact is3, this impact has been assessed as **Negative Little Significant -18.6**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-48: Impact Rating For the factor communities Lanctónicas

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Operation**	6.2	-3	Affecting subtidal, soft-bottomed biological communities	-18.6 (Little Significant

Source: Self-elaboration

g) Coastal vertebrates

During the spring 2013 campaign, twenty (20) species of vertebrates were recorded, which are composed of A (1) Species of reptile, in conservation category; Sixteen (16) species of birds, six (6) classified within a conservation category, and two (2) mammals, both in conservation category. During the summer campaign 2014, 21 species of vertebrates were recorded, which are composed of one (1) species of reptile in conservation category; Eighteen (18) species of birds, where five (5) of them are in some conservation category and, two (2) mammal species, both in conservation state.

The species of coastal vertebrates founds during field surveying and baseline elaboration, they resulted in the presence of species with conservation problems, which could be affected by the development of the Phase of construction of the project. of them, Only *Microlophus Quadrivitatus* (CFour-band Corridor) presentsN Low mobility. The EvaAssessment of the impactn this species It has been addressed in the section on terrestrial fauna.

With regard to bird species, these are highly mobile species and their impact It has also been evaluated in the section of terrestrial fauna.

According to the above, this section evaluateThe two species of mammals in conservation category, namely; Chungungo (*Lontra FElina*) and sea lion (*Otaria Flavescens*).

Environmental assessment

The species detected in the study area are common on the coast of Chile (Ra = 6), and are species little disturbed (Na= 8), of a very high ecological interest (10), and very high significance (10), of a very high irreversibility (10) and fragility (10).

Given the presence of species in conservation category, it is considered a Factor Environmental relevance **Very high (9).**

Impact identification

"Affectation of species in conservation category (mammals)"

In relation to the Chungungo (*Lontra FElina*) and the Sea lion (*Otaria Flavescens*), the project does not consider works in environments frequented by these species. The individual of Chungungo Spotted was found inhabiting the Molo de la Caleta San Marcos, and the sea lions were observed in the colonies south of Caleta San Marcos and north of the AMERB. So the construction activities as opening of the Norwegian shot, Construction and assembly associated to maritime works (adduction and discharge intake and seawater catchment pipes for Desalination and discharge of brine) could only affect these species only if they swim near the works.

During the Phase of operation NOr is consideredn New sources of Impact as it Given the low adduction and discharge speeds, around 0.15 m/s, it is estimated that an individual of wolf or Chungungo Into the Submarine shooting and discharge work, these species can easily overcome the current generated by adduction.

In the Phase of closing Either Is Provide activities that PUEdan Cause impact

Magnitude of impact

EThe impact is considered negative **(Ca =-1)**, with a probability of occurrence Moderate **(Po = 0.5)**. Its extension is average **(Ex = 1)** Because the impact could also be expected in the environment of the works and intensity Moderate **(I = 2)**, Since the current habitat will have significant changes with respect to the basal condition, however, the impacts are not expected to involve the loss of individuals or deprivation of them to carry out their life cycles.

The duration of the impact In terms of the modification of their natural habitat Is Medium-term **(Du =1)**, because it will remain Hard the construction activities That last months And after a time of completion This Phase Individuals will repopulate the sector. SE Treats of an impact Naturally Reversible **(Re = 0)**.

As a result, the magnitude of the impact is **-2**

Table 4-49: Magnitude of the effect Environmental Affectation of Species in Category Conservation (Mammal)"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Submarine	**Construction**	-1	0.5	1	2	1	0	**-2**

Source: Self-elaboration

Impact Rating

Whereas the Environmental relevance For this component is 9 and that the magnitude of the impact is2, this impact has been assessed **Negative and non-significant MO -18.**

As a result of the preceding analyses, the following is presented in the Table The summary of the impact rating.

Table 4-50: Impact Rating For the factor Coastal vertebrates

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Submarine	**Construction**	9	-2	Affectation of species in conservation category (mammals)	-18 (not significant)

Source: Self-elaboration

4.7.3 Heritage Groundbreaker

4.7.3.1 Heritage ToRqueológico

Environmental assessment

The Environmental relevance Of this factor, it was evaluated in relation to the importance of the presence in the area of the pre-Hispanic sites project, pre-Hispanic archaeological concentrations and isolated pre-Hispanic and Paleontological finds all of them considered Protected heritage (under the law n ° 17,288 on National monuments).

In the area of influence of the project, a total of 23 archaeological findings were identified, corresponding to three indeterminate inscribed fingerprints lacking associated diagnostic material, probably historical, a lithic set of medium density Identified as pre-Hispanic, four data structures/milestones Subcurrent Or indeterminate, a historical cemetery of nitrate period and platforms and imprints of the old railway. The remaining points correspond to landfills or accumulations of historical material-Subcurrent, including the discovery of historic bottles and a buildup of mineral.

The environmental assessment of this factor was determined as **Moderate (6).**

Impact identification

"Intervention of archaeological sites"

The estimated impact for the 23 archaeological sites identified in the baseline is primary, as it is considered to be a direct consequence of the project's construction activities. In addition, a possible secondary impact is envisaged, which is constituted by derivative actions, such as the transport of persons and vehicles to and from the site of the works.

The impactf the archaeological points of interest identified Happen In the short term, i.e. in the Phase Constructive. In order to minimise eventual medium-and long-term effects, management and protection measures will be implemented on the archaeological points of interest determined to be more sensitive.

Magnitude of impact

Table 4-51: Magnitude of the effect Environmental Intervention of sites ToRqueológicos"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast and Plateau	**Construction**	-1	1	1	2	2	3	**8**

Source: Self-elaboration

Impact Rating

The impact has been assessed as Negative and **Significant (-48).** Estimation reflects a general and overall assessment of the total of 23 identified archaeological points of interest, ranging from isolated finds to pre-Hispanic and historical archaeological sites.

Table 4-52: Impact Rating For the factor QAtrimonio ToRqueológico

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast and Plateau	**Construction**	6	-8	Archaeological sites Intervention	-48 (SIgnificativo)

Source: Self-elaboration

4.7.3.2 Heritage QAleontológico

Carried out the field inspection in the sector called Plateau Considering 28 main checkpoints, it was identified, in two of them, the presence of remains of terrestrial invertebrates (molluscs Gastropods) Pleistocene From the geological unit ¨ gravels of High ¨ Hospice. In addition, the presence (in four of the checkpoints) of coastal deposits with levels of coquina formed by bivalve molluscs was determined and Gastropods of the Pleistocene era.

For its part, in the Pampa sector, in LAs areas Of Tracing electric transmission line, access road and camp area, with 47 checkpoints; We verified the presence of invertebrates of continental origin presumably Pleistocene, in three of the checkpoints. In addition, in three other points, remains of various marine invertebrates were identified, such as bivalve molluscs and Gastropods Of the coastal deposits of the Pleistocene period. A site with Mesozoic marine invertebrates (Fm corals) was also detected. The Godo, Jurassic epoch, age Bajociano-Oxfordiano) in the sector of the electric transmission line.

Impact assessment

Consider the sites, elements and parts in general with paleontological value. A high index of relevance indicates the existence of sites of paleontological interest, where the presence of fossils has been detected *In situ*.

Since the fossils and places where they are found are protected by the single Ministry of the National Monuments Act (17,288) and that their affectation is irreversible, the environmental valuation of this factor was determined as **High (8)**. However, paleontological findings are found at levels present in more localities (eg. Coastal deposits with marine fossils are also found in Caleta Patillos outside the area of influence), therefore, these are not considered to be very high environmental valuation, since none of the fossiliferous geological units are unique to the sites Recognized in the area of project influence.

Impact identification

"Partial intervention of fossil levels"

During the Phase of construction All the effects are caused by activities related to surface intervention (land removals or surface constructions) or in depth (excavations) of the rocks carrying fossil remains.

The sites will be directly or indirectly operated by the works of the project. However, most of the fossil levels that appear in these sites are of great extension and it has been corroborated that the works do not affect the totality of the outcroppings of these fossil levels. Being found also several Kilometers Of Area of influence of the project.

In The Phase of operation and closing No impact sources are provided for the component Paleontological.

Magnitude of impact

Since the fossils and places where they are found are protected by the single Ministry of the National Monuments Act (17,288) and that their affectation is irreversible, the valuation of the magnitude of the effect is negative **(Ca =-1)**. The distance of the paleontological sites to the works of the project, as well as the type of activities to be developed determine a probability of high effect **(Po = 0.9)**. The extension is at an average value because although the identified sites are recurrent in the project area, the sedimentary units that contain them are extensive, surpassing the area of influence of the project **(Ex = 1)**. The intensity of the effect is moderate **(I = 2)**. Since the effect on fossil remains and paleontological sites is permanent, the duration of the effect is **Du = 2**. Also considering that the effect on the sites and paleontological remains is irreversible is considered a reversibility, **Re = 3**.

In this way, the magnitude of the Impact Will be of -7.2

Table 4-53: Magnitude of the effect Environmental Intervention QArcial of the NIveles Fossiliferous"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Costa, Pampa and Plateau	**Construction**	-1	0.9	1	2	2	3	**-7.2**

Source: Self-elaboration

Impact Rating

Bearing in mind that The Valuation Environmental for this factor is 8, which implies a Environmental relevance High, and that the magnitude of the impact ES-7.2, the impact is evaluated as **Negative and Significant -57.6.**

Table 4-54: Impact Rating For the factor QAtrimonio QAleontológico

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast, Pampa and Plateau	**Construction**	8	-7.2	Partial intervention of fossil levels	-57.6 (Significant)

Source: Self-elaboration

4.7.4 Landscape

The character of the landscape is determined by the dominance of the abiotic attributes, specifically the geomorphological and soil elements. The Landscape forms are stable and persistent so there is no great singularity of the attributes of the landscape. The human interventions are very low, these being mainly roads, electrical lines, substation and some villages, so the landscape retains its naturalness.

The conditions of visibility vary greatly between the coastal sector and that of the Pampa, in the first the conditions of visibility Depend on The forms of the relief, which generate choppy views of the landscape, while in the second are generated wide visual basins generating a high degree of exposure of the territory.

In relation to the types of landscapes identified, two units were highlighted, one by the altitude, shape and location of the relief of the coastal cliff, and the other by the high degree of roughness of its soil, in the Pampa del Tamarugal, which represents the typical landscape Desert of the north of Chile, especially by the presence of the salares.

Notwithstanding the foregoing, the sum of the biophysical, aesthetic and structural characteristics that give character to the landscape, determine that the area of influence of the landscape has a moderate or medium landscape value, determining that for the most part it is a A common landscape in the region, with a few outstanding visual attractions.

Environmental assessment

The Environmental relevance Of this factor, it was assessed in relation to the landscape units established based on the visible areas of the observers identified in the area Where the project will be installed.

In this case the rarity is considered based on the frequency and abundance of the type of landscape in relation to the Ntorno in which it is located; Naturalness based on the presence and magnitude of antr interventions Ópicas present in the landscape; Diversity based on the shapes,

colors and textures that occur in the landscape and dis-inks combinations of these; The singularity considering the landscape elements that make the scenery stand out in relation to the environment, as well as the views that can be generated for the Observers of these landscapes. Fragility in view of the vulnerability of losing quality to human interventions, which is related to the ability of the landscape to absorb such interventions

An assessment is made for each unit of landscape evaluated resulting in:

- **Coastal Edge Unit**

The Unit It shows a certain abundance in the environment so its rarity is low (Ra = 3). The natural nature of this type of landscape is moderately dominant by what is considered asNa= 6), the diversity of elements is high, producing combinations of colors and shapes (Di = 8), on the other hand the singularity is also moderate as there are certain elements quAnd make about going out into the landscape (yes = 6). Finally the fragility is moderate (Gis= 5) Since such a landscape may present a lesser vulnerability to interventions.

Consequently the environmental assessment of the **Coastal Edge Unit** is of relevance **Moderate (6)**

- **Coastal Cliff Unit**

The average quality It shows a certain abundance in the environment, so its rarity is moderate (Ra = 4). The natural nature of this type of landscape is dominant by what is considered as high (Na= 8), the diversity of elements is considerable, producing interesting combinations of colors and forms of high landscape value (Di = 7), on the other hand the singularity is very high because its elements make it stand out on the landscape (yes = 9). Finally the fragility is high (Gis= 9) Since that kind of landscape is very vulnerable to losing its quality by human actions.

Consequently the environmental assessment of the **Coastal Cliff Unit** is of relevance **High (7).**

- **Mountain Cord Unit**

The Unit It shows a certain abundance in the environment so its rarity is low (Ra = 2). The natural nature of this type of landscape is dominant by what is considered as high (Na= 7), the diversity of elements is low, producing some combinations of colors and shapes (Di = 3), on the other hand the singularity is moderate since there are certain elements that make about going out to the landscape (yes = 6). Finally the fragility is moderate (Gis= 4) Since such a landscape may present a lesser vulnerability to interventions.

Consequently the environmental assessment of the **Mountain Cord Unit** is of relevance **Moderate (4)**

- **Unit Pampa del Tamarugal**

The Unit It shows a certain abundance in the environment so its rarity is low (Ra = 2). The natural nature of this type of landscape is moderately dominant by what is considered asNa= 6), the diversity of elements is High, producing some combinations of colors and shapes (Di = 7), on the other hand the singularity is high because there are certain elements that make about going out to the landscape (yes = 8). Finally the fragility is moderate (Gis= 6) Since such a landscape may present a certain vulnerability to interventions.

