Client: YPF Energía Eléctrica S.A.

Location: Cañadón Seco – Santa Cruz Province

Date: May 26, 2017

Report: ETIA PECL 001-17

Technical Environmental Impact Study

Cañadón León Wind Farm

Scudelati & Asociados

Asesores

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2 PROJECT GENERAL INFORMATION

2.1 DETAILS OF PROJECT REPRESENTATIVES

Project Name: Cañadón León Wind Farm Project

Legal name: YPF Energía Eléctrica S.A.

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2.2 CORPORATE MAIN BUSINESS

YPF Energía Eléctrica S.A. is a company controlled by YPF S.A., and its main business is power generation.

2.3 PROJECT TECHNICAL, ECONOMIC AND SOCIAL JUSTIFICATION

The growing need for power, and increasing community concern regarding the environment, nature and quality of life, have driven the choice of new, clean, inexhaustible sources of energy that will contribute to building a robust power supply, with guaranteed sustainable supply.

Power generation from wind is framed within a global trend towards diversification and development of new sources of energy – essential in the current energy context.

Wind energy produces no emissions, is inexhaustible, competitive and creates wealth and employment. The "success of wind" is based on an industry with high technological level which in recent years has attained good maturity, making use of the natural advantages of the climate in the region for application of this technology. In order to study the aptitude of the zone, a measuring station was installed in 2015 to conduct specific studies to ensure the operation of the proposed wind farm.

In addition, at the eleventh annual session of the House of Representatives of Santa Cruz Province, held on September 23, 2016, there was unanimous approval of the initiative to adhere to National Law No. 27,191 on fostering the use of renewable energy sources.

It is worth highlighting the benefits to the region during the different development phases of the project, among which the following are outstanding:

- Construction phase: the project is expected to increase local and regional demand for: (i) services: accommodation for project personnel, food, earthworks, transportation for personnel, vehicle rental, vehicle repair, water supply, among others; (ii) supplies: construction materials, electrical materials, fuel and oil, among others; (iii) labor:

specialized personnel (welders, electricians, engineers, mechanics, etc.) and technical personnel for mounting fixed installations.

- Operations phase: given the sustainable character of the project, it will enable the region to have an energy resource to consolidate its energy mix by diversifying generation sources.

2.4 AIMS

The aim of the Cañadón León Wind Farm project is to generate electricity from the wind, i.e., clean, renewable energy. Thirty wind turbines (100 MW power) will be installed in Cañadón León, located approximately 25 km from Caleta Olivia City, Santa Cruz Province.

To transmit the energy generated at the wind farm, a transformer sub-station (SET) will be constructed within the wind farm, called SET Cañadón León, where voltage will be raised to 132 KV for transmission and connection to the Argentine Electrical Interconnection System (SADI) on the Santa Cruz Norte-Caleta Olivia (SCN-CO) line. Said line is managed by third parties and is therefore not included within the scope of this project.

To sum up, the project will create multiple benefits:

- Diversification of the energy mix.
- Use of a resource with high potential in the region (wind) to generate power.
- Power generation without greenhouse gas emission.
- Reinforcement for power demand. The power generated is equivalent to the annual consumption of approximately 140,000 households.
- Diversification of regional activity, which is highly dependent on hydrocarbon production.
- Compliance with National Law No. 26,190 on renewable energies.

3 PROJECT DESCRIPTIVE REPORT

3.1 LOCATION

The project will be located in the northeast of Santa Cruz Province, Deseado Department. The land on which it will be sited has a total surface area of **18.7 sq. km**., and is located on Lot 40- League C and D – Mat. 3205 and Lot 46- League A, **on Provincial Route No. 12,** one kilometer away from **Cañadón Seco**.

Map 01. Santa Cruz Province.
Source IGN.
Área del Proyecto = Project Area

It should be noted that the site is located within an area where conventional oil is extracted and is therefore completely anthropized, so there are operative drilling equipment, buried hydrocarbon pipelines, electrical lines for equipment, etc. These facilities are expected to continue operating during wind farm construction and operational phases. The site belongs to YPF S.A.

Figure 01. Location of Project Site (green polygon) relative to Cañadón Seco location (Source: Google Earth)

Área del Proyecto = Project Area

Figure 02: Aerial View of the Project

Figure 03: View of Provincial Route No. 12.

Figure 04. View of Access to Project Area.

(46°34'4.58"S – 67°37'7.95"W)

Figure 05: Drilling

Vertex	Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
	x	y	x	y
1	4840662.83	3369170.42	4840867.73	3369250.17
2	4840934.02	3379241.45	4841138.91	3379321.22
3	4835869.44	3379321.29	4836074.33	3379401.05
4	4835676.18	3374386.99	4835881.06	3374466.75
5	4835119.03	3374334.73	4835323.91	3374414.49
6	4838504.77	3370814.34	4838709.66	3370894.09
7	4838594.88	3369257.74	4838799.77	3369337.49

Table 01. Georeferenced vertices of Project Area

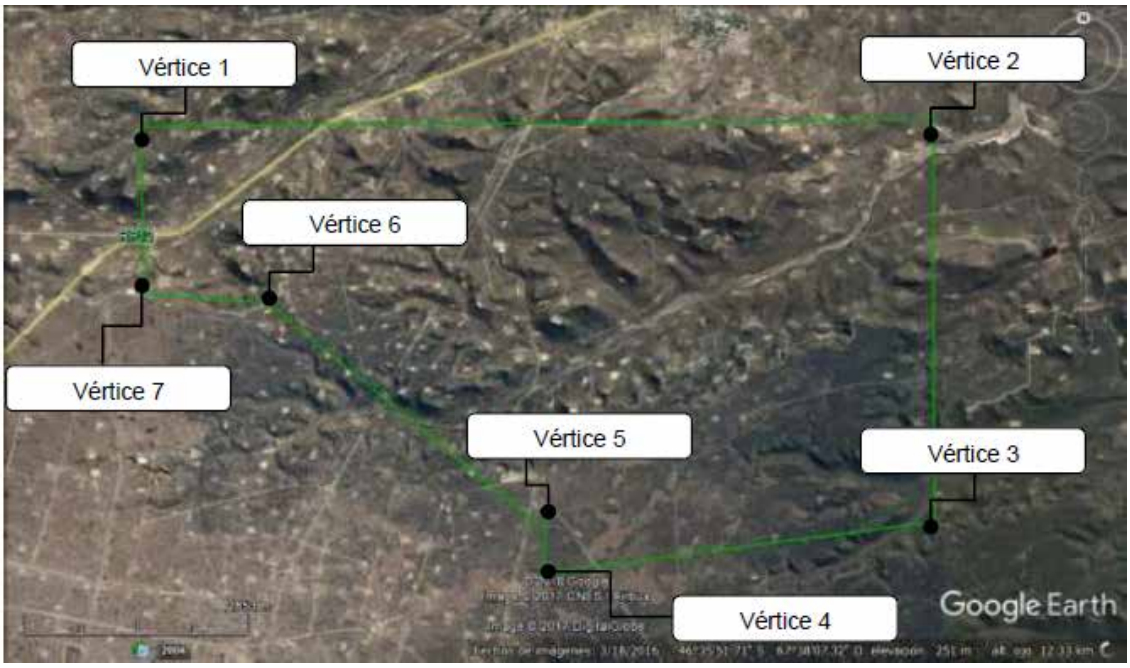


Figure 06: Project Area Vertices. [Vértice = Vertex]

3.2 SITE CHARACTERISTICS

3.2.1 WIND POTENTIAL

The orographic effects combined with the high wind regime in the zone make the chosen site ideal for using this type of resource. Moreover, site orientation and exposure favor power production by reducing aerodynamic interference among wind turbines.

3.3 WIND FARM CONFIGURATION

Wind turbines will been positioned considering prevailing wind directions as well as topographic and orographic conditions of the site and surrounding area. Specialized software was used to perform an iterative process for wind turbine location based on maximizing power production and wind farm efficiency by reducing interference among turbines. It has thus been decided to distribute the turbines preferably aligned perpendicularly to the direction of prevailing winds, spaced at more than 10 diameters in said direction and at more than 3 diameters in the perpendicular direction.

In addition to this optimization process for wind turbine location, the following geographical restrictions will be considered: (i) distance to land boundaries, (ii) distance to roads, (iii) distance to high voltage lines, (iv) site orographic analysis, and (v) site topographic analysis.

The wind farm will have 30 wind turbines, which will be interconnected to each other by means of a 33 KV medium voltage line (MVL). All lines will concur at the wind farm transformer substation, called SET Cañadón León, where voltage will be raised to 132 KV for transmission and connection to the Argentine Electrical Interconnection System (SADI) at the Santa Cruz Norte-Caleta Olivia line (SCN-CO), which is managed by third parties and outside the scope of this project.

3.4 GEOREFERENCING FOR PERMANENT FACILITIES

The location of project permanent facilities, i.e. wind turbines, transformer substation (SET) and 132 kV high voltage line (for connection to the 132 kV Santa Cruz Norte-Caleta Olivia HVL), is shown below.

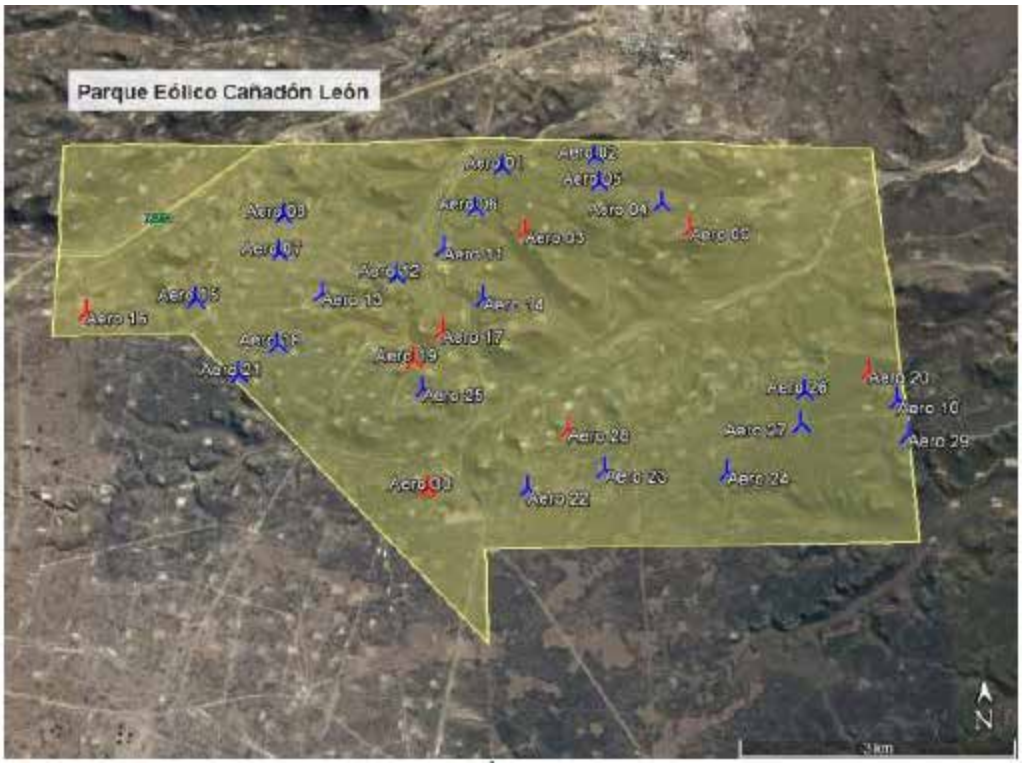


Figure 07: Location of Wind Turbines

Vertex	Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
	x	y	x	y
Aero 01	4840915,92	2604396,54	4841117,62	2604486,20
Aero 02	4841028,70	2605532,53	4841230,39	2605622,19
Aero 03	4841951,02	2604680,09	4842152,72	2604769,74
Aero 04	4840379,93	2608862,95	4840581,62	2608952,61
Aero 05	4840692,00	2605568,82	4840893,69	2605658,48
Aero 06	4840394,84	2604056,35	4840596,53	2604146,01
Aero 07	4839879,06	2601696,17	4840080,75	2601785,81
Aero 08	4840341,60	2601742,50	4840543,29	2601832,15
Aero 09	4840106,40	2606638,37	4840308,10	2606728,03
Aero 10	4837992,57	2608911,25	4838194,26	2609000,92
Aero 11	4839907,36	2603665,05	4840109,05	2603754,70
Aero 12	4839577,41	2603091,65	4839779,10	2603181,30

Aero 13	4839377,76	2602207,94	4839579,45	2602297,59
Aero 14	4839281,41	2604122,77	4839483,10	2604212,42
Aero 15	4839327,27	2600708,85	4839528,96	2600798,49
Aero 16	4839197,52	2599424,19	4839399,21	2599513,84
Aero 17	4838904,79	2603625,26	4839106,48	2603714,92
Aero 18	4838765,76	2601683,80	4838967,45	2601773,45
Aero 19	4838554,25	2603280,50	4838755,94	2603370,15
Aero 20	4838337,80	2608608,96	4838539,49	2608698,63
Aero 21	4838422,43	2601234,32	4838624,12	2601323,97
Aero 22	4837049,09	2604552,57	4837250,78	2604642,22
Aero 23	4837250,83	2605455,66	4837452,52	2605545,32
Aero 24	4837195,23	2606860,71	4837396,91	2606950,37
Aero 25	4838216,45	2603382,02	4838418,14	2603471,67
Aero 26	4838104,60	2607832,76	4838306,29	2607922,43
Aero 27	4837735,27	2607757,83	4837936,96	2607847,49
Aero 28	4837721,17	2605053,86	4837922,86	2605143,51
Aero 29	4837589,59	2608989,99	4837791,28	2609079,65
Aero 30	4837069,96	2603413,26	4837271,65	2603502,91

Table 02: Georeferencing for wind turbines

Figure 08: Location of Cañadón León Transformer Substation (blue polygon).

Vertex	Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
	x	y	x	y
1	4839718,05	2604594,34	4839919,74	2604683,99
2	4839606,04	2604659,26	4839807,73	2604748,92
3	4839554,41	2604590,44	4839756,10	2604680,09
4	4839664,60	2604523,77	4839866,29	2604613,43

Table 03: Location of Cañadón León Transformer Substation

Figure 09: Location of 132 kV Line (blue line)

Point	Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
	x	y	x	y
LAT PE CL 01	4839718,42	2604573,05	4839920,11	2604662,7
LAT PE CL 02	4839829,84	2603141,54	4840031,53	2603231,19
LAT PE CL 03	4840040,34	2601693,56	4840242,03	2601783,21
LAT PE CL 04	4840521,32	2601006,08	4840521,32	2601006,08
LAT PE CL 05	4840697,76	2600411,80	4840899,45	2600501,44
LAT PE CL 06	4840814,74	2600342,82	4841016,43	2600432,46
Conex. SADI	4840814,74	2600342,82	4841016,43	2600432,46

Table 04: Reference points for 132 kV Line. Conex. SADI = Connection to Argentine Electrical Interconnection System (SADI)

3.5 INTENDED ACTIVITY

The Cañadón León Wind Farm global project includes the installation of a wind farm with 100 MW installed power plus the infrastructure required for its operation and maintenance.

3.5.1 WIND TURBINES

Model V112 wind turbines will be used. Their specifications are as follows (See Appendix 01):

- Rated power of each wind turbine: 3.3 MW.
- Height of axis 84m.
- Diameter of swept area: 112 m.
- Each one has 3 aerodynamically designed blades approximately 55 m long.

3.5.2 CONSTRUCTION WORK

Includes construction of Cañadón León Substation, with Control Room, maintenance room, equipment entry yard and parking lot.

It also includes electrical wiring (medium voltage lines) between wind turbines and Cañadón León Transformer Substation. This will be an overhead line.

3.5.3. MEDIUM VOLTAGE LINE (33KV)

The power produced by the wind turbines will be transmitted through a medium voltage line (MVL) at 33 KV. All lines will concur at the wind farm transformer substation, called SET Cañadón León, where voltage will be raised to 132 KV for transmission and connection to the Argentine Electrical Interconnection System (SADI) at the Santa Cruz Norte – Caleta Olivia (SCN-CO) line, which is managed by third parties and outside the scope of this project.

3.5.4. TRANSFORMER STATION

A transformer substation, called SET Cañadón León, will be built within the wind farm. It will raise voltage to 132 KV for transmission and connection to the Argentine Electrical Interconnection System (SADI) at the Santa Cruz Norte – Caleta Olivia (SCN-CO) line, which is managed by third parties and outside the scope of this project.

3.5.5 HIGH VOLTAGE LINE (132 KV)

The 132 KV high voltage line projected between the Wind Farm and the connection to the 132 KV line between Santa Cruz Norte and Caleta Olivia transformer substations will be approximately 4.5 km long.

4 CONSTRUCTION PHASE

Wind Farm Construction will require the preparation of several areas related to site permanent infrastructure. The following will be considered **permanent infrastructure**:

- Wind turbines
- Foundations (bases)
- Internal access roads
- Crane pads
- Medium voltage line (overhead)
- High voltage line (overhead)
- Electrical transformer station
- Auxiliary building
- Offices, restrooms and storage places
- Temporary storage area for Hazardous Waste.

The construction phase will be conducted according to established procedures, which include the following phases:

4.1 SITE PREPARATION FOR TEMPORARY FACILITIES AND SUPPLY AND SERVICE PROVISION

Wind turbine components will be delivered by the manufacturer to the site, to be coordinated. Prior to transferring wind turbine components, authorization for circulation will be secured from Santa Cruz Province Highway Department.

Prior to beginning construction work, materials required for the following will be taken to the site: temporary sheds and chemical toilets, tools and equipment, and the ground will be prepared for the crane for assembling wind turbines. A mobile concrete plant will be used.

For construction tasks, a shed and chemical toilet will be provided for each contractor.

500 kVA diesel-powered generating sets will also be placed onsite. Diesel fuel will be stored in containers authorized and apt for such purpose.

In accordance with regulations, any water required for construction will be provided from authorized external sources.

In accordance with construction requirements, vehicles, machinery and additional equipment for construction work will circulate and operate during the Construction Phase. These include, among others:

- Concrete mixers
- Crawler cranes and fixed cranes (main and auxiliary)
- Telehandlers
- Pile drivers
- Crawler loaders and wheel loaders
- Concrete pumping systems
- Graders and/or scrapers
- Transportation vehicles (dump trucks, buses, etc.)
- Compaction equipment.

The construction materials to be transported to the Project site include the following:

- Aggregates or similar materials for construction of roads and storage areas
- Concrete and/or plastic tubes (for drains and/or piping)
- Special materials (e.g. geogrid)
- Concrete or cement and aggregates
- Steel for frames
- Electric cables
- Telecommunication cables (fiberoptic)
- Wood for formwork and other construction requirements
- Electrical equipment

All materials will be transported in appropriate vehicles.

There will be a temporary storage area for materials and supplies.

For aggregates, the Company will hire regional providers to quarry aggregates that are duly authorized by the relevant provincial authority.

4.2 CONSTRUCTION TASKS

Site preparation: preparing the site for project construction, including clearing vegetation, leveling and earthworks. Vegetation will only be cleared around the bases of the wind turbines and for crane pads and new sections of internal roads required to access each wind turbine. Any material removed will be temporarily stored, and the topsoil used to cover sites that have been used temporarily or where needed.

The use of existing roads will be optimized in order to minimize the number of new roads needed.

Wind turbine base preparation: includes excavation, formwork and subsequently pouring concrete for the base of each wind turbine. A mobile concrete plant will be installed on site. Aggregates will be obtained from authorized quarries.

Construction work and BOP (Balance of Plant): construction of Cañadón León Electrical Substation, including control room, maintenance room, equipment yard and parking lot.

It also includes electrical wiring (medium voltage lines) from the wind turbines to Cañadón León Transformer Substation. This will be an overhead line.

Wind turbine transportation and mounting.

Transportation of wind turbines from the port to their sites: transportation of wind turbine components (blades, gondola, turbine and tower). The wind turbines will arrive at Caleta Olivia port or Puerto Deseado port, from which they will be taken to the project site by truck. It is estimated that 10 trucks will be needed per wind turbine.

Transportation logistics will be coordinated with the relevant authorities (Provincial Highway Department and Civil Defense) in order to minimize any impacts on local traffic. Moreover, the community will be informed of the dates and times when wind turbines will be moved.

Wind turbine and crane transportation will be performed in accordance with highway safety legislation, YPF standards, and the Plan coordinated with the Highway Department and Civil Defense.

Mounting wind turbines on site: Each wind turbine will be mounted on its previously constructed base, using a special crane.

33 KV MEDIUM-VOLTAGE (MV) OVERHEAD LINE

The wind turbines will be interconnected by 33 kV medium voltage (MV) overhead lines.

ELECTRICAL COLLECTOR SYSTEM

The aim of the electrical collector system is to interconnect the wind generators for power transmission (10-33 kV medium voltage lines), to ground the system (grounding wire connected to a buried ground rod), to control and to communicate (fiberoptic cable). This system will be installed underground, as described previously. All power generated will be sent to the transformer substation through independent 33 kV circuits connected by means of medium-voltage shielded cells with arc protection connected to the medium-voltage bar of the transformer substation.

TRANSFORMER SUBSTATION (132/33/13.2 KV)

The Cañadón León Electrical Substation will be built, including control room, maintenance room, equipment entry yard and parking lot. Also includes the overhead medium voltage lines from the wind turbines to Cañadón León Transformer Substation.

132 KV HIGH VOLTAGE (HV) OVERHEAD LINE

An overhead line approximately **4.5 km** long will be installed for the **new connection HVL**.

CONNECTION POINT

As mentioned above, it will be connected to the 132 kV High Voltage Line between Santa Cruz Norte and Caleta Olivia Transformer Stations at **connection point 46°34'40.95"S; 67°41'23.38"W.**

4.3 FINISHING CONSTRUCTION WORK AND PRE-COMMISSIONING

Connection and grounding installation: includes overhead wiring from each wind turbine to Cañadón León Transformer Substation, and installation of grounding at each wind turbine and in the Cañadón León Transformer Substation buildings.

Identification of wind turbines and placement of workplace safety signs: Includes placing safety signs, and shall be shown on the as-built layout.

Pre-commissioning and commissioning: Include tests to be run in coordination with wind turbine manufacturer prior to commissioning Cañadón León Wind Farm.

Removing temporary installations and cleaning the area: Includes removal of sheds, chemical toilets, equipment and tools used during the construction phase.

Filling, leveling and scarifying sites temporarily intervened during construction work.

The actions listed above do not necessarily have a fixed order. Many of these tasks can be completed partly or totally in parallel, since the Projects is configured with different subsectors and is not a serial construction.

4.4 CONSTRUCTION SCHEDULE

See **Appendix 02 – Construction Schedule**

4.5 RAW MATERIALS, SUPPLIES AND PRODUCTS

The following materials and supplies will be used in Wind Farm construction:

Material / Supply	Quantity (m^3/month)
Aggregates	600
Fine gravel from authorized quarries for pedestrian walkways. Maximum grain size 32 mm.	350
H-30 type concrete for wind turbine foundations.	200

Table 05. Materials / Supplies

In addition, the following supplies are estimated for wind turbine bases:

Material / Supply	Quantity (total project)
Structural concrete (H-45 / H-30)	12,180 m^3
Various concretes (H-20 or less)	900 m^3
Iron rebar metric grade 420	1781 tn

Table 06. Materials / Supplies

All materials will be transported in duly authorized vehicles in accordance with the legislation in force. The number of journeys that the vehicles will make to deliver the aforementioned materials / supplies has not yet been determined, since to date, the providers of these supplies have not yet been selected.

4.5.1 FUELS AND LUBRICANTS

Fuels and lubricants will not be stored in the area of the temporary installations. It will be purchased at local service stations.