Consequently the environmental assessment of the **Unit Pampa del Tamarugal** is of relevance **Moderate (6).**

- **Cordillera de la Costa unit**

This unit presents a Low rarity (Ra = 2). The natural nature of this type of landscape is dominant by what is considered as high (Na= 7), the diversity of elements is low (Di = 3), and the Singularity is also low (Si = 3), considering the homogeneous description of the landscape without outstanding features. Finally the fragility is moderate (GisBecause that kind of landscape can present a vulnerability Medium to interventions.

Consequently the environmental assessment of the **Cordillera de la Costa unit** is of relevance **Moderate (4).**

Impact identification

"Visual incompatibility and loss of biophysical attributes"

The incorporation of a new element in the landscape, contributed by the project, can generate A dominance in relation to the scale of the landscape and concentrates The attention of the observer over the elements and existentes in sight, depending on the degree of visual integration that is achieved of the parts and works of the project in the landscape. It is also possible that there may be a decrease in the naturalness of the landscape, with the substantial modification or disappearance of an attribute Bíofísico Of the landscape, generated by the construction of a particular work or activity.

It evaluates then the installation of the various works in the Sectors coast, Plateau and Pampa, where the landscape is analyzed by the presence of potential observers (Caleta San Marcos, Caleta Rio Seco, Route 1, Route A-750 and Route 5).

Impact magnitude:

In the case of the works to be carried out in the Pampa Sector during the construction and operation phases, corresponding to the landscape units Pampa del Tamarugal and mountain range, it is estimated that the impact is of negative character **(Ca =-1)**, as the activities of the project add elements that are not typical of the landscape, corresponding to the high voltage line and its path. While in the Phase of closing, Whereas this Phase Involves the extraction of the discordant elements with the landscape, it is considered that There will be an impact during its realization and then is of a positive nature **(Ca = 1)**, the probability of occurrence is high **(Po = 0.8)** For all phases of the project, since the works have a high probability of being seen, it is considered of average extension **(Ex = 1)**, for the Phase of construction and operation because the works will be visible in their immediate and reduced-extension environment **(Ex = 0)** In the Phase of closing, since the impact will be distinguishable only in the area where the activity will occur, of low intensity **(I = 1)** In all The phases of the project, since the characteristics of the landscape can attenuate the visibility of the works, in all the phases it is of long term **(Du = 2)**, since the alteration to the landscape will be permanent after the end of the action, and is partially reversible **(Re = 2)** In the Phase of construction And closing, because at the end of the Phase of construction Some elements, such as the work fronts, will be eliminated from the area and during the closing the works will be removed and the impact will be reversed by corrective actions and in a natural way over time. On the other hand in the Phase of operation is irreversible **(Re = 3)**, because the impact is not reverted naturally and is maintained throughout the lifetime of the project.

Thus, the **Magnitude** Of the impact in the Pampa Sector (landscape units mountainous cordon and Pampa del Tamarugal) is **-4.8** For the Phase of construction, **-5.6** For the Phase of operation And **4** During the Phase of closing.

In the case of works to be carried out in the plateau Sector during the construction and operation phases, as regards the Cordillera de la Costa unit, it is estimated that the impact is of a negative nature **(Ca =-1)**, as the activities of the project add elements that are not typical of the landscape, correspond to the installation of work on temporary mobile working fronts and roads, medium and high voltage line and the reservoir. While in the Phase of closing, Whereas this Phase Involves the extraction of the discordant elements with the landscape, it is considered that There will be an impact during its realization and then is of a positive nature **(Ca = 1)**, the probability of occurrence is high **(Po = 0.8)** For all phases of the project, since the works have a high probability of being seen, it is considered of average extension **(Ex = 1)**, for all phases of the project because the works will be visible in their immediate environment, with moderate intensity **(I = 2)**, due to the degree of movement associated with the Phase of construction In the plateau sector and low intensity **(I = 1)** In Phase of operation And closure, since the degree of alteration by the Development and Operation of Project is notorious But not significant, in all phases is long-term **(Du = 2)**, since the alteration to the landscape will be permanent after the end of the action, and is partially reversible **(Re = 2)** In the Phase of construction And closing, because at

the end of the Phase of construction Some elements, such as work fronts, will be removed from the area and during the closure the works will be removed and the impact will be reverted through corrective actions and in a natural way over time. On the other hand in the Phase of operation is irreversible **(Re = 3)**, because the impact is not reverted naturally and is maintained throughout the lifetime of the project.

Thus, the **Magnitude** Of the impactn the plateau Sector (Cordillera de la Costa unit) during the Phase of construction and operation is **-5.6** And **4.8** During the Phase of closing.

In the case of works to be carried out in the coast Sector, corresponding to the coastal and coastal cliff units, during the Phase of construction And OrIt is estimated that this impact is of a negative nature **(Ca =-1)**, since the activities of the project add elements that are not typical of the landscape, such as, slaughter facilities, camp, roads, medium voltage lines, Work fronts. In the Phase Of operation, are considered the control building, the workshop, Whose heights are around the upper limit of existing constructions in the sector of Caleta San Marcos, the Roads The High Voltage Line, The Lines of Average Voltage, PTAS, desalination plant Parking lots. QOr another party, considering that the Phase of closing Involves the extraction of the Works of discordant infrastructure With the landscape, it is considered that There will be an impact during its realization and then is of a positive nature **(Ca = 1)**, the probability of occurrence is high **(Po = 0.8)** For all phases of the project, since the works have a high probability of being seen, it is of average extension **(Ex = 1)** Also for all phases, as the impact will be distinguishable in the area where the activity will occur and its immediate environment, moderate intensity **(I = 2)**, due to the degree of movement associated with the Phase of construction In the coastal sector close to landscape observers and low intensity **(I = 1)** In Phase of operation and closure, since the degree of alteration by the workings of the works is notorious but Time, less than the Phase of construction and Non-significant, long-term **(Du = 2)** In all phases of the project, since the alteration to the landscape is manifested during and after the end of the action that generates it, and is partially reversible **(Re = 2)** In the Phase of construction And Closure, because at the end of the Phase of construction Some elements, such as The Camp and Work fronts will be eliminated from the area and during the closing Closed or The works will be removed and the impact reverted through corrective actions and in a natural way over time. On the other hand in the Phase of operation is irreversible **(Re = 3)**, because the impact is not reverted naturally and is maintained throughout the lifetime of the project.

Thus, the **Magnitude** Of the impactn the coast sector (coastal landscape units and coastal cliff) during the Phase of construction and operation is **-5.6** And **4.8** During the Phase of closing.

The summary is shown in the Table Following:

Table 4-55: magnitude of the environmental effect "Visual incompatibility and loss of biophysical attributes"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa	Construction	-1	0.8	1	1	2	2	**-4.8**
	Operation	-1	0.8	1	1	2	3	**-5.6**
	Closing	1	0.8	0	1	2	2	**4**
Plateau	Construction	-1	0.8	1	2	2	2	**-5.6**
	Operation	-1	0.8	1	1	2	3	**-5.6**
	Closing	1	0.8	1	1	2	2	**4.8**
Coast	Construction	-1	0.8	1	2	2	2	**-5.6**
	Operation	-1	0.8	1	1	2	3	**-5.6**
	Closing	1	0.8	1	1	2	2	**4.8**

Source: Self-elaboration

Impact Rating

The landscape component is divided into four units in which each represents an environmental assessment specific to its sector.

This recognizes that for the Phase Construction, for the mountain range Unit in the Pampa Sector, there is an impact **Negative, not significant**. In the Phase of operation, the impact will be **Negative, little significant**. In the Phase of closing, for its part, the impact will be **Positive** But **Non-significant**.

For the Pampa unit of the Tamarugal, the phases of construction and operation present impacts **Negative, little significant**, while the Phase of closing It carries with it an impact **Positive** But **Little significant**.

With respect to the Cordillera de la Costa unit, in the plateau sector, in the phases of construction and operation it gives as results impacts **Negative, little significant**. For the Phase of closing, the impact is **Positive** But **Non-significant**.

In the case of the coastal Edge unit, in the coast Sector, both in the Phase of construction As an operation there are impacts **Negative, little significant**. On the other hand, in the Phase of closing The impact is **Positive** But **Little significant**.

Finally, the coastal Cliff Unit, in the Phase of construction And operation impacts are of character **Negative, little significant**, and the Phase of closing It has on its side an impact **Positive, little significant**.

Table 4-56: Impact rating "Visual incompatibility and loss of biophysical attributes"

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Pampa – Mountain Cord unit	**Construction**	4	-4.8	Visual incompatibility and loss of biophysical attributes	-19.2 (not significant
	Operation		-5.6		-22.4 (Little significant)
	Closing		4		16 (not significant)
Pampa – Unit Pampa del Tamarugal	**Construction**	6	-4.8		-28.8 (Little significant)
	Operation		-5.6		-33.6 (Little significant)
	Closing		4		24 (Little significant)
Plateau – Cordillera de la Costa unit	**Construction**	4	-5.6		-22.4 (Little significant)
	Operation		-5.6		-22.4 (Little significant)
	Closing		4.8		19.2 (not significant)
Coast-Coastal border	**Construction**	6	-5.6		-33.6 (Little significant)
	Operation		-5.6		-33.6 (Little significant)
	Closing		4.8		28.8 (Little significant)
Coast – Coastal Cliff	**Construction**	7	-5.6		-39.2 (Little significant)
	Operation		-5.6		-39.2 (Little significant)
	Closing		4.8		33.6 (Little significant)

Source: Self-elaboration

4.7.5 Protected Areas and sites QRioritarios

4.7.5.1 Protected areas

In relation to the project, the nearest protected area corresponds to the Pampa del Tamarugal National Reserve, specifically in the sector of the Lagunas substation. The main importance of this reserve is the presence of the Tamarugo which develops in an environment of extreme aridity feeding on the groundwater.

A work of the project, the line of electric transmission that arrives at the substation Lagunas, reaches to have a section of 100 m within the national reserve. It should be mentioned that

Section is not installed anything but the wiring Air of the line High Voltage For what Is Connect to Substation Electric Existing And that there is no presence of tamarugos in that sector.

Environmental assessment

The environmental assessment of this factor is done on the basis of The existence of an official environmental protection in the sector, with regard to the evaluation methodology, is considered The rarity in relation to the frequency in the environment of the characteristics of this protected area, the fragility considering the vulnerability to events that can affect its biodiversity both anthropic and natural, the diversity considering the Biophysical peculiarities of the protected area, while the significance in view of the importance of the protected area, Culturally, Ecologically and for the development of recreational activities.

In relation to the terms mentioned above The rarity in Moderate (5), because this protected area has an important peculiarity, but the sector in study does not have the characteristics that make the area a national reserve, by the absence of Tamarugos and by the intervention human related to the existence of the substation Lagunas. Fragility is equally moderate (5) Due to The Extreme conditions of aridity, that they are More and more accentuated Affect the reserve, but the sector under study does not present vegetation that can be considered fragile. The biophysical peculiarities of the area (Pampa Sector) are not very varied so their diversity is Moderate (4). Finally the significance is Low (3) Because although Protected area of local, regional recognition and national, the sector under study and possible impactf the project covers a minimum area of the reserve, which is already intervened with the substation Lagunas and does not present any of the elements that make the area a national reserve (there is no Tamarugos).

Consequently the environmental assessment of the Factor **Areas Protected** In the Pampa Sector it is considered as **Moderate (4).**

Impact identification

"Intervention in a protected area"

The project requires making the connection of the LAT to the existing Lagunas substation, which is currently located within the area corresponding to the reserve of the Pampa del Tamarugal. This corresponds only to the last meters of line (less than 100 m) and it is envisaged only the realization of works related to The Wiring And The Towers installation.

It should be noted that the object of protection of this reserve is to preserve the nature in situ by protecting the forests of Tamarugo, however the area in which the project requires to connect The LAT with the substation is currently highly intervened and without presence of tamarugos.

Magnitude of impact

In the case of the works to be carried out in the Pampa Sector, during the Phase of construction and operation It is estimated that the impact is **Negative Arácter (Ca =-1** And That P activities Project Add elements That are not proper to the protected area Pampa del Tamarugal, Lto the probability of **Occurrence** Is **Some (Po = 1)**, Since the substation is already installed within the reserve and the power line must do Connection With her. is considered DE Reduced extension For all phases **(Ex =0)**, Already That the impact is manifested only in the sector where the project is located, Low intensity For all phases **(I = 1)**, Since it is a place where human intervention is presented, Long-term For all phases **(Du =2)**, since the alteration to the Protected Area manifested during and after completion of the action that generates it (The power line is built), and is Partially reversible **(Re =2)** In Phase of construction and closing, because at the end of the Phase of construction The power line remains but construction works, such as work fronts, are eliminated And in the closing the works will be removed and the impact will be reverted by corrective actions and in a natural way over time. While in Phase of operation be considered Irreversible **(Re =3)**, because at the end of the Phase of operation The impact will not be reverted naturally.