Consumption of diesel fuel per construction stage	Liters
Wind turbine transfer and assembly	169,500
Construction work / BOP	783,000
Cañadón León Transformer Substation	140,000

Table 07: Fuel used during construction phase

4.5.2 WATER

Water will be provided in bottles or dispensers from the closest town **for consumption by personnel and food preparation.**

Construction	Consumption
Water consumed per worker per day (liters)	2
Water consumed per worker per day (minimum) (liters)	1
Water consumed per worker per day (maximum) (liters)	3
Concrete mixing (if a concrete plant is used) (m^3)	6.7
Water for cleaning equipment (m^3)	0.5

Others (m^3)	-

Table 08. Water consumption

4.5.3 ELECTRICITY

Electricity will be provided by a 500 kVA diesel generator.

4.6 SOLID WASTE, EFFLUENTS AND EMISSIONS

The company will have a Program in place for waste management for all project phases.

Waste generation is circumscribed to solid or liquid waste remaining from some process during the construction phase and maintenance waste during the operational phase.

The following waste is expected during the construction phase:

- Waste similar to household waste: waste not derived from industrial processes. Office waste, cleared vegetation and debris, food leftovers, plastics, wood, cardboard, paper.
- Construction and demolition waste (inert): concrete mixtures, wood, packing materials, among others.
- Hazardous waste: batteries, paints, oils, filters, gloves, rags with hydrocarbons, barrels, contaminated empty containers, contaminated earth, fluorescent tubes and aerosols, among others.

Contractor companies shall be responsible for proper management of their waste. YPF EE will audit that management and require relevant documentation.

Construction waste will be stored and disposed of as follows:

Waste type	Temporary storage	Final disposal
Similar to urban.	Standard containers	Municipal waste disposal facility
Inert construction waste (rubble, wood, etc.)	Construction containers, checked daily to ensure they have sufficient capacity	Municipal rubble disposal facility
Hazardous waste	Marked containers with lids and spill containment trays	Final disposal as hazardous waste by authorized treatment company

Table 09. Construction waste

Chemical toilets will be used during the construction phase. The effluent will be stored and removed periodically by a duly authorized septic truck for treatment.

4.6.1 WASTE FROM EXCAVATIONS

Earth from excavations will be loaded and transported by the Contractor to the place designated by YPF EE.

No earth from small excavations will be accumulated in the construction zone, and any such material shall be placed in appropriate containers provided by Contractor and distributed around the site appropriately.

If any environmental situations / liabilities are detected, action shall be taken as set forth in Procedure "10073-PR-370500-000A – Identification, Classification and Ranking of Environmental Situations" (see Appendix 04).

5 OPERATION AND MAINTENANCE PHASE

5.1 PERSONNEL AND OUTLINE OF OPERATIONS

Wind Farm operation and maintenance is expected to require about 10 people.

5.1.1. HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT PLAN

Prior to the first energization and Wind Farm startup, the **Health, Safety and Environment Management Plan** shall come into force.

5.1.2 PLAN FOR WIND FARM OPERATION AND MAINTENANCE

Attached to this study is the **Operation and Maintenance Plan**, which shall be executed by the team in charge of this Phase. The Plan will enable safe, reliable operation of the Wind Farm. This Plan will be specific and in accordance with the regulatory agency, equipment providers and industry requirements as of the time the Project is implemented.

5.1.3 OPERATIONAL TASKS

Wind Farm will be operated permanently through the control room by monitoring in a SCADA ("Supervisory Control and Data Acquisition") system linked to each wind turbine and to the Cañadón León Transformer Substation.

Forecasts of wind speed and direction will be available to coordinate operation. It should be highlighted that wind generators will be set for a given operational range of wind speed with a cut-in wind speed at which operation begins and a cut-out wind speed above which the wind turbine goes out of service.

5.1.4 MAINTENANCE TASKS

See Section **WIND FARM OPERATION AND MAINTENANCE PLAN.**

5.2 WIND POWER GENERATION PROCESS

See Section **ACTIVITIES TO BE PERFORMED.**

5.3 SOLID AND SEMISOLID WASTE

The following waste is expected during the operations phase:

- Waste similar to household waste: waste from offices and dining room.
- Inert waste: scrap metal, paper and cardboard, wood, plastics, remains of packaging materials, uncontaminated metal remains or parts.
- Hazardous waste: used oils, contaminated filters, contaminated absorbents, contaminated empty containers, batteries, coolants, greases, contaminated earth, contaminated rags.

YPF EE will ensure at all times that the storage, transportation and final disposition of waste meets legal requirements throughout project life cycle.

Waste from the operational phase will be stored and disposed of as follows:

Waste type		Temporary storage	Final disposal
Similar to household waste	Organic	Compost facility (see details in ***Appendix III)*** or marked container located in offices.	Compost facility (see details in ***Appendix III)*** or Municipal waste disposal facility
	Paper, carboard, sacks, packaging, bottles, ribbons, strings	Marked container located in offices	Municipal waste disposal facility
Inert waste	Plastic, wood, carboard, remains of tool packaging, uncontaminated barrels and leather gloves, rubble, glass, etc.	Marked container located in Temporary Storage Area	Municipal waste disposal facility
Hazardous waste	Used lubricant oil	Barrels with spill containment trays to be located in the Temporary Storage Area	Final disposal as hazardous waste by authorized treatment company
	Used hydraulic oil	Barrels with spill containment trays to be located in the Temporary Storage Area	Final disposal as hazardous waste by authorized treatment company
	Oily rags	Marked container located in the Temporary Storage Area	Final disposal as hazardous waste by authorized treatment company
	Remains of paint / empty paint cans / rags, paint brushes, gloves with paint, etc.	Marked container located in the Temporary Storage Area	
	Used filters	Marked container located in the Temporary Storage Area	
	Used batteries	Marked container located in the Temporary Storage Area	Final disposal as hazardous waste. Resolution 544/94 SRNyAH.
	Broken / spent lightbulb	Marked container located in the Temporary Storage Area	Final disposal as hazardous waste by authorized treatment company

Table 10: Waste classification

5.1 LOW-FREQUENCY ELECTRIC AND MAGNETIC FIELDS

The aim of this section is to verify compliance with Resolution SE No. 77/98 by means of literature about facilities with similar characteristics.

As described above, the line to be constructed between the Cañadón León Substation and the 132 kV Santa Cruz Norte – Caleta Olivia HVL will have the following characteristics:

- Single 132 kV circuit, one conductor per phase
- IMALUM aluminum-steel conductor 185/30mm^2
- Length 4.5 km
- 24 single-mode wire OPGW guard-wire
- Average ground resistance at 1 meter depth 60 Ωm
- Reinforced concrete towers
- Estimated rated current 486 Ampere (cos Φ = 0.9).

According to the paper *"Aspectos Ambientales de los Campos Eléctricos y Magnéticos en Líneas de Transmisión"* (J. Vernieri, P. Arnera, M. Barbieri. IITREE 2002), one of the following configurations is usually used for a 132-kV single circuit transmission line:

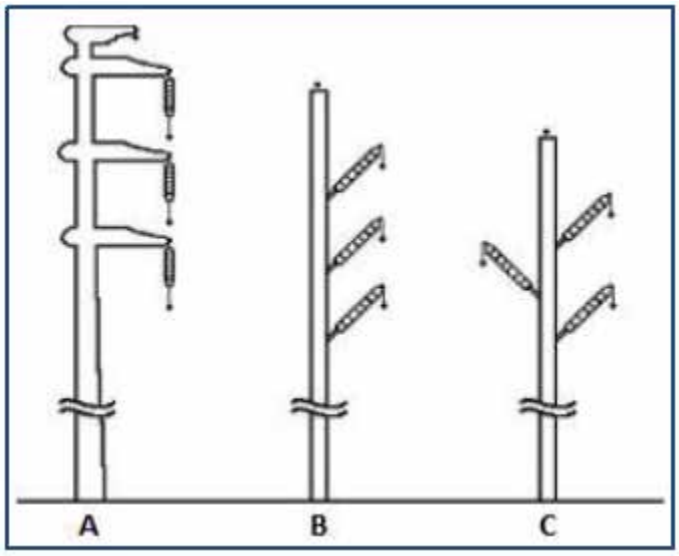


Figure 10: 132 kV single circuit transmission line

(A: tower with projecting support, vertical single-plane arrangement; B: "Line Post" vertical single-plane arrangement, compact design; C: "Line Post" triangulated arrangement).

Electric and magnetic field values are calculated for each of these arrangements.

The following illustration shows electric field (E) in kilovolts per meter (kV/m) associated to each of the three arrangements.

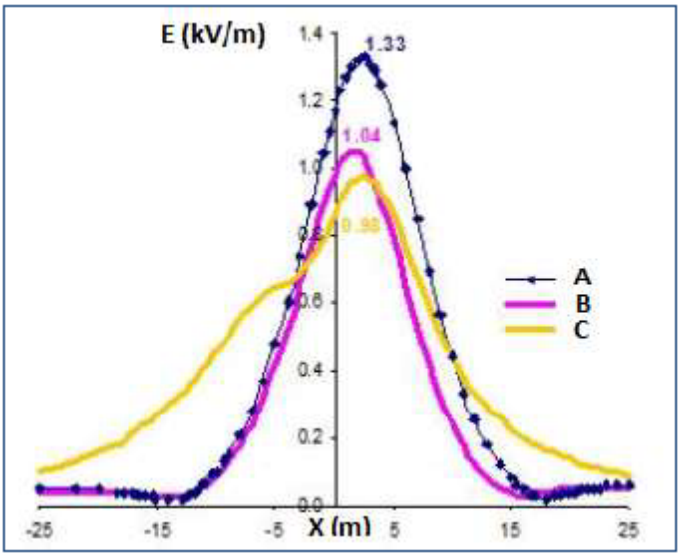


Figure 11. Transversal profile of electric field in kV/m. U = 132 kV.

It can be seen that in no case does it exceed the upper limit of the electric field for rated voltage of the circuit, which Resolution 77/98 of the Secretariat of Energy establishes as 3 kilovolts per meter (kV/m).

The following illustration shows magnetic field (B) expressed in microtesla (µT) associated to each of the arrangements in Figure 10 for a 630-ampere (A) current.

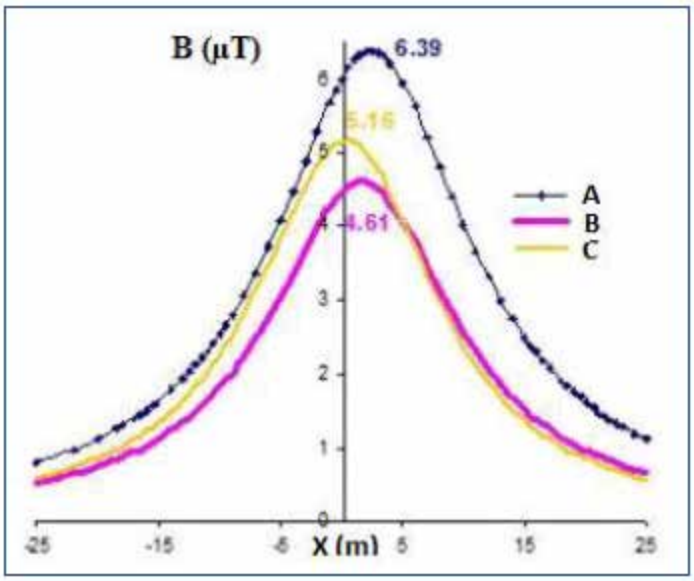


Figure 12: Transversal profile of magnetic field in microtesla (µT)

It can be seen that in no case does it exceed the upper limit of the magnetic induction field for lines in conditions of maximum current established by Resolution 77/98 of the Secretariat of Energy as 250 mG (equivalent to 25 µT).

It should be noted that rated current projected for the 132 kV HVL is significantly lower than the value used in the calculations in the above study (630 A), which is a favorable condition in terms of magnetic field.