Like this The **Magnitude** of the impact During the Phase of construction Is **-5**, **-6** In operation and **5** During closing

The summary is shown in the **Table 4-57** Following:

Table 4-57: Magnitude of the environmental effect "Intervention in 'sRea QRotegida"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa	Construction	-1	1	0	1	2	2	**-5**
	Operation	-1	1	0	1	2	3	**-6**
	Closing	1	1	0	1	2	2	**5**

Source: Self-elaboration

Impact Rating

The environmental assessment of the protected area is **4**, due to the site of the project's work andN a Sector of the Reserve Already tapped joint typically And Which is also Away from the relevant areas of the Same.

It is concluded then that for the National Reserve factor Pampa del Tamarugal, the Phase of construction has an impact **Negative, not Significant**. In the Phase of operation the Impact in this sector is **Negative Little Significant**. And finally, in the Phase of closing, the impact becomes **Positive** But **No Significant**.

Table 4-58: Impact Rating "Intervention in 'sRea QRotegida"

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Pampa	Construction	4	-5	Intervention in protected Area	-20 (not significant)
	Operation		-6		-24 (Little significant)
	Closing		5		20 (not significant)

Source: Self-elaboration

4.7.5.2 Natural and Cultural Attractions

i. Attractions Tourist

In relation to the study area it is established that there are three important tourist attractions: the Caleta San Marcos, the Caleta Rio Seco and the Pampa del Tamarugal Reserve in the sector of the Lagunas substation. From the information collected it is established that the tourist activity is not completely exploited, since the main tourist activity carried out is of local and seasonal demand in the case of the two caletas, that corresponds to the visits to the beaches Close to Las Caletas during the summer season, being a custom of the camping area for the seasons on these beaches and Along the coastline. A tourist plant is not identified for the development of this activity. The analyzed sector of the Pampa del Tamarugal does not present any type of tourist development, since the area of the national reserve that is most visited and exploited is in the north sector of the reserve, far from the project.

In relation to the works of the project, it is estimated that there is a work susceptible to generate tourist attraction, product of the size and type of intervention, corresponding to the reservoir of water or Espejo de water located in the Sector works Plateau, intervention that added to the Improvement of the roads, giving accessibility to the area, can generate a new tourist attraction.

Environmental assessment

The Environmental relevance Of this factor was assessed in relation to its rarity (Ra), as an uncommon attraction in the regional environment, depending on its competitive capacity with respect To others that exist in the area.

L(a) singularity (Si) that values the condition of distinct or distinguished or importance that it represents The tourist attraction for the Región in terms of the ability to attract markets (hierarchy); Fragility (AF) in relation to the vulnerability of the Attractiveness Before Interventions The historical and Cultural Interest (IHC) which considers the historical and cultural importance of the attractions; The SignificanceGis) Additional value for the importance for the area of the environment Especially for the locals and tourists, considering the portion of territory corresponding to the Project's influence area. In relation to the identified attractions it is

established that of rarity is Moderate (Ra =4), since they are mainly common attractions within the littoral of the Tarapacá region, which generates a singularity moderate (Si =4), the fragility is high (Fa = 7), the Cultural historical interest is considered as moderate (IHC = 5) While the significance was valued as moderate (Gis= 5).

Consequently, the environmental assessment of factor has a relevance **Moderate5)**.

Impact identification

"Alteration of the tourist attraction"

The intervention of the project is mainly given by the materialization of the Works, the work to be done for this can generate as a consequence the loss in the attraction of the tourist areas, especially those that generate spatial interventions like the earth movements or delimitations of areas of work, as well as the Work to be carried out in the area on the beach and seabed, added to the increase in the flow of heavy vehicles by routes 1 and 5.

Magnitude of impact

This effect In the Phase of construction and operation is from Negative character **(Ca =-1)** Since it is at the expense of the Attractiveness Of the coastal edge especially in the locations in San Marcos and Rioor dry And in Phase of closing is from Positive character **(Ca = 1)**To Probability of occurrence In Phase of construction Is High **(Po = 0,9)** Because it is likely that an impactn the These locations In Phase of operation Is High **(Po = 0,8)** Because it is likely that an impactn the These localities, resulting in a decline in tourist demand and in Phase of closing There is a probability of High occurrence **(Po = 0.7)**, since it is highly probable that activities such as plant operations and the movement involving the extraction of works cause a degree of alteration To Extension is half In all phases **(Ex = 1)** Because if bIen Project is developed over a large part of the Territory, the alteration of the tourist attraction is manifested in the immediate environment of this, lTo Intensity In the Phase of construction Is **Moderate (I = 2)**, As tourism activity is both incipient and vulnerable in the area, Low In Phase of operation **(I =1)**, Because during this Phase Decrease the movement of workers and materials and during the Phase of closing is of moderate intensity **(I =2)**, due to the degree of alteration involved in the extraction of the works To **Duration** is from Long-term **(Du = 2)** In all phases of the project And **Partially Reversible (Re = 2)** In Phase of construction and closing, because at the end of the works the vestiges left by the construction activities will be removed, But there are Works that will last beyond construction, such as capturing water, the house of machines, roads, structures and drivers And during the closing the works will be removed and the impact will be reverted by corrective actions and in a natural way with the passage of time. While in Phase of operation Is Irreversible **(Re = 3)**, Because the impact is not reverted naturally and is maintained throughout the Phase of operation.

As a result, the magnitude of the impact in the Phase of construction Is **-6.3,-5.6** In Phase of operation And **-4.9** In Phase of closing

The summary is shown in the **Table 4-59** Following:

Table 4-59: magnitude of the environmental effect "Alteration of ToTractive TUrísticos"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast	**Construction**	-1	0.9	1	2	2	2	**-6.3**
	Operation	-1	0.8	1	1	2	3	**-5.6**
	Closing	1	0.7	1	2	2	2	**-4.9**

Source: Self-elaboration

Impact Rating

The tourism component presented an environmental assessment of **5**.

It is calculated that the impact, during the three Phases of project activity, construction, operation and closure, is **Negative** And **Little significant**.

Table 4-60: Impact Rating "Alteration of ToTractive TUrísticos"

Sector	Phase	Relevance	Magnitude	Impact	Impact Rating
Coast	**Construction**	5	**-6.3**	Alteration of tourist attractions	-32 (little significant)
	Operation	5	**-5.6**		-28 (Little significant)
	Closing	5	**-4.9**		-25 (little significant)

Source: Self-elaboration

Impact identification

"Generation of tourist attractions"

The project considers the installation of a water reservoir in the plateau sector. The generation of a body of water in the middle of the desert can be transformed into a Potential Tourist attraction of local hierarchy.

The impact is assessed in the Phase of operation, which is when access to this new potentially tourist element would be generated.

Magnitude of impact

This effect is **Positive character (Ca = 1)** Since it generates a new area with tourist potential for the area. The probability of **Occurrence** Is **High (Po = 0,8)** Because it is highly probable that this lagoon will arouse the tourist interest at local level. The **Extension** Is **Average (Ex = 1)** Since the effects can manifest not only in the area of the reservoir but can have a significant

impact in the localities of San Marcos and Rio Seco. The **Intensity** Is **Moderate (I = 2)**, because this attraction would be rather local, without overcoming the most tourist areas already existing in the area like Iquique. The duration is Of **Long term (Du = 2)**, because this work is maintained throughout the lifetime of the project. Finally, this impact is considered as **Reversible (Re = 1)**, due to the end of the useful life of the project the lagoon will be emptied losing its tourist attraction status.

As a result, the **Magnitude** of the impact is **48**.

The summary is shown in the **Table 4-61** Following:

Table 4-61: magnitude of the environmental effect "Generation of ToTractive TUrístico"

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Plateau	**Operation**	1	0.8	1	2	2	1	**4.8**

Source: Self-elaboration

Impact Rating

The tourism component presented an environmental assessment of **5**.

It is calculated that the impact during the Phase of operation Of the project, is **Positive** But **Little significant**.

Table 4-62: Impact Rating "Generation of To Tractive TUrísticos"

Sector	Phase	Relevance	Magnitude	Impact
Plateau	**Operation**	5	**4.8**	**24**

Source: Self-elaboration

4.7.6 Human environment

4.7.6.1 Geographical Dimension: Geographical Environment

The impact to the element 'Geographic environment with social uses' Be assessed on the basis of possible effects on The Forms Of occupation of a particular space by a human group, which can be housing, economic, symbolic or religious, carried out by the inhabitants of the Costa sector (Costa: San Marcos and Costa: Río Seco).

DE Baseline Agreement, for the sector Coast: San Marcos, is identified in the vicinity of land works located on the northern boundary of Caleta San Marcos, a residential and economic use, housing and a processing plant fleeing. Also, in the area of site of the works are identified billets of material used in the arrangement of the route A-1 and a landfill Clandestine.

Meanwhile, for the Costa sector: Rio Seco, There are several Social uses of the territory by the local population. In the vicinity of the construction of the road in Caleta Rio Seco, there is a residential, equipment and cultural use, highlighting the presence of a house very close to the path, a glass of water from the committee of Rural drinking water and a cemetery.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to The particularities of each sub-sector studied, namely: Sector Costa: San Marcos and Sector Costa: Río Seco.

The Environmental relevance Assigned to Each sub-sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element 'Geographic environment with social uses' is the following:

Table 4-63: Evaluation criteria Geographical environment Caleta San Marcos

Criteria	Value
Material culture	6
Intangible culture	7
Abundance	7
Diversity	8
Singularity	6
Fragility	7
Historical and/or Cultural interest	8
Significance	8
Total	**7**

Source: Self-elaboration

Whereas There are social uses in the territory by the local population, specifically a housing and economic use in a sector close to the land works of the project, Your assessment is 7; Therefore, its relevance is 'High.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos**, is of **Relevance High (7).**

For the Costa sector: Caleta Rio Seco LA Environmental relevance of the element 'Geographic environment with social uses' is the following:

Table 4-64: Criteria of evaluation geographical environment Caleta Rio Seco

Criteria	Value
Material culture	7
Intangible culture	8
Abundance	7
Diversity	8
Singularity	6
Fragility	7
Historical and/or Cultural interest	8
Significance	8
Total	**7**

Source: Self-elaboration

Whereas There are social uses in the territory by the local population, specifically a housing, equipment and cultural use, In a sector close to the works of the project, Your assessment is 7; Therefore, its relevance is 'High.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta Dry River**, is of **Relevance High (7).**

Impact identification

"Alteration of the geographical environment with social uses"

The analysis of the IM potential pact in the geographical environment with social RealiZó In The area of influence of Project, corresponding To sector Costa: Caleta San Marcos and Sector Costa: Caleta Rio Seco.

En the Phase of construction LAs Project actions susceptible to the identified impact are the hiring of temporary labour, preparation of the land, the transport of materials, supplies, waste and personnel, the installation of operations, camps, collection centres, Storage of waste and working fronts, ground movement, construction and improvement of access roads, construction of portals, Construction tunnels, pickets and cave machines, the construction of the electric transmission line, the dumps of excavation material and the removal of facilities for slaughtering and cleaning. During the Phase of operation The activities that can generate impact decrease considerably, and are related to the maintenance of roads and to the transfer of personnel for the operation of the hydraulic plant. These are isolated works that generally require low mobilization and deployment on site.

Magnitude of impact

In the case of the sector **Coast: Caleta San Marcos**, the impact has been described as negative **(Ca =-1)**, since In the vicinity of land works located on the northern boundary of San Marcos, there is a housing and economic use, with housing and a processing plant to flee, which could be affected in the Phase Construction of the project. For The Phase Operation, the impact has also been described as Negative character **(Ca =-1)**since Buildings will be installed on the northern boundary of Caleta San Marcos, near a space where there is a residential and economic use, with housing and a processing plant to flee.

The probability of occurrence is Moderate **(Po =0.6)**, since there is a probability that the environment is impacted during construction works; While in the Phase of operation, The probability of occurrence is Moderate **(Po = 0.5)**, Since there is a probability that the impact is manifested, although most of the works Is Underground Rán.

The impact extension has been qualified as a broad **(Ex = 2)**, Since the effect is not only in the immediate environment of the Works But it In The locality during the Construction of these, without directly affecting housing (for example, relocating homes) or the operation of the processing plant fleeing. In the Phase Of operation, also has been qualified the extent of the impact as wide **(Ex = 2)**, Because the effect will occur Not only in the immediate environment of the Works But it It is extensive to the locality.

The intensity For the Phase of construction is has qualified as Moderate **(I = 2)** Since the degree of alteration implies significant changes in relation to the basal condition, but within acceptable ranges, while in the Phase of operation the impact has been qualified or with low intensity **(I = 1)** Because the degree of alteration implies noticeable changes, but not significant with respect to the basal condition.

The duration For the Phase of construction has been described as Medium-term **(Du = 1)** As the Impact is manifested while Last construction of the project, which is expected in a Period of more than a year. For the Phase of operation, LA duration has been described as of long Term **(Du = 2)** As the impact is manifested Permanently after the action that generates it is finished.

The reversibility In the Phase of construction It has been described as partially Reversible **(Re = 2)**since The impact can be partially reversed by Corrective actions; Meanwhile, in the Phase of operation, LA reversibility has been qualified as Reversible **(Re = 1)**, since The impact can be reversed by Corrective actions.

In the case of the sector **Coast: Caleta Dry River**, Sand considers that the impact Is of a negative nature **(Ca =-1)**, since In the vicinity of the works necessary for the construction of the road, there is a residential, cultural and economic use that could be impacted by the construction of the road. For The Phase Operation, the impact has also been described as Negative character **(Ca =-1)**since The path that will be enabled in dry River implies a change in the basal condition.

The probability of occurrence has been qualified Of Moderate **(Po =0.5)**, since there is a probability that the environment is impacted during construction works; While in the Phase of operation, The probability of occurrence is Moderate **(Po = 0.5)**, Since there is a probability that the new built path generates an impactn the environment.

The impact extension has been qualified as a broad **(Ex = 2)**, Since the effect is not only in the immediate environment of the Works But it In The locality during the Road construction. In the Phase Of operation, the extension has also been qualified of impact as Broad **(Ex = 2)**, Because it will occur The effect Not only Is In the immediate environment of the work But it It is extensive to the locality, with a new access.

The intensity For the Phase of construction Is has qualified as Moderate **(I = 2)** Since the degree of alteration implies changes Regarding the basal condition, But in a period very limited in time. Meanwhile, in the Phase of operation, it is considered an intensity Moderate **(I =1)** Because the installation and operation of an access route to the plateau sector Considered a low intensity of alteration.

The duration For the Phase of construction has been described as Medium-term **(Du = 1)** As the Impact is manifested while Last construction of the project, which is expected to be more than a year. For the Phase of operation, LA duration has been described as of long Term **(Du = 2)** As the impact is manifested Permanently after the action that generates it is finished.

The reversibility In the Phase of construction It has been described as partially Reversible **(Re = 2)**since The impact can be partially reversed by Corrective actions; Meanwhile, in the Phase of operation, LA reversibility has been qualified as Reversible **(Re = 1)**, since The impact can be reversed by Corrective actions.

The summary is shown in the Table Following:

Table 4-65: Magnitude of the environmental effect "Alteration of the geographic Environment with USos SOciales", SEctorIs CosTA: San Marcos and Río Seco

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Sector: San Marcos	**Construction**	-1	0.6	2	2	1	2	**-4,2**
	Operation	-1	0.5	2	1	2	1	**-3.0**
Sector: Rio Seco	**Construction**	-1	0.5	2	2	1	2	**-3.5**
	Operation	-1	0.5	2	1	2	1	**-30**

Source: Self-elaboration

Rating of the impact

The impact "Alteration of the geographical environment with social uses" In the Phase of construction Of the project in the sector Coast: San Marcos is considered **Little Significant (-29**. In the Phase of operation is considered The Impact **Little significant (-21).**

The impact "Alteration of the geographical environment with social uses" In the Phase of construction Of the project in the sector Coast: Rio Seco is considered **Little Significant (-25)**. In the Phase of operation is considered The Impact **Little Significant (-21).**

In the Following Table, the impact rating for the Phase of construction Of the project in the factor Geographic environment with social uses.

Table 4-66: Impact Rating "Alteration of the geographical environment with social uses", SectorIs Coast: San Marcos and Río Seco

Sector	Phase	Relevance	Magnitude	Impact
Costa Sector: San Marcos	**Construction**	7	-4.2	**-29**
	Operation	7	-3.0	**-21**
Costa Sector: Rio Seco	**Construction**	7	-3.5	**-25**
	Operation	7	-30	**-21**

Source: Self-elaboration

4.7.6.2 Geographic Dimension: Dynamics Moving around Within the territory

The impact to the element 'Displacement dynamics within the Territory' Be assessed on the basis of possible effects on The Displacement dynamics within a territory, carried out by the inhabitants of the Costa, Pampa and Plateau sectors. This component is It will evaluate for each sector, making the distinction between the sectors of the project site (Pampa and Plateau, Coast: San Marcos and Costa: Rio Seco).

The analysis of the potential impactn the dynamics of displacement was carried out in the area of influence of the project, corresponding to sectors Pampa and Plateau, Sector Costa: Caleta San Marcos and Sector Costa: Caleta Rio Seco.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to the particularities of each sector studied to know: sectors Pampa and plateau, coastal sector: San Marcos and Costa sector: Río Seco.

The Environmental relevance Assigned to Each sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Pampa and Plateau sector the Environmental relevance of the element 'Displacement dynamics within the Territory' is the following:

Table 4-67: Dynamic evaluation criteria for S-displacement Ector Pampa and Plateau

Criteria	Value
Material culture	3
Intangible culture	2
Abundance	3
Diversity	3
Singularity	3
Fragility	6
Historical and/or Cultural interest	3
Significance	6
Total	**4**

Source: Self-elaboration

Whereas the Dynamics of displacement in the sector correspond almost exclusively to the transit of vehicles linked to mining, Your assessment is 4; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the **Pampa and Plateau sector** is from **Relevance Moderate (4).**

For the Costa sector: Caleta San Marcos and for the Costa sector: Rio Seco, LA Environmental relevance of the element 'Displacement dynamics within the Territory' is the following:

Table 4-68: Dynamic Displacement Evaluation criteria SectorIs Coast: Caleta San Marcos and Río Seco

Criteria	Value
Material culture	6
Intangible culture	8
Abundance	5
Diversity	6
Singularity	3
Fragility	8
Historical and/or Cultural interest	8
Significance	8
Total	**7**

Source: Self-elaboration

Whereas theS Dynamics of displacement in the sector correspond to that carried out by the inhabitants within their locality, as outside of it by the route A-1; And that this, receives a moderate flow of vehicles to the communal capitals of Iquique and Tocopilla, Your assessment is 7; Therefore, its relevance is 'High.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos** And for the Sector **Coast: Rio Seco**, is of **Relevance High (7).**

Impact identification

"Alteration of the connectivity flows of the human groups in and out of the Territory"

In the Phase of construction LAs Actions of the project susceptible to cause the identified impact are the preparation of the terrain, the transport of materials, inputs, waste and personnel, the movement of land, the construction and improvement of access roads, the construction of portals, the Construction of the electric transmission line, the dumps of excavation material and the removal of facilities for operations and cleaning. During the Phase of operation Impact-generating activities decrease considerably, and are related to monitoring, maintenance of power lines and the transfer of personnel for the operation of the hydraulic plant. These are isolated works that generally require low mobilization and eventually deployment on site.

Magnitude of impact

In the case of **Pampa and Plateau sector**, Sand considers That the impact identified in the previous point, during the Phase of construction, you'll have a Negative character **(Ca =-1)**, since Can alter The current dynamics of displacement in the territory of the, mainly the vehicular flow of the mine Bernadette, the closest to the project. For The Phase Operation is not considered the impact generation.

The Probability of Occurrence is True **(Po = 1.0)** since For The Phase of construction Project works Cross Route A-750 and A-752 For which transit vehicles linked to mining.

The impact extension has been qualified as a broad **(Ex = 2)** By affecting the displacement dynamics outside the immediate source environment, in particular the traffic of trucks linked to the mining.

Intensity has been rated as moderate **(I = 2)** As the displacement dynamics will be negatively altered, But within acceptable ranges And for a reduced time.

The duration has been described as Medium-term **(Du = 1)** since Even though The displacement dynamics will return to normal once What Complete the Phase of construction, the duration of this Phase It'll be over 2 years.

Reversibility has been described as Reversible **(Re = 1)**, Because the alteration of the routes used in the dynamics of displacement can be reversed through corrective actions.

In the case of the sector **Coast: Caleta San Marcos**, Sand considers that the impact has been described as negative **(Ca =-1)**, since the project occupies the route A-1 which is the access road to Caleta San Marcos, concentrating its terrestrial works on the northern boundary of the Cove, so there is L(a) Possibility of affecting existing connectivity flows in the locality. For The Phase Operation is not considered the impact generation.

The Probability of Occurrence is moderate **(Po = 0.5)** since For The Phase of construction Delays in connectivity flows are unlikely to be created due to work activities. The construction considers the use of route A-1 for circulation related to the delivery of machinery and supplies, travel of personnel and withdrawal of waste, but the circulation between the works, the installation of operations of the sector and the collection, will be done by roads of services for the project, without permanently intervening in the A-1 route

The impact extension has been qualified as a broad **(Ex = 2)** Since the effect is manifested outside the immediate environment of the source, although in a limited radius and in a base scenario under vehicular flow.

Intensity has been rated as moderate **(I = 2)** Since the degree of alteration implies significant changes in relation to the basal condition, but within acceptable ranges Whereas the routes have the capacity to receive more flow without congestion.

The duration has been described as Medium-term **(Du = 1)** since Even though The displacement dynamics will return to normal once What Complete the Phase of construction, the duration of this Phase It'll be more than two years.

Reversibility has been described as Reversible **(Re = 1)**, since the alteration of the routes used in the displacement dynamics can be reversed to Through corrective actions and once the construction is finished, the corresponding trips will not be carried out.

In the case of the sector **Coast: Caleta Rio Seco**, Sand considers that the impact has been described as negative **(Ca =-1)**, since the project occupies the route A-1 which is the access road to Caleta Dry River, And will occupy internal roads of the locality to The access of machinery, personnel and supplies for The construction of the new route to the Pampa and plateau sectors, so there is L(a) Possibility of affecting existing connectivity flows in the locality. It should be considered that, for the flow between the work, the installation of operations and the collection, a path of service of the project will be used, without the need to use the route A-1. While the North access road can improve the connectivity of Caleta Rio Seco, pAra The Phase Operation is regarded as a negative impact **(Ca =-1)**, It can alter Negatively the current dynamics of displacement in the Territory, By increasing the vehicular flow of third parties By the new road connecting the coast with The plateau and the Pampa, rising The coastal cliff. EL

Project considers The use of that path During Operation For Activities related to the Reservoir Monitoring and The Maintenance of the Works.

The Probability of Occurrence is moderate **(Po = 0.5)** For The Phase of construction, Since construction works on the project access road are located Close to the Locality. Meanwhile, for the Phase of operation, Your Phas been described as a Moderate **(Po = 0.5)** Since during This Phase The new path will be operative, which can alter the dynamics of displacement existing in the locality. It should be considered that the modification can be positive in contributing to greater connectivity.

The impact extension has been qualified as a broad **(Ex = 2)** During the Phase of construction and operation, By affecting the displacement dynamics outside the immediate source environment.

The intensity has been described as Moderate **(I = 2)** During the Phase of construction, Since the degree of alteration implies significant changes in relation to the basal condition, but within acceptable ranges. Meanwhile, during the Phase of operation The intensity has been considered Low **(I = 1),** As the dynamics of displacement Can be Altered But not in a meaningful way And on a timely basis About the basal condition.

The duration has been qualified as long term **(Du = 2)** Both for the Phase of construction and operation, Since the dynamics of displacement will be permanently altered with the construction of an access road in the locality.

In the Phase Construction and operation, LA reversibility has been qualified as Reversible **(Re = 1)**, since the alteration of the routes used in the displacement dynamics can be reversed through corrective actions.

The summary is shown in the Table below:

Table 4-69: Magnitude of the environmental effect "Alteration of the FloWS COnectividad of the Groups HumanoS DEnter and FOut of the TErritorio", SEctorIs Pampa, Plateau, San Marcos and Río Seco

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa and Plateau	**Construction**	-1	1	2	2	1	1	**-6.0**
Coast: San Marcos	**Construction**	-1	0.5	2	2	1	1	**-3.0**
Coast: Rio Seco	**Construction**	-1	0.5	2	2	2	1	**-3.5**
	Operation	-1	0.5	2	1	2	1	**-3.0**

Source: Self-elaboration

Rating of the impact

The impact "alteration of the connectivity flows of human groups within and outside the Territory" In the Phase of construction Of the project in the Pampa and plateau sector is considered **Little Significant (-24)**. In the Phase of operation No The impact generation is considered.

The impact "alteration of the connectivity flows of human groups within and outside the Territory" In the Phase of construction Of the project in the sector Coast: Caleta San Marcos is considered **Little Significant (-21)**. In the Phase of operation The impact generation is not considered.

The impact "alteration of the connectivity flows of the human groupss in and out of the Territory" In the Phase of construction Of the project in the sector Coast: Caleta Rio Seco is considered **Little Significant (-25)**. In the Phase of operation is considered **Little significant (-21)**.

In the Following table presents The impact rating for the Phase of construction and operation Of the project in the factor Displacement dynamics within the Territory.

Table 4-70: Impact Rating "Alteration of the FLuxuries of Conectividad of the Groups Humanos DEnter and FOut of the TErritorio", SEctorIs Pampa, Plateau, San Marcos and Río Seco

Sector	Phase	Environmental assessment	Magnitude	Impact
Pampa and Plateau	**Construction**	4	-6.0	**-24**
Coast: San Marcos	**Construction**	7	-3.0	**-21**
Coast: Rio Seco	**Construction**	7	-3.5	**-25**
	Operation	7	-3.0	**-21**

Source: Self-elaboration

4.7.6.3 Demographical Dimension: Local demographic Structure

The impact to the element 'Local demographic structure' Be assessed on the basis of possible effects on The main demographic characteristics of the human groups in the study area, in the sector Coast (coast: San Marcos and Costa: Río Seco).