It is therefore concluded that by defining the constructional characteristics of the 132 kV HVL that will connect Cañadón León Substation (to be built within Cañadón León Wind Farm) to the Santa Cruz Norte – Caleta Olivia 132 kV HVL using one of the options described in the study *Aspectos Ambientales de los Campos Eléctricos y Magnéticos en Líneas de Transmisión"*, the "Cañadón León" Wind Farm Project will meet the limits established in Secretariat of Energy Resolution 77/98.

6 CLOSURE PHASE

As mentioned above, Project life cycle will be 20 years. After that time, relevant authorities will be notified that the Closure Phase will begin. A **Plan for facility closure** will be submitted. The main activities to be performed are specified below.

Construction and/or installation	Closure activities
Wind turbines and external power lines	Posting signage appropriate to closure. Dismantling wind turbines. Removing electrical cables and towers. Removing foundations
Underground channeling	Removal of electrical and fiberoptic cables
Transformer station	Dismantling transformer station and associated facilities
Perimeter fencing and signs	Removal
Intervened areas	Restoring affected land Re-vegetation with native species

Table 11: Closure activities

6.1 HIRING LABOR

Labor required for dismantling buildings and equipment, as well as any necessary installations, will be estimated when the time comes to plan the Closure Phase in greater detail.

6.2 DISMANTLING/REMOVING WIND TURBINES

All buildings and installations that can feasibly be dismounted will be dismantled.

All equipment, furniture and devices used during Project operation will be removed.

6.3 REMOVING BASES AND FOUNDATIONS

Concrete structures will be demolished and the rubble will be removed from Project Area so that it does not cause visual impact due to accumulation.

6.4 RESTORATION OF LANDFORMS IN PROJECT SITE

Once project service life has ended, and unless surface rights holders specifically request the contrary, landforms will be restored to their original condition by filling any areas that so require with materials extracted from quarries near the site, with soil characteristics similar to those in the area affected by the project. The material to be used will be provided by a company authorized by the Sub-Secretariat of Mining to extract aggregates.

6.5 CLOSURE OF FACILITIES

Any materials that cannot be sold will be taken to the places specified by competent environmental authorities.

6.6 SOLID AND SEMI-SOLID WASTE, EFFLUENTS AND EMISSIONS

If the closure phase involves construction work, the same provisions as in the construction phase will be applicable.

- Waste similar to household waste: waste not derived from industrial processes. Office waste, cleared vegetation and debris, food leftovers, plastics, wood, cardboard, paper.
- Demolition waste (inert): concrete mixtures, wood, packing materials, among others.
- Hazardous waste: batteries, paints, oils, filters, gloves, rags with hydrocarbons, barrels, contaminated empty containers, contaminated earth, fluorescent tubes and aerosols, among others.

Contractor companies shall be responsible for proper management of their waste. YPF EE will audit that management and require relevant documentation.

Construction waste will be stored and disposed of as follows:

Waste type	Temporary storage	Final disposal
Similar to urban.	Standard containers	Municipal waste disposal facility
Inert waste (rubble, wood, etc.)	Construction containers, checked daily to ensure they have sufficient capacity	Municipal rubble disposal facility
Hazardous waste	Marked containers with lids and spill containment trays	Final disposal as hazardous waste by authorized treatment company

Table 12. Waste generated during closure phase

Chemical toilets will be used during the closure phase. The effluent will be stored and removed periodically by a duly authorized septic truck for treatment.

7. ENVIRONMENTAL AND SOCIAL SENSITIVITY – BASELINE REPORT

7.1 PHYSICAL OR INERT ENVIRONMENT

7.1.1 CLIMATE

Climate in the study area was characterized using data from Comodoro Rivadavia Airport Meteorological Station, which is the nearest.

TYPE OF CLIMATE

Predominant climate in the Project Area is cold-temperate, arid to semi-arid plateau, which is the most characteristic in the region. Summers are cool and winters are cold to very cold. The Patagonian climate is dominated by westerly winds accompanied by air masses originating from the Pacific Ocean.

The Project area is classified within the zones with Arid Cold Patagonian Climate. Temperatures in the area range from average 3 °C in winter to average 26 °C in summer.

The influence of this type of climate ranges from Chubut Province to Puerto Coig, approximately, on a strip along the coast of San Jorge Gulf.

Map 02: Climates in Santa Cruz Province.

Source : mapoteca.edu.ar

MAPA DE CLIMAS DE LA PROVINCIA DE SANTA CRUZ	MAP OF CLIMATES IN SANTA CRUZ PROVINCE
Área del Proyecto	Project Area
REFERENCIAS	REFERENCES
Isotermas medias anuales	Mean annual isotherms
Isohietas anuales	Annual isohyets
TIPOS Y VARIEDADES DE CLIMAS	CLIMATE TYPES AND VARIETIES
Frio nival	Cold snowy
Frío húmedo	Cold damp
Frío húmedo austral	Austral cold damp
Frío árido de la Patagonia	Cold arid Patagonian

TEMPERATURE

Caleta Olivia has a succession of seasons. In winter, mean temperature is 7°C and minimum 10°C below zero. In summer, mean temperature is 19°C and maximum 30°C. Annual mean temperature is 10°C. The study area has wide diurnal temperature range and low relative humidity.

The following figure shows statistics for maximum, mean and minimum temperatures for 1961 – 1990 in Comodoro Rivadavia, the closest city to the Project Area with a national meteorological station.

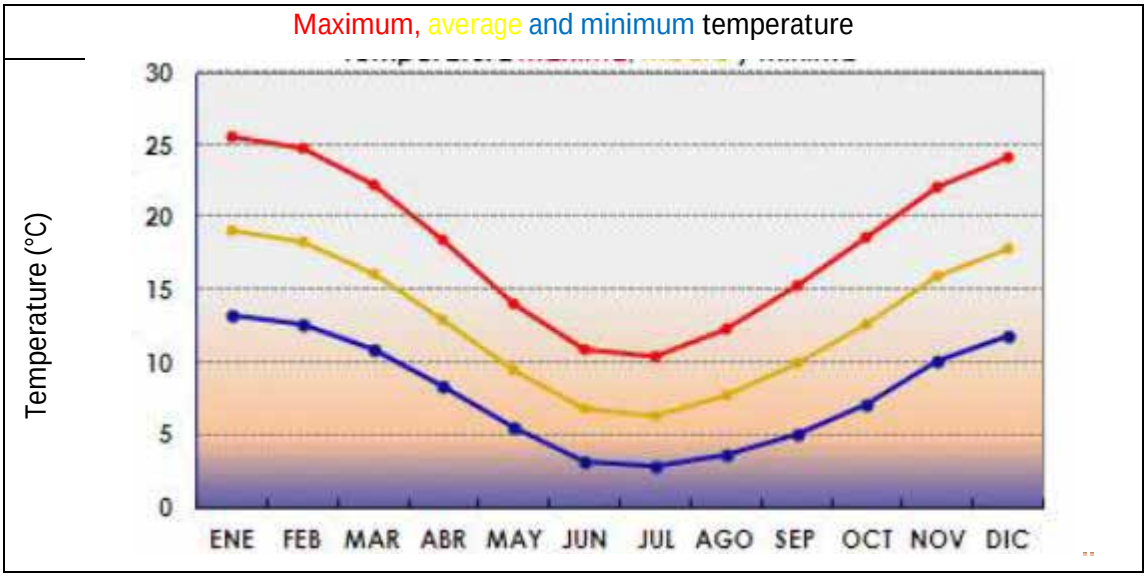


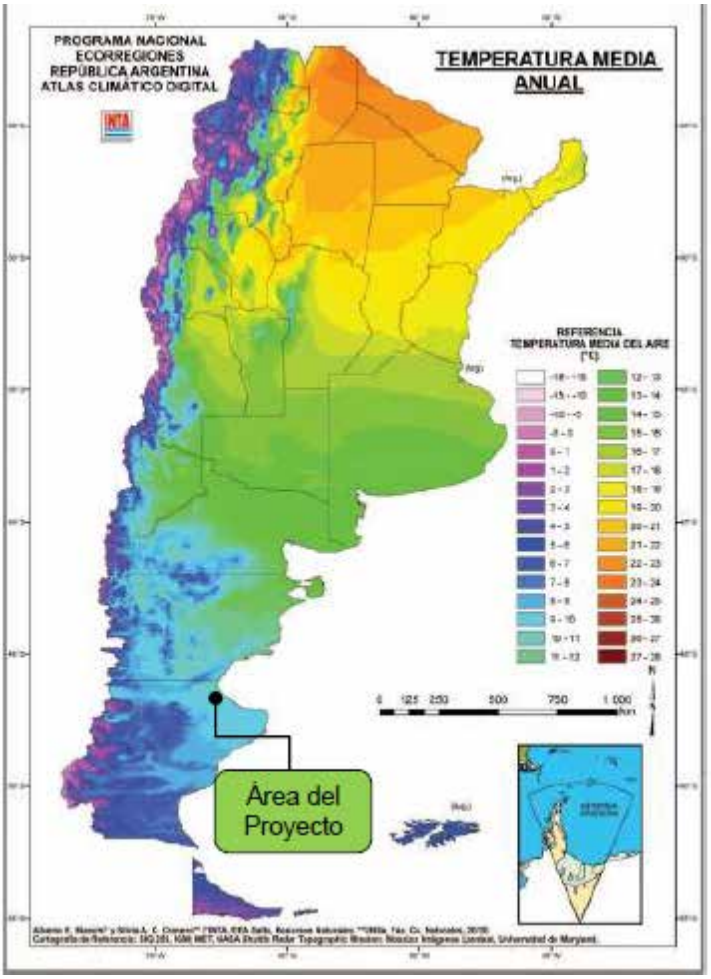
Figure 01. Maximum, average and minimum temperatures for 1961-1990.

Source: National Meteorological Service

ENE	JAN
FEB	FEB

MAR	MAR
ABR	APR
MAY	MAY
JUN	JUN
JUL	JUL
AGO	AUG
SEP	SEP
OCT	OCT
NOV	NOV
DIC	DEC

Mean maximum temperature for the years mentioned was 26°C in January. Average temperature recorded a maximum of 19°C approximately in January and a minimum of 7°C in July. Finally, for minimum temperatures, the maximum was recorded at 13°C and the minimum at 3°C for the same months.



Map 03: Mean annual temperatures in Argentina

Source: INTA

PROGRAMA NACIONAL ECORREGIONES REPÚBLICA ARGENTINA ATLAS CLIMÁTICO DIGITAL	NATIONAL ECO-REGIONS PROGRAM REPUBLIC OF ARGENTINA DIGITAL CLIMATE ATLAS
TEMPERATURA MEDIA ANUAL	MEAN ANNUAL TEMPERATURE
REFERENCIA – TEMPERATURA MEDIA DEL AIRE	REFERENCE – MEAN AIR TEMPERATURE
Área del Proyecto	Project Area

PRECIPITATION

Precipitation in the Project Area ranges from 200 to 300 mm per year, as shown in Map 04. Mean annual precipitation is 215 mm in the Project Area. The month with least precipitation is October, while the month with most precipitation is May. The following figure shows precipitation statistics for 1961-1990 in Comodoro Rivadavia, the nearest city with a national meteorological station, as mentioned above.