DE Baseline Agreement, for the sector Coast: San Marcos, LA DemogBast fibre of the town of San Marcos is characterized by having a moderate population of approximately 300 Inhabitants (data collected by the Registration Made by The headline During the year 2013, about 350 including floating population), which you run The different groups ET's Prisoners, ie young adults and seniors. In addition, there is a large proportion of people From different parts of the country, particularly the communities of Coquimbo and Los Vilos Who arrived around the year 1980.

Meanwhile, for the Costa sector: Rio Seco, Demographics of the town of Dry River is characterized by having According to the census 2002, A population Of approximately 150 inhabitants, Population that has significantly increased in recent years, and is characterized by CorrespondsR to the different groups EtaPrisoners, ie young adults and seniors. The population

is Formed by iquiqueñas families linked to dry river from the time of the use of the locality to embark salt and the arrival from the years 1980 of fishermen and divers of different parts of the country, in particular of Tongoy.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to The particularities of each sub-sector studied, namely: Sector Costa: San Marcos and Sector Costa: Río Seco.

The Environmental relevance Assigned to Each sub-sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element 'Local demographic structure' is the following:

Table 4-71: Evaluation criteria Structure Local demographic Caleta San Marcos

Criteria	Value
Material culture	7
Intangible culture	5
Abundance	6
Diversity	6
Singularity	5
Fragility	3
Historical and/or Cultural interest	6
Significance	6
Total	**6**

Source: Self-elaboration

Whereas There is a population of more than 300 people in the locality, With people from different parts of the country, Sor valuation is 6; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos**, is of **Relevance Moderate (6).**

For the Costa sector: Caleta Rio Seco LA Environmental relevance of the element 'Local demographic structure' is the following:

Table 4-72: Evaluation criteria Structure local demographic Caleta Rio Seco

Criteria	Value
Material culture	7
Intangible culture	6

Abundance	4
Diversity	6
Singularity	6
Fragility	3
Historical and/or Cultural interest	6
Significance	6
Total	**6**

Source: Self-elaboration

Whereas There is a population of more than 150 inhabitants, which during the last years has been increasing, Your assessment is 6; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta Dry River**, is of **Relevance Moderate (6).**

Impact identification

"Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)"

The analysis of the potential impact in the local demographic structure is realized In The area of influence of Project, corresponding To sector Costa: Caleta San Marcos and Sector Costa: Caleta Rio Seco.

On the Phase of construction LAs Project actions susceptible to the identified impact are the hiring of temporary labor, and the installation of operations and the camp, located halfway between the two Caletas. During the Phase of operation Impact-generating activities decrease considerably, and are related to the Hiring Labor for the Maintenance and operation of the hydraulic plant. These are isolated jobs that generally require fewer skilled workers and operators.

Magnitude of impact

In the case of the sector **Coast: Caleta San Marcos**, the impact has been described as negative **(Ca =-1)**, Since the number of workers Overnight in the camp Present during the Phase of Construction, with an average of 250 person As and a Peak of 500 (250 working on various fronts and 250 sleeping in the camp), it will mean An impact compared to the population of San Marcos. For The Phase Operation, the impact has also been described as Negative character **(Ca =-1)**, Since there will be a floating population of workers in a constant way in the locality.

The probability of occurrence, in the Phase Of construction, is moderate **(Po =0.5)**, Since a camp will be installed at approximately 7 Kilometres north of the town of San Marcos during the Phase of construction. Notwithstanding the foregoing, the holder will be responsible for moving from the area of the project to Iquique to all the workers every time it changes the shift, in order to avoid the circulation of these by the nearby towns.

The impact extension has been qualified as a broad **(Ex = 2)** Since the effect is not only in the immediate vicinity of the camp but within the locality Following the development of The Construction works. In the Phase Of operation, also has been qualified the extent of the impact as wide **(Ex = 2)**, Since the effect will manifest itself Outside the immediate environment of the project infrastructure, albeit with a significantly lower number of people.

Intensity has been rated as high **(I = 3)** Since the amount Total Of workers present during the Phase Of Construction Equals and even surpasses the total population of San Marcos, although they will be distributed in at least the following labor fronts coast, Plateau and Pampa, while in the Phase of operation the impact has been qualifiedor as Low **(I = 1)**, Since the TyWorkers ' ad is reduced by 15 to 20 people per shift in offices in the San Marcos sector, That will imply noticeable changes At first, but not significant to the basal condition.

The duration For the Phase of construction has been described as of medium Term **(Du = 1)** The impact is evident as long as the construction of the project lasts, which is expected to be longer than two years. For the Phase of operation, LA duration has been described as of long Term **(Du = 2)** As the impact is manifested Permanently after the action that generates it (for more than five years).

The reversibility in the Phase Construction has been described as partially Reversible **(Re = 2)**, since the impact Can be partially reversed by Actions Preventive and Corrective; Meanwhile, in the Phase of operation, LA reversibility has been qualified as Reversible **(Re = 1)**, since The impact can be positive in local and preventative trade in terms of their code of conduct.

In the case of the sector **Coast: Caleta Dry River**, the impact has been described as negative **(Ca =-1)**, Since it will be built a road in the locality so there is an interaction originated by the workers that will arrive in a floating way at the moment Construction of the project. For The Phase Operation, no impact is recognised, since there will be no workers in the locality, and the installation of the camp is only scheduled in the Phase of construction, south of the cove.

The probability of occurrence has been qualified Of Moderate **(Po =0.5)**, Since a camp will be installed South of this town During the Phase of construction; And in the Phase of operation, the project will not develop activities in Rio Seco with the exception of the traffic on the North access road for the monitoring activities of the reservoir and maintenance of the power lines. Notwithstanding the foregoing, during the Phase of construction, the holder will be in charge of moving from the area of the project to Iquique to all the workers every time that change the shift,

in order to avoid the circulation of these by the nearby towns. The impact extension has been described as **(Ex =1)**, since The works correspond to a limited sector of the construction works of the North access road

The intensity has been described as Low **(I =1)** since Even though The number of workers present during the Phase Of construction is important compared to the number of inhabitants that the locality has, These workers will be staying in the project camp and finished their shifts will be directed towards Iquique. Also in the sector the works will be limited and It will correspond to the construction of the road of North access and the line of medium tension, works whose construction should last less than one year. For the Phase of operation It has been rated as low **(I = 1)**, as although workers will be a very minor amount compared to the construction and will be concentrated in the sector of Caleta San Marcos.

The duration For the Phase of construction has been described as Of Short Term **(Du =0)** As the Impact is manifested while Last construction of the project, In this sector is limited to less than a year. For the operation it has been considered as **(Du =0),** Since there will no longer be workers in the vicinity of Rio Seco, as the camp will have been lifted and only vehicles are to be circulated on the North access road for monitoring the reservoir and maintaining the power lines.

The reversibility in the Phase Construction and operation has been rated as Reversible **(Re = 1)**, since The impact can be reversed by Corrective actions That enable the continuity and promotion of activities linked to the extraction of resources from the Sea and the valuation and promotion of the cultural identity Sanmarquina.

The summary is shown in the Table 4-13 Following:

Table 4-73: Magnitude of the environmental effect "Alteration of the Characteristics of the local demographic of the human Group by influence of Production workers)", SectorIs Coast: San Marcos and Río Seco

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: San Marcos	**Construction**	-1	0.5	2	3	1	2	**-40**
	Operation	-1	0.5	2	1	2	1	**-3, 0**
Coast: Rio Seco	**Construction**	-1	0.5	1	1	0	2	**-2, 0**
	Operation	-1	0.5	1	1	0	1	**-1, 5**

Source: Self-elaboration

Rating of the impact

The impact "Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)" In the Phase of construction Of the project in the **Costa**

sector: Caleta San Marcos is considered **Little Significant (-24)**. In the Phase of operation The impact is considered **No Significant (-18).**

The impact "Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)"In the Phase of construction Of the project in the **Coastal sector: Caleta Rio Seco** Is Considered **NOr Significant (-12)**. In the Phase of operation Is Considered **NOr Significant (-9)**.

In the Table, the impact rating for the Phase of construction and operation Of the project in the factor Local demographic structure.

Table 4-74: Impact Rating "Alteration of the local demographic Characteristics of the Group Human by influence of Production workers oblation FLota)", sectorIs Coast: San Marcos and Río Seco

Sector	Phase	Environmental assessment	Magnitude	Impact
Coast: San Marcos	**Construction**	6	-4, 0	-24
	Operation	6	-3, 0	-18
Coast: Rio Seco	**Construction**	6	-20	-12
	Operation	6	-1, 5	-9

Source: Self-elaboration

4.7.6.4 Dimension To Ntropológica: Local identity

The impact to the element 'Local identity' Be assessed on the basis of possible effects on The set of values and representative expressions that are differentiating elements, and are shared collectively By the human groups in the study area, in the sector Coast: San Marcos.

DE Baseline Agreement, in the sector Coast: San Marcos, exists An identity of the population linked to the identification and belonging to the Cove, to the various places of origin of the population (mainly in the region of Coquimbo and Tarapacá) and mainly to the sea and the work of extraction that is carried out.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to The particularities of the sector Coast: San Marcos.

The Environmental relevance Assigned to Each sub-sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element 'Local identity' is the following:

Table 4-75: Evaluation Criteria Identity Local Caleta Rio Seco

Criteria	Value
Material culture	8
Intangible culture	9
Abundance	7
Diversity	6
Singularity	6
Fragility	7
Historical and/or Cultural interest	7
Significance	10
Total	**8**

Source: Self-elaboration

Whereas There is a culture and identity of the population Linked to the traditional activities carried out in the sea and to an identification and rooting of the Caleta San Marcos, its Valuation is 8; Therefore, its relevance is 'High.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos**, is of **Relevance High (8).**

Impact identification

"Affecting the local culture of the human group"

The analysis of the potential impact in the local culture is realized In The area of influence of Project, corresponding To Sector Costa: Caleta San Marcos.

In the Phase of construction LAs Project actions susceptible to the identified impact are the hiring of temporary labor, the installation of tasks and camps and the construction of the project's works. During the Phase of operation The activities capable of generating impact are related to the operation of the hydraulic plant.

Magnitude of impact

In the case of the sector **Coast: Caleta San Marcos**, the impact has been described as negative **(Ca =-1)**, Both in the Phase of construction as an operation, Because the activities Related to the hydraulic plant, for example, of construction and operation Of the work of

capturing and downloading, Could affect activities linked to the extraction of marine resources, one of the constituent elements of the Culture Sanmarquina, as well as Its operation also implies a new activity that differs from those traditionally developed in the locality.

The probability of occurrence, in the Phase of construction has been rated high **(Po = 0.7)**Already That activities linked to Project can Eventually cause alterations In the dynamics of the population, related to the activities traditionally carried out by the community. In the Phase of operation, its probability has been rated as moderate **(Po = 0.5)**, since the installation of a productive activity that It is new in the area and the eventual alterations to the activities related to the extraction of marine resources, In the Water capture and discharge in the sea, It probably affects constituent elements of the Sanmarquina identity.

The impact extension has been qualified as a broad **(Ex = 2)**, both for the Phase of construction and operation, since the effect is not only in the immediate environment of the source that generates the impact, but in different sectors of the area of influence.

Intensity has been rated as moderate **(I = 2)**a lot In the Phase of construction As of operation, since the degree of alteration of the basal condition would imply significant changes, but within acceptable ranges.

The duration For the Phase of construction has been described as Medium-term **(Du = 1)** The impact is evident as long as the construction of the project lasts, which is expected to be longer than two years. For the Phase of operation, LA duration has been described as of long Term **(Du = 2)** Because the impactf occurring will be permanently manifested throughout the Phase of operation.

The reversibility in the Phase Construction and operation has been rated as Reversible **(Re = 1)**, since The impact can be reversed by Corrective actions That enable the continuity and promotion of activities linked to divers and fishermen in the sea and the valuation and promotion of cultural identity Sanmarquina.

The summary is shown in the Table Following:

Table 4-76: Magnitude of the environmental effect "Affecting the Culture Local of the Group Human", Sector Costa: San Marcos

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: San Marcos	**Construction**	-1	0.7	2	2	1	1	**-4.2**
	Operation	-1	0.5	2	2	2	1	**-3.5**

Source: Self-elaboration

Rating of the impact

The impact "Affecting the local culture of the human group" In the Phase of construction Of the project in the **Costa sector: Caleta San Marcos** is considered **Little Significant (-34)**, as well as En the Phase of operation **(-28).**

In the following table, the impact rating for the Phase of construction and operation Of the project in the factor Local identity.

Table 4-77: Impact Rating "Affecting the Cultura Lcal of the Group Hmano", Sector Costa: San Marcos

Sector	Phase	Environmental assessment	Magnitude	Impact
Coast: San Marcos	**Construction**	8	-4.2	**-34**
	Operation	8	-3.5	**-28**

Source: Self-elaboration

4.7.6.5 Dimension ToNtropológica: Expressions Culturales Loales

The impact to the element 'Local Cultural Expressions' Be assessed on the basis of possible effects on The Series of manifestations practiced By the human groups in the study area, As part De their culture. This component will be evaluated by each sector, making the distinction between the project's site sectors (Pampa and Plateau, Costa: San Marcos and Costa: Río Seco).