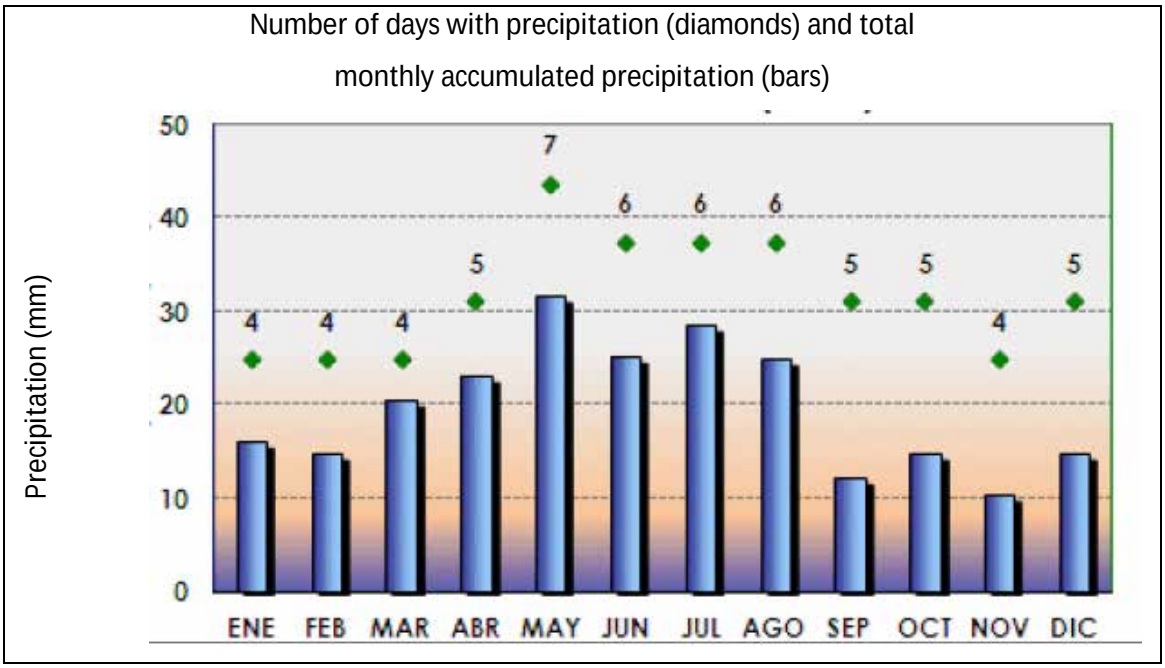


Figure 02. Days with precipitation and total monthly accumulated precipitation for 1961-1990.

Source: National Meteorological Service

ENE	JAN
FEB	FEB
MAR	MAR
ABR	APR
MAY	MAY
JUN	JUN
JUL	JUL
AGO	AUG
SEP	SEP
OCT	OCT
NOV	NOV
DIC	DEC

The figure shows that the months with greatest precipitation are May (with approximately 32 mm per month) followed by July (approximately 28 mm) and June (25 mm monthly accumulation). The months with lowest precipitation in the same period are November (10 mm) and September (approximately 12 mm accumulated per month).

HUMIDITY

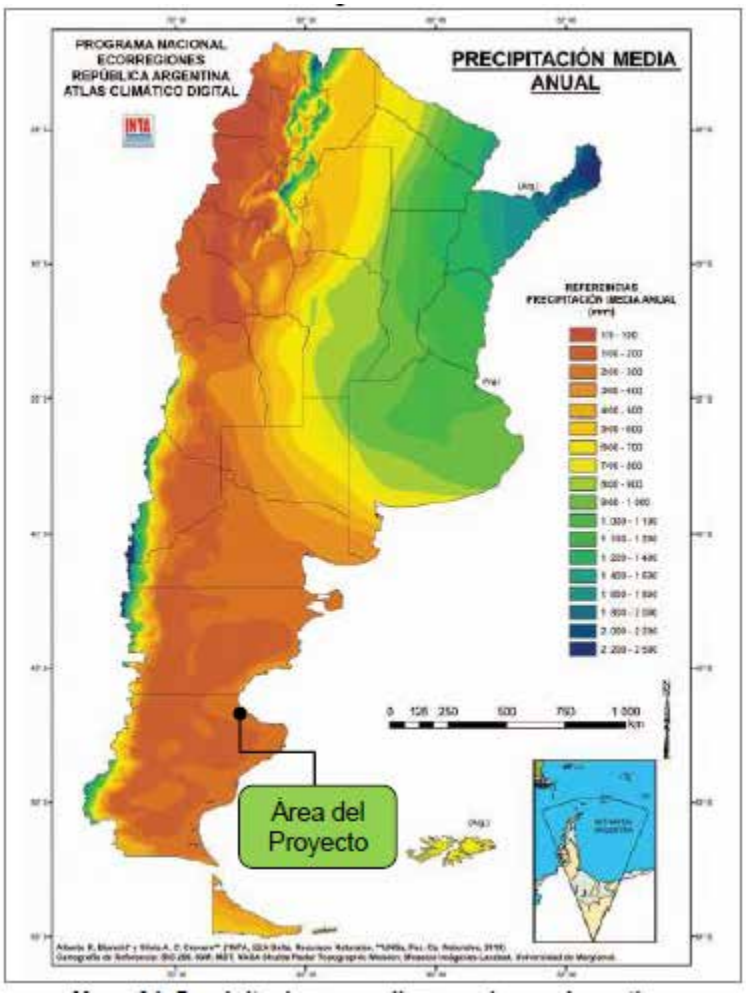
Average annual relative humidity is 49%, with minimum in January (39%) and maximum in June (62%). Vapor pressure ranges from 5.9 hPa in July to 9.8 hPa in February. Mean annual

cloud cover is 56%, with very little variation over the year. The sky is completely overcast 102 days a year and completely clear for only 57 days. The frequency of clear days is lower in summer and higher in winter. This analysis used the following data, recorded at Comodoro Rivadavia Airport Weather Station from 1971 to 2000 for relative humidity and vapor pressure, and from 1991 to 2000 for cloud cover.

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Relative humidity (%)	39	43	48	50	60	58	58	53	50	46	41	40	49
Vapor pressure (hPa)	9.4	9.8	9.5	8.1	7.4	5.9	5.9	6.0	6.7	7.4	8.0	8.9	7.8
Average cloud cover (%)	55	54	55	51	56	54	54	55	56	59	60	59	56
Overcast days	5.9	6.7	7.6	7.1	9.4	8.5	8.5	8.5	10.6	9.5	10.3	8.7	102
Clear days	2.8	4.5	4.5	6.4	5.4	5.4	5.4	5.4	5.0	3.7	3.5	3.2	57

Table 13. Relative humidity and vapor pressure for cloudiness.

Source: Comodoro Rivadavia Airport Meteorological Station



Map 04: Mean annual precipitations in Argentina

Source: INTA, 2010

PROGRAMA NACIONAL ECORREGIONES	NATIONAL ECO-REGIONS PROGRAM
REPÚBLICA ARGENTINA	REPUBLIC OF ARGENTINA
ATLAS CLIMÁTICO DIGITAL	DIGITAL CLIMATE ATLAS

PRECIPITACIÓN MEDIA ANUAL	MEAN ANNUAL PRECIPITATION
REFERENCIA – PRECIPITACIÓN MEDIA ANUAL (mm)	REFERENCE – MEAN ANNUAL PRECIPITATION (mm)
Área del Proyecto	Project Area

WIND

Wind intensity and persistence is the most outstanding climate feature throughout the Patagonian region. Mean annual velocity recorded at Comodoro Rivadavia Airport Meteorological Station is 25 km/h and the most frequent direction is West, with 52% of annual frequency. The graph in Figure 03 shows annual wind intensity and frequency of direction. Mean speed is nearly 30 km/h from November to January. This is typical of West winds at these latitudes, which are stronger in summer because the meridional gradient of atmospheric pressure increases. In addition to being the most frequent, West winds are the strongest, with mean annual speeds of 27 km/h and monthly means of 32 km/h in December and January. Maximum speeds recorded are also from the West and may be higher than 120 km/h at any time of year. The second most frequent direction is Southwest, with 14% and mean annual speed of 20 km/h, followed by Northwest with 9% and mean speed 18 km/h. The sum of all three directions from the Northwest-Southwest quadrant accounts for 75% of annual frequency.

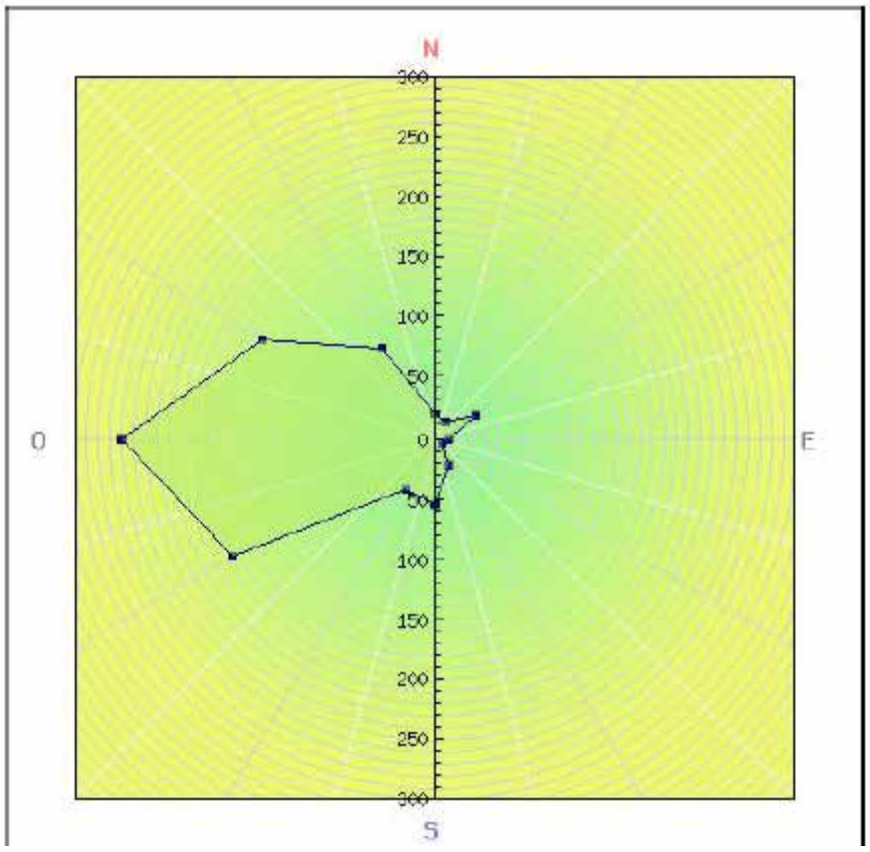


Figure 03. Wind direction.

Source: SIG Eólico

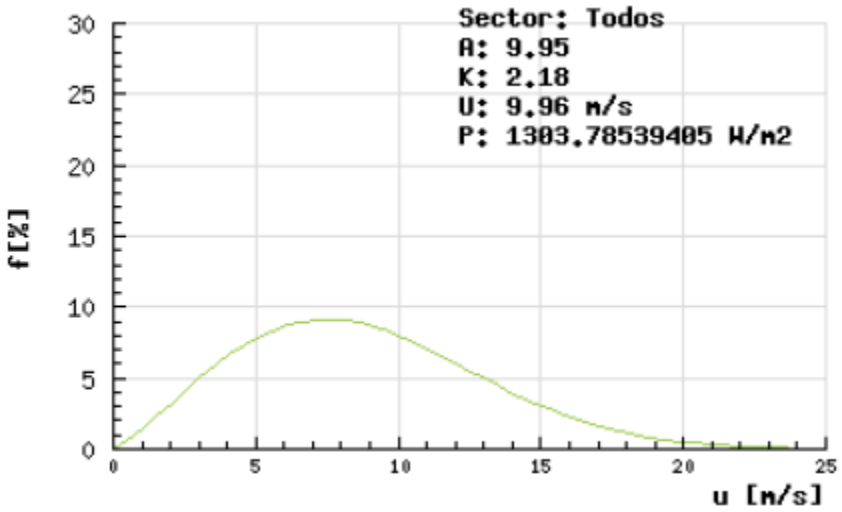


Figure 03. Speed frequencies.