According to baseline, for the plateau sector and Pampa is Identified The accomplishment of one of the stages of the Dakar Rally in some of its editions, being its Version Closer During the rally held on 2014. This activity has its value related to the significance of this sport activity at an international level.

In the sector Coast: San Marcos, Different festivities are held, both national, related to the Fiestas fatherlands, Christmas and New Year, as religious, for example celebration of San Pedro and San Marcos. It also has local celebrations, such as the burning of monkeys and football championships during the summer.

Meanwhile, in the coastal sector: Rio Seco, Dry River The festivities are also celebrated, both national, related to the Fiestas Patrias, Christmas and New Year, as religious, for example the celebration of San Pedro, San Lorenzo and La Virgen. Local festivities are also held, such as the summer Festival and the burning of monkeys.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to The particularities of each sector studied to know: sectors Pampa and plateau, coastal sector: San Marcos and Costa sector: Río Seco.

The Environmental relevance Assigned to Each sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Pampa and Plateau sector the Environmental relevance of the element ' local cultural expressions' is the following:

Table 4-78: Evaluation criteria Cultural Expressions Pampa and Plateau sectors

Criteria	Value
Material culture	4
Intangible culture	2
Abundance	3
Diversity	2
Singularity	7
Fragility	2
Historical and/or Cultural interest	4
Significance	4
Total	**4**

Source: Self-elaboration

Considering The existence of the celebration of a stage of the Dakar Rally, in the section that traveled from Iquique to Antofagasta, Your assessment is 4; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the **Pampa and Plateau sector** is from **Relevance Moderate (4).**

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element 'Local Cultural Expressions' is the following:

Table 4-79: Criteria of Evaluation Cultural Expressions Caleta San Marcos

Criteria	Value
Material culture	6
Intangible culture	5
Abundance	5
Diversity	7

Singularity	4
Fragility	5
Historical and/or Cultural interest	6
Significance	6
Total	**6**

Source: Self-elaboration

Whereas Exist Different celebrations carried out in the town of San Marcos, related to religious and national festivities, sor valuation is 6; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos**, is of **Relevance Moderate (6).**

For the Costa sector: Caleta Rio Seco LA Environmental relevance of the element 'Local Cultural Expressions' is the following:

Table 4-80: Criteria of Evaluation Cultural Expressions Caleta San Marcos

Criteria	Value
Material culture	6
Intangible culture	6
Abundance	5
Diversity	7
Singularity	5
Fragility	6
Historical and/or Cultural interest	7
Significance	8
Total	**6**

Source: Self-elaboration

COnsiderando that Exist Different celebrations carried out in the locality, Your assessment is 6; Therefore, its relevance is 'Moderate.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta Dry River**, is of **Relevance Moderate (6).**

Impact identification

"Potential impactn local festivities"

The analysis of the potential impact in celebrations and traditional manifestations are realized In The area of influence of Project, corresponding To sectors Pampa and Plateau, Sector Costa: Caleta San Marcos and Sector Costa: Caleta Río Seco.

In the Phase of construction LAs Actions of the project susceptible to cause the identified impact are the preparation of the terrain, the transport of materials, inputs, waste and personnel, the movement of land, the construction and improvement of access roads, the construction of portals, the Construction of the electric transmission line, the dumps of excavation material and the removal of facilities for operations and cleaning. During the Phase of operation The activities that can generate impact decrease considerably, and are related to the maintenance of roads and to the transfer of personnel for the operation of the hydraulic plant. These are isolated works that generally require low mobilization and deployment on site.

Magnitude of impact

In the case of the Pampa and Plateau sector, sand considers That the impact identified can only be manifested in the Phase of construction, and Is of a negative nature **(Ca =-1)** Because the Phase of construction Can potentially interfere with The Dakar Rally tour.

Your probability has been downgraded **(Po = 0.2)**, as the Dakar Rally takes place only once a year, In a bounded time, and Whose stages and Trips have been varying year by year.

The impact extension has been described as Average **(Ex = 1)** since The impact could manifest in an immediate environment to the source that generates it.

The intensity has been rated as low **(I = 1)** Well, while May affect this manifestation In the Territory, ÉSTA is not ascribes to a limited geographic space but is done in large spaces so the changes to the basal condition are not significant.

The duration has been described as Medium term **(Du =1)** As the Phase Of construction lasts more than one year.

Reversibility has been described as Reversible **(Re =1)**Well The impact can be completely reversed by corrective actions.

In the case of the sector **Coast: Caleta San Marcos and Sector Costa: Caleta Río Seco**, the impact It is recognized only in the Phase of construction, and has been described as character Negative **(Ca =-1)**, as eventually the activities of the Phase Of construction could alter the normal development of the festivities identified in each locality.

The probability of occurrence has been rated as moderate **(Po = 0.3)** There is a low probability that the construction works coincide with the festivities and alter them.

The impact extension has been qualified as a broad **(Ex = 2)**, as the effect of the impact is manifested in sectors far from the vicinity of the source.

Intensity has been rated as high **(I = 3)** The impact, if any, would take place on a one-time-a-year celebration.

The duration has been qualified as a medium term **(Du =1)** Because the impact would only manifest during the Phase of construction.

Reversibility has been described as naturally Reversible **(Re = 0)** As the basal condition will recover once the Phase of construction.

The summary is shown in the Table Following:

Table 4-81: Magnitude of the environmental effect "Potential ToFectación FEstividades LOcales ", SEctorIs Pampa, Plateau, San Marcos and Río Seco

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Pampa and Plateau	**Construction**	-1	0.2	1	1	1	1	**-0.8**
Coast: San Marcos	**Construction**	-1	0.3	2	3	1	0	**-1.8**
Coast: Rio Seco	**Construction**	-1	0.3	2	3	1	0	**-1.8**

Source: Self-elaboration

Rating of the impact

The impact "Potential impactn local festivities" In the Phase of construction Of the project in the **Sector Pampa and Plateau** is considered **No Significant (-3.2)**. In the Phase of operation The occurrence of the impact is not considered

The impact "Potential impactn local festivities" In the Phase of construction Of the project in the **Costa sector: Caleta San Marcos** is considered **No Significant (-11)**. In the Phase of operation The occurrence of the impact is not considered.

The impact "Potential impactn local festivities"In the Phase of construction Of the project in the **Coastal sector: Caleta Rio Seco** Is Considered **No Significant (-11)**. In the Phase of operation The occurrence of the impact is not considered.

In the following table, the impact rating for the Phase of construction and operation Of the project in the factor Local Cultural Expressions.

Table 4-82: Qualification of the Potential impact ToFectación FEstividades LOcales ", SEctorIs Pampa, Plateau, San Marcos Dry River

Sector	Phase	Environmental assessment	Magnitude	Impact
Pampa and Plateau	**Construction**	4	-0.8	**-3.2**
Coast: San Marcos	**Construction**	6	-1.8	**-11**
Coast: Rio Seco	**Construction**	6	-1.8	**-11**

Source: Self-elaboration

4.7.6.6 Dimension ToNtropológica: Sites of SIgnificancia Groundbreaker

The impact to the element 'Cultural significance sites' Be assessed on the basis of possible effects on LUgares Agglutinators of the local population that are constituted as symbolic or iconic elements of the local identity for a specific human group Or that are referents of the geographical and social space of the local population. This component will be assessed For the Costa sector: Rio Seco.

According to baseline information, The Costa sector: Rio Seco, Has Sites of cultural and historical significance. Within the town, you will find a chapel, A graveyard, a court of FuFootball and a museum, In addition to different structures, mainly the foundations of a lifeline, salt pools, Pier and housing Corresponding to the time when The Company of exploitation Punta Lobos embarked salt through dry river.

Valuation Environmental

The Environmental relevance Of this factor, was assessed in relation to The particularities of the sector Coast: Rio Seco.

The Environmental relevance Assigned to the sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Costa sector: Caleta Rio Seco LA Environmental relevance of the element 'Cultural significance sites' is the following:

Table 4-83: Criteria of evaluation Cultural significance sites Caleta Rio Seco

Criteria	Value
Material culture	8
Intangible culture	8
Abundance	8
Diversity	8
Singularity	6
Fragility	8
Historical and/or Cultural interest	8
Significance	7
Total	**8**

Source: Self-elaboration

Considering the existence of Sites of cultural and historical significance In the locality, Your assessment is 8; Therefore, its relevance is 'High.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta Dry River**, is of **Relevance High (8).**

Impact identification

"Affecting the sites of cultural significance"

The analysis of the potential in the cultural significance sites of the local population are Realized In The area of influence of Project, corresponding To the Costa sector: Caleta Rio Seco.

En the Phase of construction LAs Actions of the project susceptible to cause the identified impact are the preparation of the terrain, the transport of materials, inputs, waste and personnel, the movement of land, the construction and improvement of access roads, the construction of portals, the Construction of the electric transmission line, the dumps of excavation material and the removal of facilities for operations and cleaning. During the Phase of operation The activities that can generate impact decrease considerably, and are related to the maintenance of roads and to the transfer of personnel for the operation of the hydraulic plant. These are isolated works that generally require low mobilization and deployment on site.

Magnitude of impact

In the sector **Coast: Caleta Rio Seco** the impact has been described as negative **(Ca =-1)** For during the Phase Of construction could affect the cemetery of the locality and the foundations of the old lift.

Your probability has been rated high **(Po = 0.8)** As the structures are located approximately 30 meters from the works.

The impact extension has been qualified as a broad **(Ex = 2)** The effect of the impact is evident in sectors outside the immediate environment of the source.

Intensity has been rated as high **(I = 3)** Because the impactn the sites of cultural significance, particularly in the case of the cemetery, could be considered unacceptable on the part of the inhabitants of the locality.

The Duration has been described as Temporary **(Du = 0)** Because the impact will only manifest's During the Phase of construction Of the access road to the plateau, which will have a duration less than one year (9 months).

Reversibility has been described as Reversible **(Re =1)** Well The impact can be reversed by corrective actions.

The summary is shown in the Table Following:

Table 4-84: Magnitude of the environmental effect "Affectation To The sites Of Significant Groundbreaker", Dry River

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: Rio Seco	**Construction**	-1	0.8	2	3	0	1	**-4.8**

Source: Self-elaboration

Rating of the impact

The impact "Affecting the sites of cultural significance "In the Phase of construction Of the project in the **Coastal sector: Caleta Rio Seco** Is Considered **Little Significant (-38)**. In the Phase of operation The occurrence of the impact is not considered.

In the Following table shows The impact rating for the Phase of construction and operation Of the project in the factor Cultural significance sites.

Table 4-85: Impact Rating "Affecting the SItios SIgnificancia Groundbreaker", Rio Seco

Sector	Phase	Environmental assessment	Magnitude	Impact

Coast: Rio Seco	**Construction**	6	-4.8	**-38**

Source: Self-elaboration

4.7.6.7 Socio economic Dimension: Local economic activities

The impact to the element 'Local Economic Activities' Be assessed on the basis of possible effects on The set of economic activities carried out by the local population and the economic use of the marine environment, articulated by the human groups Of the area of influence, which constitute their economic support. This impact is appreciated in the sector of Caleta San Marcos, since it corresponds to the area of direct influence of the project.

DE Baseline Agreement, in the sector Coast: San Marcos, economic activities of the primary sector are developed linked to the exploitation of the marine resources, specifically the extraction of benthic resources, fishing and collection of algae. The extraction of benthic resources by divers is an activity performed only by men, as well as fishing, while women generally participate in the collection of fleeing and processing some benthic resources, prior to sale, as for Example the crabs. These activities represent the economic support of the families of the locality. In this way, The local population develops strategies to dispose of the exploitable marine resources, which are renewable, making intensive and extensive use of it. These strategies are directly related to the management of the area of management of benthic resources (AMERB), belonging to the trade union of independent artisanal fishermen, divers, shellfish and helpers of Caleta San Marcos, located to the north De la Caleta; And with the exploitation of the areas of free access, which are mostly located south of Caleta San Marcos. In Annex 3.6 of the baseline, The Landings register of the AMERB is delivered to and B of the trade union, with the species data for the years 2004 to 2013.

According to the download modelingAnnex 4.3 The main difference between discharged water and the marine environment will be the temperature. This differential Will be the 96% of the time under 3 ° C and the 99% of the time under the 4 ° C at the point of discharge Submarine And, As can be seen in Figure 4-3, the scatter feather Surface thermal reaches differentials below 0.3 °c in a narrow area within the bay. So the impact is confined to that area.

It should be remembered that the daily operation consists of pumping seawater during the day to the reservoir and at night return it To the Sea Generating electric power. For this it is used The Same work of taking and underwater discharge, which It means that you can't pump and unload water at the same time. This way of operating implies that In the short term, For a day, The effects Of the project on the marine environment Are Different and alternate. In the same way, in cases of continuous generation, this also has a limited duration depending on the accumulated flow in the reservoir and the power with which it is discharged.

Valuation Environmental

The Environmental relevance of this factor, was assessed in relation to The particularities of each sub-sector studied, namely: Costa sector: San Marcos.

The Environmental relevance Assigned to Each sub-sector to This element has considered its Material culture, Intangible culture, Abundance Diversity, Singularity Fragility Historical and/or cultural interest, and significance.