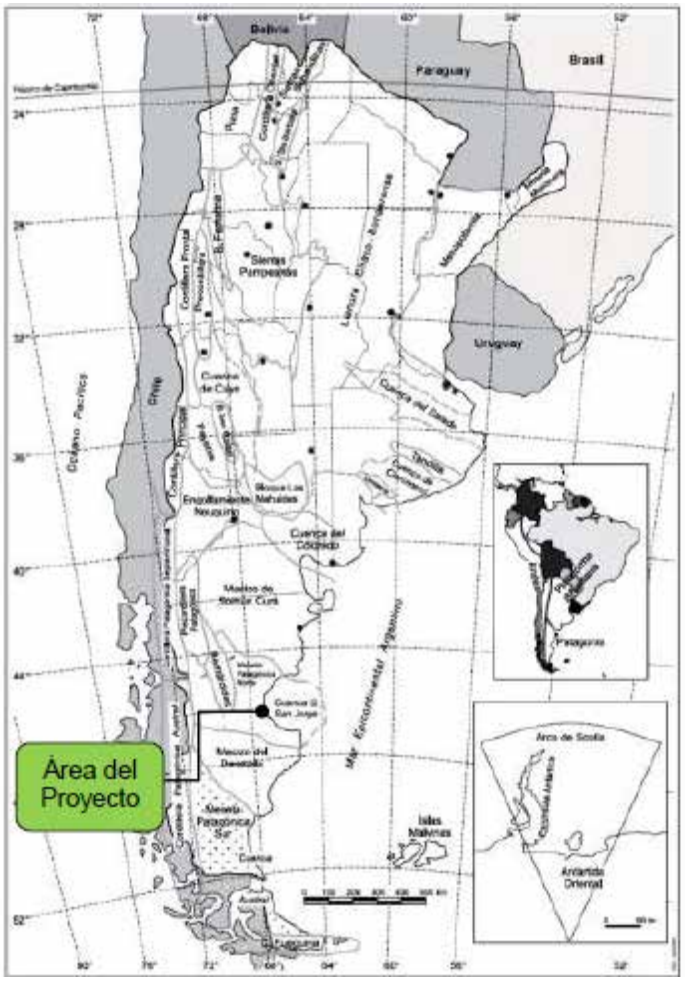
Source. SIG Eólico

Sector: Todos = Sector: All

7.1.2 *GEOLOGY*

The Argentine territory has been divided into various geological units (Victor A. Ramos, 1999) since the first geological reconnoitering and exploration conducted at the end of last century and beginning of the current century (Stelzner, 1873; Brackebusch, 1883; Stappenbeck, 1990; Bonarelli, 1921, among others). The current characterization was developed according to the contributions of the First and Second Symposiums on Argentine Regional Geology (Leanza, 1972a and Turner, 1979-80). The recognized geological provinces have first-order tectonic control in the latitudinal segmentation of the oceanic lithosphere under the Andes (Isacks et al., 1982). This segmentation, evidenced by the different inclinations of the oceanic slab subducted in the Wadati-Benioff zone[1], has enabled understanding of the processes that have led to the current distribution of units and reflects a more logical appreciation of its current morpho-structural expression (Jordan et al., 1983). The development of segments with active vulcanism, others without recent volcanic activity and different structural styles, as a result of this segmentation of the geometry of the subducted plate, endows each geological province with its own particular characteristics (Victor A. Ramos, 1999).

[1] Seismic zone at the edge of a plate along one side of an oceanic trench.



Map 05. Project Area according to Geological Provinces in the Argentine territory.

Source: Institute of Geology and Mineral resources.

Área del Proyecto = Project Area

The geology at the project site is included in the San Jorge Gulf basin. This is a basin developed east of the first foothills of the Patagonian Cordillera between 44° and 48° latitude south, and has undergone complex geological history. Its basement was structured by a major compressive deformation associated to the Neo-Paleozoic collision, followed by extensional periods in the Early Jurassic related to the opening of the Weddell Sea. In the Late Jurassic, an almost orthogonal extensional fracturing was superimposed, associated to the opening of the south Atlantic. During the Early Cretaceous, an extensional regime predominated, caused by subduction with extension, governed by the absolute movement of the South American plate. The beginning of compression in the Late Cretaceous controlled the subsidence of the tectonic load of the continental deposits of the Chubut Group in the foreland basin. This basin, with highly segmented basement and non-confined margins favored the existence of a distensive fault in the Late Cretaceous with orientation sub-parallel to the maximum primary compressive force. This system continued during the early Paleogene with conspicuous rotation of forces, culminating in the Oligocene with incipient primary extension associated to alkaline basaltic inter-plate vulcanism. This was associated with a decline in absolute

displacement of the South American plate. Basin structure culminated in the Neogene, producing the current Bernárdides fold and thrust belt structure.

7.1.3 GEOMORPHOLOGY

The Project area corresponds to a fluvial terraces surface. The Deseado River valley and terraces are included in this topography (See Appendix 06 – Maps). The course of the Deseado River develops over monotonous, horizontal relief of pampas or plateaus interrupted to the east by gullies and depressions. The valley itself has a series of terraced levels that correspond to its current activity, with large difference in level compared to the oldest terraced levels. The river runs intermittently on a meandering course. There are numerous wind deposits on its current flood plain.

The terraced plains correspond to 6 levels (Feruglio, 1949), with elevations ranging from 65 to 450 m above sea level. The dissection is noticeable near the current valley and the coast of San Jorge Gulf, where these terraced levels are isolated because they are crossed by numerous gullies that only carry water during runoff periods. Caleta Olivia city is located at 38 m above sea level and is surrounded by terraced levels and gullies.

Map 06. Geographic Regions of Santa Cruz Province.

Source: mapoteca.educ.ar

Área del Proyecto = Project Area

Figure 13. View towards the north of the Project Area.

Figure 14. View towards the east of the Project Area.

Figure 15. View towards the south of the Project Area.

Figure 16. View towards the west of the Project Area.

7.1.4 SOILS

STRATIGRAPHY

NEOCOMIAN: The Neocomian series is represented by two formal stratigraphic units, namely: Pozo Anticlinal Aguada Bandera Formation (Lesta *et al,* 1980.) and Pozo Cerro Guadal Formation (Ferello y Lesta, 1973). Originally, Lesta *et al.* (1980) included these formations together with the Pozo D-129 Formation into the Las Heras Group. Clavijo (1986), recognizes

two different sedimentary cycles with distinct lithological characteristics which, in turn, are separated by a regional erosional unconformity, therefore, he proposed the Pozo D-129 Formation be excluded from the Las Heras Group. This proposal has been accepted by most authors and it is agreed, in general, to include the Pozo D-129 Formation in the Chubut Group (i.e., Chelotti, 1997) or into the Chubutian (Figari *et al, 1997.;* 1999; Hechem, 1998).

Pozo Anticlinal Aguada Bandera Formation: The oldest unit, Pozo Anticlinal Aguada Bandera, consists mainly of fine grey sandstones, with tuffaceous matrix, interbedded with laminated black shales, siltstones and dark mudstones at its base. The mid-section is richer in black shales and dark mudstones while towards its top the granulometry increases, showing sands, conglomerates and mudstones (Barcat et al., 1989).

Pozo Cerro Guadal Formation: overlying the Pozo Anticlinal Aguada Bandera Formation (Ferello and Lesta, 1973). The contact between both units is unconformable.

CHUBUTIAN CYCLE: This cycle is composed of four formations, namely: Pozo D-129 (equivalent to Matasiete Formation in the western sector), "Mina El Carmen" (equivalent to Castillo Formation in the western sector), "Comodoro Rivadavia" (equivalent to Cañadón Seco Formation in the southern flank and to Bajo Barreal Formaiton in the western sector) and "Yacimiento El Trébol" (equivalent to Meseta Espinosa Formation in the southern flank and to Upper Bajo Barreal Formation in the western sector).

Pozo D-129 Formation: (Lesta, 1968) is the oldest unit of this cycle. As already mentioned, originally it was included in the Las Heras Group, but due to their stratigraphic relationship, it is now accepted to be included in the Chubutian cycle. The Pozo D-129 Formation is developed in the whole basin, with thickness that varies from more than 1.5 km in the center of the basin to a few hundred meters at marginal positions.

Mina del Carmen and Castillo Formations: defined by Lesta (1968) as a subsurface unit, is characterized in central sectors of the basin by pyroclasts, mainly greenish grey tuffs and shales, with scarce interbedded tuffaceous sandstones.

Comodoro Rivadavia, Cañadón Seco, and Bajo Barreal Formations: The Comodoro Rivadavia Formation is a subsurface unit described by Lesta (1968) in the northern flank of the basin. Its subsurface equivalent in the southern flank is the Cañadón Seco Formation (Lesta, 1968). The thickness of these units ranges from 200 to 300 m in marginal sectors and 1000 to 1200 m at distal positions (basin center).

Yacimiento El Trébol, Meseta Espinosa and Bajo Barreal Formations: The reactivation of subsidence and a basin expansion episode are observed during the late Cretaceous. From the formal point of view this event is represented by the formations Yacimiento El Trébol (northern flank) and Meseta Espinosa (southern flank; Lesta, 1968) and the upper member of Bajo Barreal Formation (western sector). These units are the final event of the sag basin, and consist of predominant pelitic deposits. These units are well represented in the basin, being between 100 - 200 m thick in the margin and 700 - 800 m in the distal sectors.

TERTIARY CYCLE: Formally, five units represent the Tertiary cycle: Salamanca, Río Chico, Sarmiento, Patagonia and Santa Cruz formations.

- ***Salamanca Formation:*** This unit represents the first Tertiary marine transgression from the Atlantic in the San Jorge Gulf Basin.

Río Chico Formation: Unit of continental origin defined by Feruglio, 1949. It is made up of tuffs, dust tuff, fine to medium sandstones and claystones. Its main outcroppings are in the

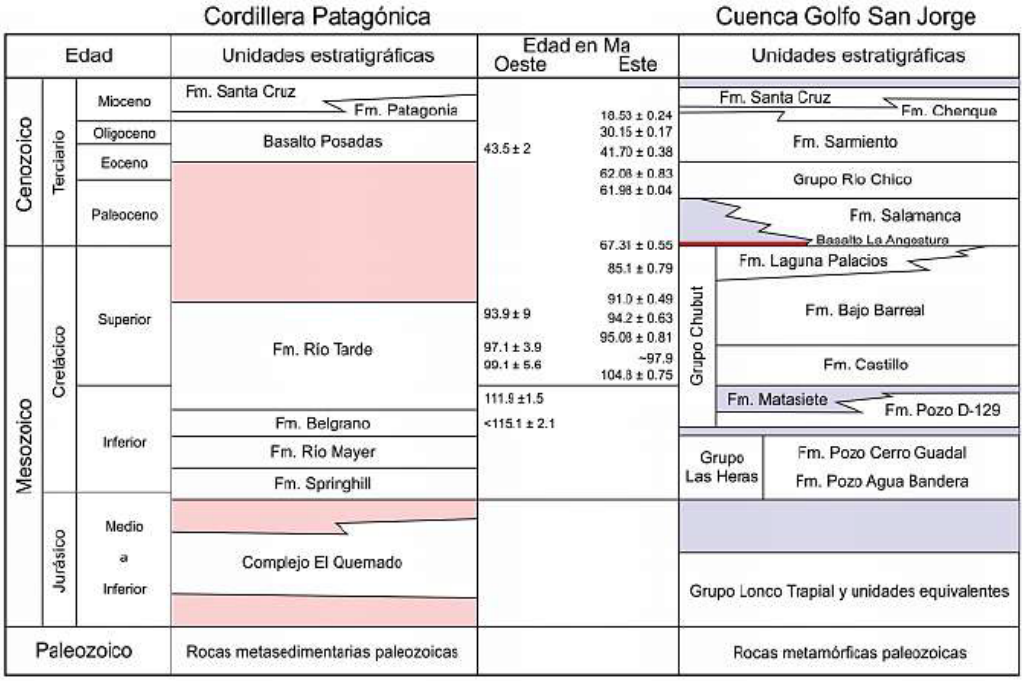
east, between the borders of the plateau and the piedmont levels, and in the northeast in the area of the Perales anticline. It has major facial variations both vertical and laterally. Greyish, brownish and reddish colors predominate. In this area, its base is transitional from the Salamanca Formation. The Sarmiento Formation overlays it.

Sarmiento Formation: Defined by Simpson, 1941. Consists of thick banks of whitish, yellowish, brownish and pink tuffaceous rocks, which are earthy and little consolidated. Interbedded with clayey tuffs, sandstone with tuff clasts and concretions of chalcedony. In general, it has badland relief. The depositional environment was interpreted in its lower member (Gran Barranca) as deposits of loess. The middle member (Puesto Almendra) was probably formed in association with edaphogenic relief affected by water currents. The upper member (Colhue Huapí) corresponds to loess deposits but associated to a colder, drier climate than the lower member. The age assigned by several authors is Lower Eocene to Lower Oligocene. It outcrops in the zone west of Pampa del Castillo. Its main outcrops are south of Lake Colhue Huapí.