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element 'Local Economic Activities' is the following:

Table 4-86: Evaluation criteria Local economic activities Caleta San Marcos

Criteria	Value
Material culture	9
Intangible culture	10
Abundance	8
Diversity	9
Singularity	7
Fragility	9
Historical and/or Cultural interest	8
Significance	10
Total	**9**

Source: Self-elaboration

Whereas There are local economic activities, linked to the primary sector, in the extraction of molluscs and fishes, and collection of algae, vital for the local population, sor valuation is 9; Therefore, its relevance is 'Very high '.

Consequently, the environmental assessment of this factor For the sector **Coast: Caleta San Marcos**, is of **Relevance Very high (9).**

Impact identification

"Impactn local resources and economic activities and their associated dynamics"

The analysis of the IM potentialPact in local economic activities is RealiZó In The area of influence ofL Project That might be affected by this impact, What Corresponds A Costa sector: Caleta San Marcos, based on the results of the marine medium component.

En the Phase of construction LAs Project actions likely to cause the impact identified In the marine environment Are The construction of the work of taking and underwater discharge, As well as the tests for the Putting into service of the plant And the installation of the ducts for the desalination plant. DE indirect form the activities carried out at surface level for the construction of surface and underground works could affect a lesser degree the dynamics associated with. During the Phase of operation the activity that can generate impact is The use of seawater to The operation of the hydraulic plant. In connection with The Phase of CLosure, Dismantling and cleaning works will be developed So as to impact as little as possible The activities of The community, so no underwater work will be done.

Magnitude of impact

In the case of the sector **Coast: Caleta San Marcos**, for the Phase of construction and operation, the impact has been described as negative **(Ca =-1)**. In the Phase of construction Activities related to the collection and downloading work can be Eventually To affect the activities related to the extraction of marine resources carried out in the sea and the coast, as well as can alter the transit routes used by the boats of divers and artisanal fishermen. Also in the Phase of operation, activities related to CWater discharge to the Sea May eventually affect The activities related to the extraction of marine resources carried out in the sea and the coast, specifically those concerning the exploitation of the area of management of benthic resources (AMERB B, for being in the vicinity of the Point Suction and discharge of the hydraulic plant.

The probability of occurrence has been described as Low **(Po = 0,1)** In the Phase of constructionsince There is a low probability That the economic activities linked to the extraction of marine resources carried out in the sea and the coast are impacted by the activities of construction of the work of capture and discharges, specifically to the transit of boats and to the activities of diving in Areas surrounding the work in the marine environment. Meanwhile, in the Phase Of operation the impact has been qualified Of Under **(Po =03)**since There is a probability that the economic activities linked to the extraction of marine resources carried out in the sea and the coast are impacted by the activities of CWater discharge to the seaSpecifically those related to the exploitation of the Area of Management of benthic resources (AMERB), to be located near the suction and discharge area of the hydraulic plant. This can be verified in the results of the discharge modeling of the marine environment, enclosed in annex 4.3.

The impact extension has been described as Reduced **(Ex =0)** For the Phase of construction As it relates to the area in which the work of taking and unloading and the associated tasks will be

built. For the Phase of operation The extension has been rated as a mean **(Ex = 1)**, Since the effect May manifest outside the immediate environment of the source.

The intensity has been described as Low **(I =1)** In the Phase of construction, Since EL degree of alteration does not imply noticeable changes in its basal condition. In the Phase of operationLA intensity has been described as Low **(I = 1)** Since according to Studies and modeling of the marine medium component (annex 4.3, modeling of Scatter pen) Alteration is not significant with respect to its basal condition, as mentioned at the beginning of the title 4.7.6.7.

Duration has been qualified as temporary **(Du = 0)** During the Phase of construction, because the impact will only be generated while the construction works are carried out, that is to say only while the action that generates it lasts. In the case of works linked to the capture and discharges, in the sea will have a approximate duration of 3 Months. For the Phase of operation, duration has been qualified as long-term **(Du = 2)** As the impactf occurring It is permanently manifested after the end of the action that generates it (for more than five years).

LA reversibility has been described as Partially Reversible **(Re = 2)**, In the Phase of construction, Already What The impact can be partially reversed by Corrective actions; While in the Phase Of operation, it has been considered Reversible **(Re = 1)**Already That the impactf occurring can be reversed by Corrective actions That enable the continuation of economic activities related to the extraction of marine resources. In this sense, The owner is committed to develop a project compatible with the extractive activity of Caleta San Marcos, In this respect, a) A work of taking and unloading was designed Underwater That reduces the effects on the marine environment in speed and sense of flowsb The results of the modeling indicate a range of temperature variation of the bounded discharge that allows reasonably to maintain the quality of the seawater And C The project Incorporated into their contingency plans actions If the discharge temperature exceeds a certain threshold.

The summary is shown in the Table Following:

Table 4-87: Magnitude of the environmental effect "Affectation Work The Resources and The To local Economics activities and its Dynamics toPartners ", San Marcos

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: San Marcos	**Construction**	-1	01	0	1	0	2	**-0.3**
	Operation	-1	03	1	1	2	1	**-1.5**

Source: Self-elaboration

Rating of the impact

The impact "Impactn local economic activities and their associated dynamics" In the Phase of construction Of the project in the **Costa sector: Caleta San Marcos** is considered **No Significant (-2.7)**. In the Phase of operation The impact is considered **No Significant (-13.5).**

In the following table, the impact rating for the Phase of construction and operation Of the project in the factor Local Economic Activities.

Table 4-88: Impact Rating "Affectation Work Resources and local economic activities and its Dynamics to Partners", San Marcos

Sector	Phase	Environmental assessment	Magnitude	Impact
Coast: San Marcos	**Construction**	9	-0.3	**-2,7**
	Operation	9	-1.5	**-13.5**

Source: Self-elaboration

Impact identification

"Potential local employment generation"

The analysis of the potential impact in local economic activities is Realized In The area of influence ofL Project, corresponding To Sector Costa: Caleta San Marcos.

En the Phase of construction LAs Project actions susceptible to cause the impact identified are the hiring of labor, both in the Phase of construction and operation.

Magnitude of impact

In the sector **Coast: Caleta San Marcos**, for the Phase of construction and operation, the impact has been described as character Positive **(Ca =+1**. In the Phase of construction The activities related to the construction of the works will generate Jobs, which eventually They can be for the population of the locality that is discontinued at the time of the construction of the project. In the same way, it will happen with Activities related to the Phase of operation, That may eventually be occupied by members of the local population.

The probability of occurrence has been described as Moderate **(Po = 0.5)**, Both for the Phase of construction As an operation, Because there is a probability that local people work in the Phase of construction and operation Of the project, if there is a relationship between the required labour competencies and the labour competencies of the local population.

The impact extension has been qualified as a broad **(Ex = 2)** Both for the Phase of construction and operation, Since the effect It can manifest itself outside the immediate environment of the source that generates it, by hiring people from the locality and/or other places in the region.

The intensity has been described as Moderate **(I = 2)** Both for the Phase of construction and operation, Since the degree of alteration would imply changes Significant Regarding its basal condition, but within acceptable ranges.

The duration has been described as Medium-term **(Du =1)** During the Phase of construction, since the impact will only be generated while the construction works are carried out, I mean, about five years. In the Phase of operation, LA duration has been qualified as long-term **(Du = 2)** Because the impact is permanently manifested, Because the jobs generated in the Phase Operation will be maintained until the end of this Phase, For more than five years.

Reversibility has been described as Partially Reversible **(Re =2)**Well Once the Phase of construction, the number of workers will decrease considerably, More A proportion of workers will continue to work in the Phase of operation. In the Phase of operation, the impact has been rated as Reversible **(Re = 1)**, Because it can be reversed with corrective actions for the duration of this Phase.

The summary is shown in the Table Following:

Table 4-89: Magnitude of the environmental effect "Potential local employment ", San Marcos

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: San Marcos	**Construction**	+1	0.5	2	2	1	2	**3.5**
	Operation	+1	0.5	2	2	2	1	**3.5**

Source: Self-elaboration

Rating of the impact

The impact "Potential local employment generation" In the Phase of construction and operation Of the project in the **Costa sector: Caleta San Marcos** is considered **Little Significant (+32).**

In the Table, the impact rating for the Phase of construction and operation Of the project in the factor Local Economic Activities.

Table 4-90: Impact Rating "Potential local employment", San Marcos

Sector	Phase	Environmental assessment	Magnitude	Impact
Coast: San Marcos	**Construction**	9	+ 3.5	**+ 32**
	Operation	9	+ 3.5	**+ 32**

Source: Self-elaboration

4.7.6.8 Basic Social Welfare Dimension: OFerta and DEmanda SErvices basic service

The impactn the ' supply and demand of basic services ' element It will be assessed in relation to the existence in the area of the project of supply structure of basic services of the area of study, and the demand of this one, in the sector Coast (coast: San Marcos and Costa: Río Seco).

According to baseline, for the sector Coast: San Marcos, the basic services offer is as follows: in education, there is a school that provides pre-school and basic education, which does not cover the demand for secondary education, delivered in Iquique; In health, there is a Rural health post that offers primary and emergency care, but does not have an ambulance. With regard to potable water services for human consumption, this is bought by the population in Iquique to the company Aguas Altiplano, and distributed through a tank truck by the municipality of Iquique, there being problems With his Distribution. The availability of hygienic service is solved by means of a black well crate or septic tank, and light Electric, by generatorIt is based on gasoline Community or own – And in a sector through of electrical laying, service provided by the company Eliqsa.

Meanwhile, for the Costa sector: Rio Seco, The offer of basic services is as follows: in education, the children attend the school located in Caleta San Marcos that provides pre-school and basic education, which does not cover the demand for secondary education, delivered in Iquique; In health, the population attends the San Marcos Rural Health clinic that offers primary and emergency care. With regard to drinking water services for human consumption, this is bought by the population in Iquique to the company Aguas Altiplano, and accumulated in a glass of water to be distributed later on Mondays and Fridays by the Water Committee Local drinking. The availability of hygienic service is solved by means of a black well crate or septic tank, While some of the homes have access to Electricity Through the electrical laying installation from This year, service delivered by the company Eliqsa.

Environmental assessment

The Environmental relevance Of this factor, was assessed in relation to the particularities of each sub-sector studied, namely: Sector Costa: San Marcos and Sector Costa: Río Seco.

The Environmental relevance Assigned to each sub-sector for this element has considered its material culture, intangible culture, abundance, diversity, singularity, fragility, historical and/or cultural interest, and significance.

For the Costa sector: Caleta San Marcos LA Environmental relevance of the element ' supply and demand of basic services ' is as follows:

Table 4-91: Assessment criteria supply and demand for basic services San Marcos

Criteria	Value
Material culture	7
Intangible culture	8
Abundance	4
Diversity	6
Singularity	6
Fragility	8
Historical and/or Cultural interest	7
Significance	10
Total	**7**

Source: Self-elaboration

Whereas there is in the locality, education and health services, And That access to basic water and light services is largely resolved by the local population, its valuation is 7; Therefore, its relevance is ' high'.

Consequently, the environmental assessment of this factor for the sector **Coast: Caleta San Marcos**, is of **High relevance (7).**

For the Costa sector: Caleta Rio Seco LA Environmental relevance of the element ' supply and demand of basic services ' is as follows:

Table 4-92: Criteria of evaluation offer and demand of basic services Rio Seco

Criteria	Value
Material culture	6
Intangible culture	7
Abundance	4
Diversity	5
Singularity	5
Fragility	8
Historical and/or Cultural interest	7
Significance	10
Total	**7**

Source: Self-elaboration

Whereas the inhabitants flock to to school and LA post of Rural health of San Marcos, which have a committee on Rural drinking water and electric power service through public laying, its valuation is 7; Therefore, its relevance is 'High'.

Consequently, the environmental assessment of this factor for the sector **Coast: Caleta Rio Seco**, is of **Relevance High (7).**

Impact identification

"Affecting basic services present in the area of influence"

The analysis of the potential impactn the supply and demand of basic services was carried out in the area of influence of the project, corresponding to sector Costa: Caleta San Marcos and Sector Costa: Caleta Rio Seco. In the coastal sector: Caleta Rio Seco, only Identified A Potential impactn the Phase of construction.

En the Phase Of construction the project actions susceptible to cause the identified impact are the hiring of temporary workforce, the installation of operations and camps, the transport of materials, the construction and improvement of access roads. During the Phase of operation Impact-generating activities decrease considerably, and are related to the Hiring Labor for the Maintenance of roads and operation of the hydraulic plant. These are isolated jobs that generally require fewer workers.

Magnitude of impact

In the case of the sector **Coast: Caleta San Marcos**, In the Phase of construction, The impact has been character-qualified Positive **(Ca =1**, Given that Drinking water consumption and other services for Project workers during the Phase of With Construction will be supplied by the holder, so the consumption of the population of Caleta San Marcos will not be affected. For The Phase Operation, the impact has also been described as Positive **(Ca =1**, Since the project contemplates the provision of Infrastructure needed to generate up to 50m3/day, considering that the costs of production, distribution and disinfection will be the responsibility of the community.

The probability of occurrence during the Phase of construction, is Some **(Po =1)**, As there is a high probability that the project does not affect the basic services since the project will provide drinking water to its workers. For operation the probability is certain **(Po =1)** Given that it is true that the holder is able to provide Infrastructure to Drinking water to San Marcos.