Patagonia Formation: Made up of sequences of marine sedimentary rocks that form part of the great Atlantic transgression generically called Patagonian. Constituted of claystones, tuffs, fine to medium sandstones and conglomerates. It has well-consolidated banks of grey coquina towards the top of the unit, forming characteristic ledges. It sits on the unconformity over the Río Chico Formation, Sarmiento Formation or Eocene basalts. It is overlain in unconformity by Miocene basalts, fluvial terraces and aggradation deposits. The depositional environment corresponds to neritic and littoral conditions with interleaved pyroclastic volcanic episodes. Assigned age is Oligocene-Miocene. It outcrops along the edge of the Pampa del Castillo. These outcroppings sit on an erosional surface over the Sarmiento Formation deposits.

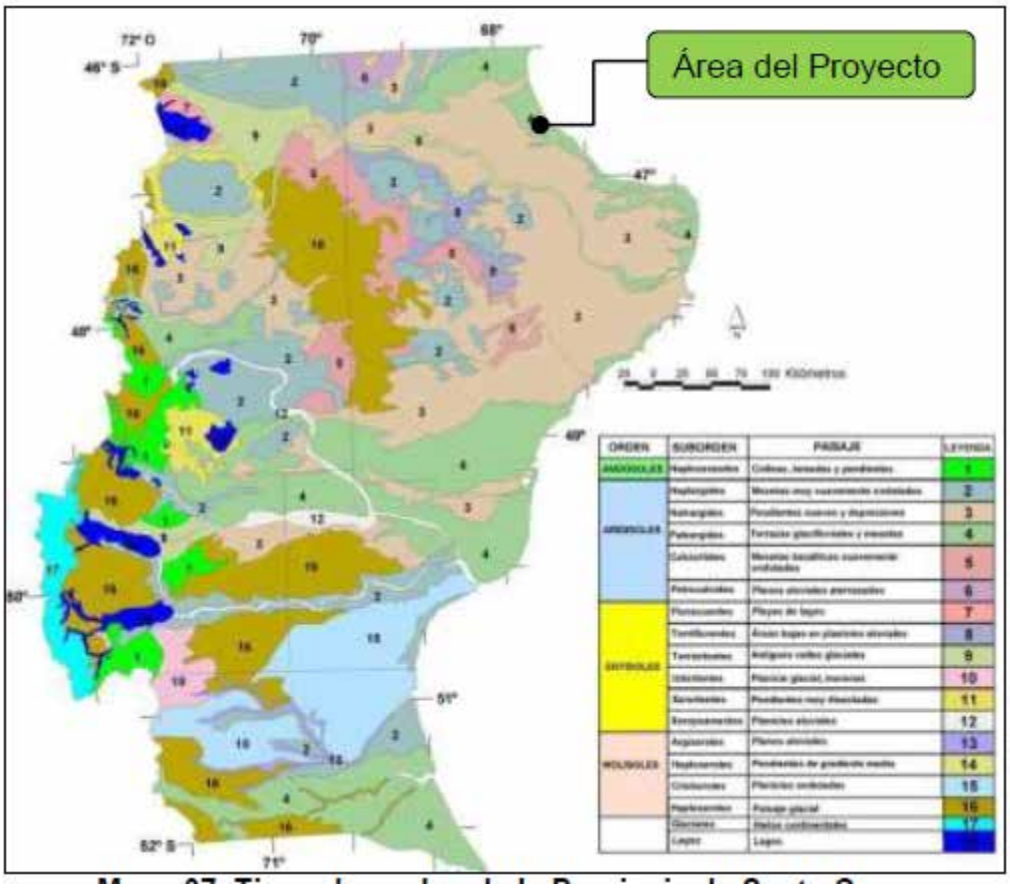
Santa Cruz Formation: Defined by Ameghino, 1906, it is constituted by predominant epiclastic sediments and subordinate pyroclastics. The accumulation of this continental sediment occurred after a progressive retreat of the Atlantic sea during the early Miocene. The environment is primarily aeolian and fluvial, with pyroclastic contribution and with development of paleosols. The passage from the Formation is transitional, in some sectors defined as net. The top is eroded by the "Rodadods Patagónicos" (Patagonian Pebbles). Regionally, it is in both the San Jorge Gulf basin and towards the South. It outcrops on both margins of Pampa del Castillo, but the outcroppings in the Southeast of Pampa del Castillo are larger and better exposed. On the basis of fossil content, its age is considered as Early Miocene, although other determinations assign it to the Middle Miocene.

Pampa del Castillo terraced level (or "Rodados Patagónicos" [Patagonian Pebbles]): Defined by Feruglio, 1950, it corresponds to the highest gravel level in the entire zone, and contains smaller steps with ridges of tens of meters. They occupy zones that were once structurally and topographically lower. The composition of the pebbles is porphyry volcanic rock from the Andes mountain zone in the northwest of the Deseado Massif (César et al., 1986). Paleo-runoff pattern was from southwest to northeast (Sciutto et al., 2000). They are interpreted as glaciofluvial deposits associated to glacial periods which primarily affected the Andes mountain range (César et al., 1986). Because of their stratigraphic position, they are assigned to the Pliocene.



Graph 01. Stratigraphic chart of San Jorge Gulf Basin.

Cordillera Patagónica	Patagonian Cordillera
Cuenca Golfo San Jorge	San Jorge Gulf Basin
Edad	Age
Unidades estratigráficas	Stratigraphic units
Edad en Ma	Age in My
Oeste	West
Este	East
Superior	Upper
Inferior	Lower
Medio	Middle
Rocas metasedimentarias paleozoicas	Paleozoic meta-sedimentary rocks
Rocas metamórficas paleozoicas	Paleozoic metamorphic rocks.



Map 07. Soil types in Santa Cruz Province.

Source: INTA

Área del Proyecto = Project Area [The key is illegible.]

Figure 17. View of the soil in the project area.

7.1.4.1 SOIL MONITORING

Soil in the project area was sampled in May 2017, to analyze the following:

- Total oil hydrocarbons
- BTEX
- Hg
- Cd
- Cr
- Pb

The analyses were performed by the lab Laboratorio Industrial Scudelaty y Asociados S.A. Appendix 12 provides the protocols and calibration certificates for the equipment used.

Equipment, method and detection limits

Study parameters were analyzed with an Agilent GC/MS MODEL 6890/5973 gas chromatography – mass spectrometry (GC-MS) system and an atomic absorption spectrophotometer (AA Varian ComboSystem serial number US95041333).

The following methodologies and detection limits for each parameter sampled were used:

Parameter	Method	Detection Limit
Total oil hydrocarbons	TNRCC 1005	2 mg/Kg

BTEX	EPA 8260	0.5 mg/Kg
Hg	EPA 7741A (SW 846 – CH 3.3)	0.01 mg/Kg
Cd	EPA 7130 (SW 846 - CH 3.3)	0.2 mg/Kg
Cr	EPA 7190 (SW 846 - CH 3.3)	2 mg/Kg
Pb	EPA 7420 (SW 846 - CH 3.3)	5 mg/Kg

Table 14. Methods and detection limits.

Sampling point

A trial pit approximately 1.5 m deep was made at the following coordinates:

Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
x	y	x	Y
4838574.44	2605718.97	4838776.12	2605808.62

Figure 18. Soil monitoring point.

Four horizons were distinguished, and one sample was taken per horizon, designated as follows:

Sample	Horizon
M5	A1
M6	A2
M7	C
M8	$2C_2$

Table 15. Samples per horizon.

To characterize the soil in the project environment on a regional scale, the map of Argentine Soils on a scale of 1:50,000, provided by INTA on the GEOINTA viewer was used.

According to the field observations, soil type was determined as Entisol. Entisols are little-developed soils which are poorly differentiated from their original materials. Their low level of pedogenetic development is due to the low precipitation and constant erosion or the low age or inertia of soil-forming process from parent materials.

The following figures show photographs of the study soil:

Figure 19. Soil characteristics.

Figure 20. Soil characteristics

Figure 21. Soil characteristics

The results obtained for soil were compared to the values set forth in Decree 831/93 of the National Ministries of Environment and Sustainable Development, Appendix II, Table 09 – GUIDELINE LEVELS FOR SOIL QUALITY– INDUSTRIAL USE.

Each parameter was compared to the values provided by this legislation.

M5-A1

Parameter	Value measured (mg/Kg)	Decree 831/93 Appendix II
Total oil hydrocarbons	ND	NE
BTEX	ND	10/30/50/50
Hg	ND	20
Cd	ND	20
Cr	ND	800
Pb	ND	1000

NE: No specific limit established for the time being.

Table 16. Results for sample M5-A1 and comparison to admissible levels.

Conclusion: comparison of the values measured with those provided in the legislation shows that the results obtained do not exceed admissible levels.

M6-A2

Parameter	Value measured (mg/Kg)	Decree 831/93 Appendix II
Total oil hydrocarbons	ND	NE
BTEX	ND	10/30/50/50
Hg	ND	20
Cd	ND	20

Cr	ND	800
Pb	ND	1000

NE: No specific limit established for the time being.

Table 17. Results for sample M6-A2 and comparison to admissible levels.

Conclusion: comparison of the values measured with those provided in the legislation shows that the results obtained do not exceed admissible levels.

M7-C

Parameter	Value measured (mg/Kg)	Decree 831/93 Appendix II
Total oil hydrocarbons	ND	NE
BTEX	ND	10/30/50/50
Hg	ND	20
Cd	ND	20
Cr	ND	800
Pb	ND	1000

NE: No specific limit established for the time being.

Table 18. Results for sample M7-A3 and comparison to admissible levels.

Conclusion: comparison of the values measured with those provided in the legislation shows that the results obtained do not exceed admissible levels.

M8-2C$_2$

Parameter	Value measured (mg/Kg)	Decree 831/93 Appendix II
Total oil hydrocarbons	ND	NE
BTEX	ND	10/30/50/50
Hg	ND	20
Cd	ND	20
Cr	ND	800
Pb	ND	1000

NE: No specific limit established for the time being.

Table 19. Results for sample M8-A4 and comparison to admissible levels.

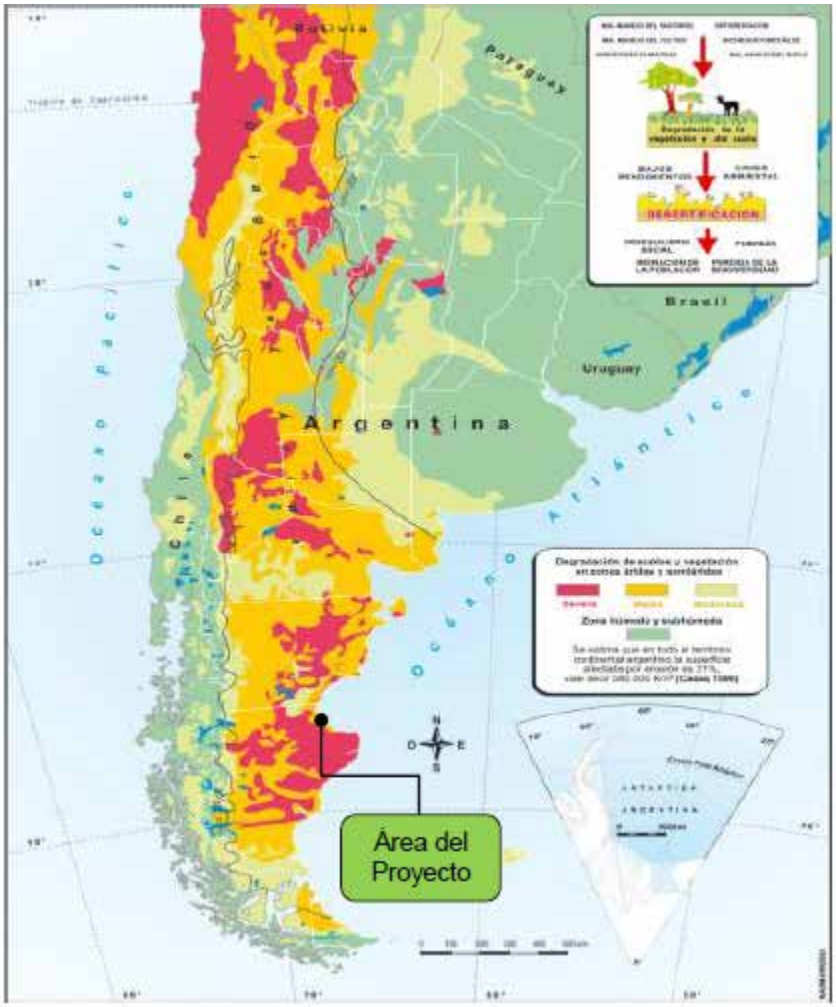
Conclusion: comparison of the values measured with those provided in the legislation shows that the results obtained do not exceed admissible levels.