The impact extension during the Phase of construction and operation It has been qualified as a broad **(Ex = 2)** for the effect of the impact is manifested outside the immediate environment of its source.

The intensity during the Phase of construction is rated very low **(I = 0)** Since the degree of alteration is expected to be low and the basal condition can be considered to be maintained. For the Phase of operation has been described as High **(I =3)** because the population's baseline

condition will change significantly by having The Necessary infrastructure for the supply of Drinking water.

The duration for the Phase Of construction has been described as Medium term **(Du =1)** because the impact will only manifest during the Phase of construction, which will be less than 5 years. For the Phase of operation, LA duration has been described as Long-term **(Du = 2)** Since the impact It would manifest as long as the Phase of operation.

The reversibility in the Phase Construction has been rated as Reversible **(Re = 2)**, And In the Phase of operation, LA reversibility has been described as Irreversible **(Re =3)**, As the basal condition will be improved given that the provision of Infrastructure to Drinking water for the population of San Marcos will be permanent.

In the case of the sector **Coast: Caleta Rio Seco**, the impact has been described as negative **(Ca =-1)**, since The infrastructure of the Rural Drinking Water Committee (Water Cup) is close to the route of the projected road in Río Seco, which considers its location in the footprint used by the tank truck that supplies the water cup of the committee. It should be noted that the drinking water consumption of the project workers during the Phase of construction will be supplied by the holder So the consumption of the dry river population will not be affected.

The probability of occurrence has been described as Moderate **(Po =0.5)** Well The new road will be built on the footprint used by the tank truck to supply water to the existing glass in the locality.

The impact extension has been described as Wide **(Ex = 2)**, as the effect of the impact is manifested outside the immediate environment of its source.

Intensity has been rated as high **(I = 3)** because if the correct functioning of the water supply of the dry river population is affected, The degree of alteration implies Laugh Significant changes in the baseline condition.

The duration for the Phase Construction has been described as Temporary **(Du = 0)** Since the impact It will only manifest itself During The Phase of road construction, time less than one year.

The reversibility in the Phase Construction has been rated as Reversible **(Re =1)** As it can be reversed or by corrective actions that allow the correct operation and access of the supplying truck.

The summary is shown in the following table:

Table 4-93: magnitude of the environmental effect "Affectation to SErvices BÁsicos QResents in the 'sArea of INfluencia", SEctorIs Coast: San Marcos And Dry River

Sector	Phase	Ca	Po	Former	I	Du	Re	Magnitude
Coast: San Marcos	**Construction**	1	1	2	0	1	2	**-5, 0**
	Operation	1	1	2	3	2	3	**10**
Coast: Rio Seco	**Construction**	-1	0.5	2	3	0	1	**-3, 0**
	Operation	0	0	0	0	0	0	**0**

Source: Self-elaboration

Impact Rating

The impact "Affecting basic services present in the area of influence"In the Phase of construction Of the project in the **Costa sector: Caleta San Marcos** is considered **Little Significant (-35)**. In the Phase of operation The impact is considered **Significant positive (70).**

The impact "Affecting basic services present in the area of influence"In the Phase of construction Of the project in the **Coastal sector: Caleta Rio Seco** is considered **Little Significant (-21)**. In the Phase of operation The occurrence of the impact is not considered.

In the Table below, the impact rating for the Phase of construction and operation of the project in the supply and demand factor of basic services.

Table 4-94: Impact Rating "Affectation to SErvices BÁsicos QResents in the 'sArea of INfluencia", SEctorIs Coast: San Marcos Rio Seco

Sector	Phase	Environmental assessment	Magnitude	Impact
Coast: San Marcos	**Construction**	7	-5, 0	-35
	Operation	7	10	70
Coast: Rio Seco	**Construction**	7	-3, 0	-21
	Operation	7	0	0

Source: Self-elaboration

4.7.7 Summary andImpact valuation

The following table presents the summary of the impacts associated with The phases of the project.

Table 4-95. Matrix of EValuation of Impact hierarchy For TOdes the FAces Of Project

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
Atmosphere	Air quality	Costa and Pampa	-	Increased material emissions Particulate and gases	Construction	-32	Little significant
					Operation	-2.4	Non-significant
					Closing	-32	Little significant
	Noise	Costa and Pampa	-	Increased noise level	Construction	-36	Little significant
					Operation	-2.7	Non-significant
					Closing	-36	Little significant
	Electromagnetic fields	Sector Costa/PAMPA sector	-	Radio interference	Construction	-	-
					Operation	-9	Non-significant
					Closing	-	-
Lithosphere	Geomorphology	Sector Costa/Plateau sector	-	Modification of the topography	Construction	-24	Little significant
					Operation	-	-
					Closing	-	-
Hydrosphere Marina	Chemical oceanography	Submarine Sector	Sea water Quality	Alteration of sea water quality	Construction	-24	Little significant
					Operation	-30, 4	Little significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
					Closing	-	-
		Submarine Sector	Marine sediments	Alteration of the physical-chemical properties of marine sediments	Construction	-8.4	Non-significant
					Operation	-25.2	Little significant
					Closing	-	-
		Submarine Sector	Macrobenthos Intertidal of soft funds	Alteration of marine communities Intertidal of soft funds	Construction	-18	Non-significant
					Operation	-3	Non-significant
					Closing	-	-
		Submarine Sector	Planktonic communities	Affecting subtidal, soft-bottomed biological communities	Construction	-	-
					Operation	-18.6	Non-significant
					Closing	-	-
		Submarine Sector	Epibiota Intertidal of hard funds	Alteration of marine communities Intertidal of hard funds	Construction	-28	Little significant
					Operation	-7.2	Non-significant
					Closing	-	.
		Submarine Sector	Macroinfauna Subtidal	Affecting subtidal, soft-	Construction	-16	Non-significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
			sedimentary funds	bottomed biological communities	Operation	-24	Little significant
					Closing	-	-
		Submarine Sector	Epibiota Subtidal background	Alteration of subtidal marine hard-fund communities	Construction	-32	Little significant
					Operation	-33	Little significant
					Closing	-	-
		Submarine Sector	Ichthyofauna	Loss of individuals	Construction	-10	Non-significant
					Operation	-25	Little Significant
					Closing	-	.
		Submarine Sector	Coastal vertebrates	Affectation of species in conservation category (mammals)	Construction	-18	Non-significant
					Operation	-	-
					Closing	-	-
Soils	Type of land use capacity Arable	All sectors	-	Irreversible soil loss	Construction	-8	Non-significant
					Operation	-	-
					Closing	-	-

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
			-	Soil compaction degradation.	Construction	-5	Non-significant
					Operation	-	-
					Closing	-4	Non-significant
Fauna	Site of Interest	Sector Coast/Plateau Sector	Nesting area Of *Oceanodroma Markhami*	Involvement of nesting area	Construction	**-72**	**Significant**
					Operation	-27	Little SIgnificativo
					Closing	-	-
	Species of fauna in conservation category	Sector Pampa/Sector Plateau	-	Loss of specimens from the reptile group	Construction	**-45**	**Significant**
					Operation	-22	Little significant
					Closing	-22	Little significant
		Sector Coast	-		Construction	-22	Little significant
					Operation	-11	Non-significant
					Closing	-22	Little significant
		Sector Plateau Pampa Sector/ Sector Costa	-	Loss of specimens from the birds group	Construction	-18	Non-significant
					Operation	-11	Non-significant
					Closing	-18	Non-significant
Archaeology	Archaeological heritage	Coast and Plateau	-	Archaeological sites Intervention	Construction	**-48**	**Significant**
					Operation	-	-
					Closing	-	-
Paleontology	Paleontological	Coast, Plateau	-	Partial intervention of	Construction	**-57.6**	**Significant**

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
	Heritage	and Pampa		fossil levels	Operation	-	-
					Closing	-	-
Landscape	Visual quality	Pampa – Mountain Cord unit	-	Visual incompatibility and loss of biophysical attributes	Construction	-19.2	Non-significant
					Operation	-22.4	Little significant
					Closing	16	Non-significant
		Pampa – Unit Pampa del Tamarugal			Construction	-28.8	Little significant
					Operation	-33.6	Little significant
					Closing	24	Little significant
		Plateau – Cordillera de la Costa			Construction	-22.4	Little significant
					Operation	-22.4	Little significant
					Closing	19.2	Non-significant
		Coast-Coastal border			Construction	-33.6	Little significant
					Operation	-33.6	Little significant
					Closing	28.8	Little significant
		Coast – Coastal Cliff			Construction	-39.2	Little significant
					Operation	-39.2	Little significant
					Closing	33.6	Little significant
Protected areas and priority sites	Protected areas	Pampa Sector	-	Intervention in protected Area	Construction	-20	Non-significant
					Operation	-24	Little significant
					Closing	-20	Non-significant
Tourism	Tourist attractions	Cost SectorTo	-	Alteration of tourist attractions	Construction	-32	Little significant
					Operation	-28	Little significant
					Closing	-25	Little significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
		Plateau Sector	-	Generation tourist attraction	Construction	-	-
					Operation	24	Little significant
					Closing	-	-
Geographic dimension	Displacement dynamics within the Territory	Plateau Sector/PAMPA sector	-	Alteration of the connectivity flows of human groups within and outside the Territory	Construction	-24	Little significant
					Operation		-
					Closing	-	-
Anthropological Dimension	Local Cultural Expressions	Plateau Sector/PAMPA sector	-	Potential impactn local festivities	Construction	-3.2	Non-significant
					Operation	-	-
					Closing	-	-
Geographic dimension	Geographic environment with social uses	Coast: Caleta San Marcos	-	Alteration of the geographical environment with social uses	Construction	-29	Little significant
					Operation	-21	Little significant
					Closing	-	-
	Displacement dynamics within	Coast: Caleta	-	Alteration of the connectivity flows of	Construction	-21	Non-significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
	the Territory	San Marcos		human groups within and outside the Territory	Operation	-	-
					Closing	-	-
Demographic dimension	Local demographic structure	Coast: Caleta San Marcos	-	Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)	Construction	-24	Little significant
					Operation	-18	Nor significant
					Closing	-	-
Anthropological Dimension	Local identity	Coast: Caleta San Marcos	-	Affecting the local culture of the human group	Construction	-34	Little significant
					Operation	-28	Little significant
					Closing	-	-
	Local Cultural Expressions	Coast: Caleta San Marcos	-	Potential impactn local festivities	Construction	-11	Non-significant
					Operation	-	-
					Closing	-	-
Socio-economic dimension	Local Economic Activities	Coast: Caleta	-	Impactn local resources and economic activities	Construction	-2,7	Little significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
		San Marcos		and their associated dynamics.	Operation	-13.5	Little significant
					Closing	-	-
				Potential generation of local employment	Construction	+ 32	Non-significant
					Operation	+ 32	Little significant
					Closing	-	-
Basic Social Welfare dimension	Supply and demand for basic services	Coast: Caleta San Marcos	-	Affecting basic services present in the area of influence.	Construction	-35	Little significant
					Operation	**+ 70**	**Significant**
					Closing	**-**	**-**
Geographic dimension	Geographic environment with social uses	Coast: Rio Seco	-	Alteration of the geographical environment with social uses	Construction	-25	Little Significant
					Operation	-21	Little significant
					Closing	-	-
	Displacement dynamics within	Coast: Rio Seco	-	Alteration of the connectivity flows of	Construction	-25	Little significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
	the Territory			human groups within and outside the Territory	Operation	-21	Little significant
					Closing	-	-
Demographic dimension	Local demographic structure	Coast: Rio Seco	-	Alteration of the characteristics of the local demographics of the human group by influx of workers (floating population)	Construction	-12	Nor significant
					Operation	-9	Nor significant
					Closing	-	-
Anthropological Dimension	Local Cultural Expressions	Coast: Rio Seco	-	Potential impactn local festivities	Construction	-11	Non-significant
					Operation	-	-
					Closing	-	-
	Cultural significance sites at the local level	Coast: Rio Seco	-	Affecting the sites of cultural significance	Construction	-38	Little significant
					Operation	-	-
					Closing	-	-
Basic Social Welfare	Supply and demand for basic	Coast: Rio Seco	-	Affecting basic services present in the area of	Construction	-21	Little Significant

Environmental component	Factor Environmental	Sector	Sub Category Environmental Factor	Impact	Phase Project	Environmental impact Value	Importance of impact
dimension	services			influence.	Operation	-	-
					Closing	-	-

Source: Self-elaboration

4.7.8 Hierarchy of Impacts

The table below presents the hierarchy of significant impacts.

Table 4-96. Hierarchy of Environmental Impacts of the Project

Environmental Factor	Impact	Environmental impact Value	Phase	Rating of the impact
Area of Nesting Of *Oceanodroma Markhami*	Involvement of nesting area	-72	Construction	**Significant**
Supply and demand for basic services	Affecting basic services present in the area of influence	+ 70	Operation	**Significant**
Paleontological Heritage	Partial intervention of fossil levels	-57	Construction	**Significant**
Archaeological heritage	Archaeological sites Intervention	-48	Construction	**Significant**
Species of fauna in conservation category	Loss of specimens from the reptile group	-45	Construction	**Significant**