DESERTIFICATION

Desertification as a result of the natural ecosystem variables (climate, physiography and original materials) generates low productivity and biological diversity in the area, and increases with the deterioration of the vegetation, alteration of the water balance and soil erosion.

In Patagonia, where there is steppe vegetation with plateau relief, the main cause of desertification is overgrazing by sheep. The extensive livestock raising systems that were established over a century ago did not consider the sustainable use of natural grassland, and as a result, intensified the arid conditions as a result of reduction or elimination of the plant cover. Currently, over 30% of the surface area in the region is affected by severe or serious wind and water erosion processes.

The following map shows that over 50% of the provincial territory has symptoms of strong- to medium-level degradation. The project area is located in the **medium desertification zone**.



Map 08. Desertification in Argentina – 2000.

Source: www.suelos.org.ar

Degradación de suelos y vegetación en zonas áridas y semiáridas	Degradation of soil and vegetation in arid and semiarid zones.
Severa	Severe
Media	Medium
Moderada	Moderate
Zona húmeda y subhúmeda	Humid and sub-humid zone

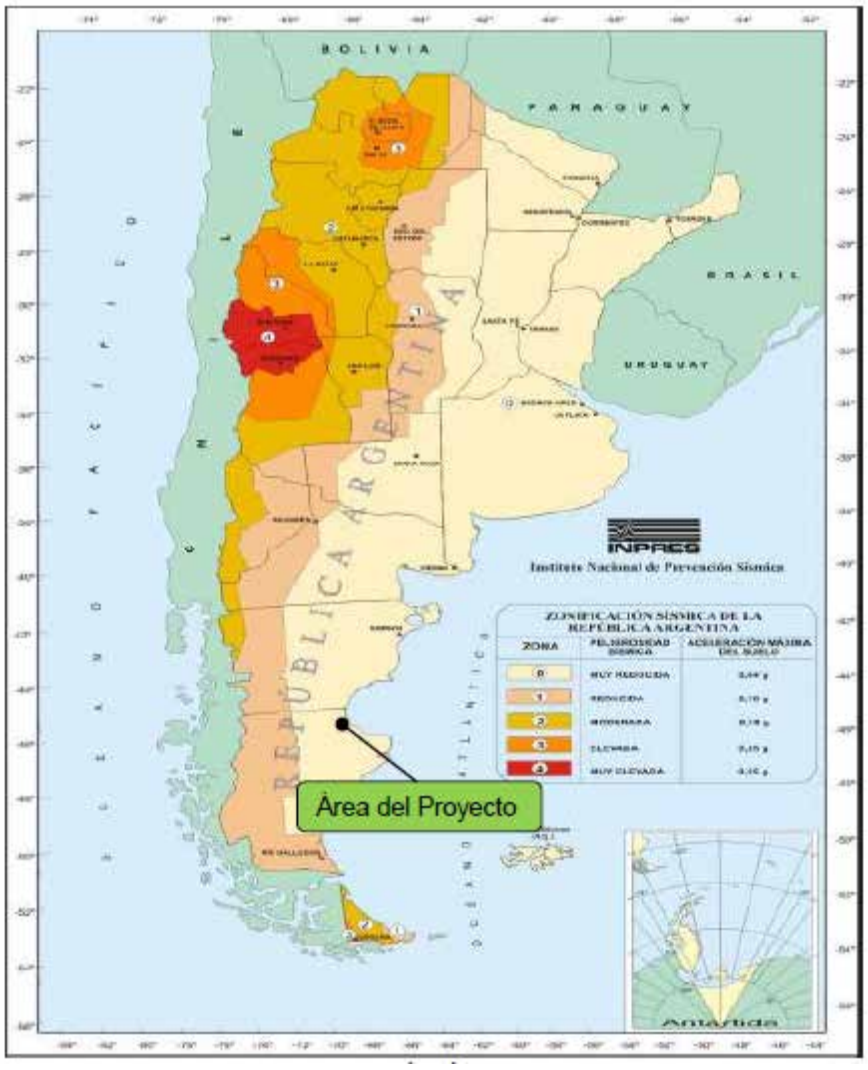
Área del Proyecto	Project Area

[The rest of the key is illegible.]

7.1.5 SEISMICITY

In Argentina there are two large seismic risk zones: eastern, with a high degree of stability, and western, including the Andes Mountains and ranges on the western front, where there are often seismic movements of different intensities. As shown in the Map of Seismic Zoning for Argentina, the zone of maximum risk is in the northwest of the country, in the provinces of San Juan, Mendoza, Salta, La Rioja, Jujuy and Tierra del Fuego, which, over time, have undergone earthquakes of varying intensity.

The Map of Seismic Zoning for Argentina shows that the Project Area has very low seismic hazard.



Map 09. Seismic zoning in Argentina.

Source: INPRES

Área del Proyecto	Project Area
INPRES Instituto Nacional de Prevención	INPRES National Institute for Seismic

Sísmica	Prevention
Zonificación sísmica de la República Argenina	Seismic zoning for Republic of Argentina
ZONA	ZONE
PELIGROSIDAD SÍSMICA	SEISMIC HAZARD
ACELERACIÓN MÁXIMA DEL SUELO	MAXIMUM GROUND ACCELERATION
MUY REDUCIDA	VERY LOW
REDUCIDA	LOW
MODERADA	MODERATE
ELEVADA	HIGH
MUY ELEVADA	VERY HIGH

7.1.6 SURFACE WATER AND GROUNDWATER RESOURCES

SURFACE WATER RESOURCES

Surface water resources are located in hydrographic basins – water in rivers, lakes and ponds. Glaciers are also considered to be surface water resources because they are important deposits that feed other water resources.

The Project Area is located in the surface water basin consisting of small rivers and streams of the Atlantic watershed between River Chubut and River Deseado (see Appendix 06 – Maps). Water resources in the study area are temporary and scarce. During the months with high rainfall, there are water courses that accumulate as runoff in gullies or depressions. Currently there is no evidence of these small surface water courses on the site where the activity will be implemented.

GROUNDWATER RESOURCES

Caleta Olivia city depends on groundwater for its basic water needs, for both human and industrial consumption.

The Project site is on the Meseta Espinosa-El Cordón Hydrogeologic Reserve[2] area. This basin covers a surface area that provides to some towns such as Caleta Olivia and Pico Truncado. The exploited aquifers are confined and semi-confined types.

Since the activity to be performed in the Project Area is wind-powered, the groundwater resource will not be used for its operation. Notwithstanding, any necessary prevention measures will be taken to prevent any potential affectation.

7.2 BIOTIC ENVIRONMENT

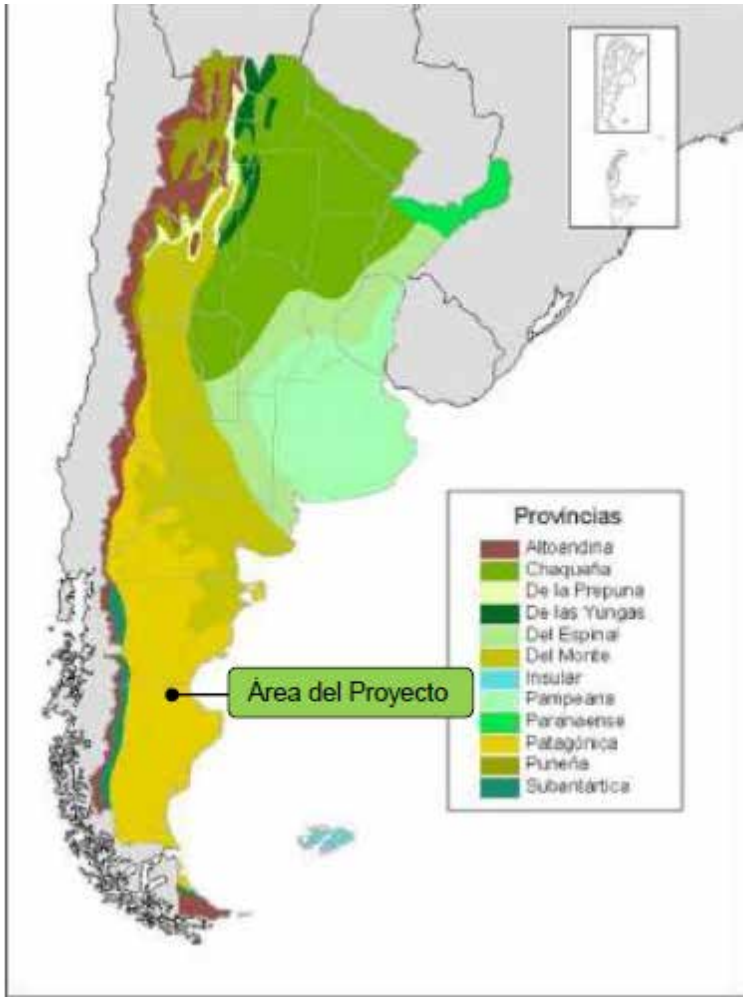
The characteristic biotic environment corresponds to Patagonian Province, which is included in the Andean-Patagonian Domain (Cabrera, 1976). The characteristic of this region is Patagonian Steppe, with natural predominance of herbaceous vegetation and stunted, low, open shrubland (see Appendix 06 – Maps).

[2] Provincial Law No. 2185.

To identify the main ecological systems in a region, phytogeography is a useful tool. It is based on the description of biological types of plant species and their physiognomy, or on floristic associations in the vegetation. The vegetation in the study zone corresponds to the Patagonian Phytogeographic Province which belongs to the Andean Patagonian Domain of the Neotropical Region. The vegetation in this province is heterogenous as a result of the variation in geomorphology, soils and climate. The main differences in physiognomy and relative abundance of dominant species are explained mainly by the differences in annual precipitation.

The different plant species that live in the Patagonian region have specific adaptive features that enable them to grow in this ecoregion, e.g. scrubland and stunted bushes with strong underground roots adapted to conditions of water deficit, low temperatures and strong winds. Also typical are cushion-shaped or thorny plants with tiny leaves or no leaves, photosynthetic stems, succulents, and different photosynthetic pathways. Perennial bunchgrasses such as xerophilous Festuca grass partially cover the stony, sandy soil. Other communities are adapted to specific soil characteristics, such as flood meadows, briny lowlands and fluvial terraces.

Phytogeographic Regions according to Cabrera



Map 11. Phytogeographic Regions in Republic of Argentina.

Source: Cabrera, 1976.

Área del Proyecto = Project Area

7.2.1 NATIVE AND INTRODUCED VEGETATION

Vegetation in the region is highly adapted to critical conditions of drought and strong winds that are present in the zone. These factors determine predominance of herbaceous steppes with sparse grasses and xerophilous shrub-steppes with low, sparse shrubs.

Predominant vegetation is made up of stunted, dwarf shrubs, decumbent, cushion-shaped plants and herbaceous plants, which partially cover the ground.

Tree specimens may also be found, e.g. *Austrocedrus chilensis* (ciprés), *Lomatia hirsuta* (radal), *Maytenus boaria* (maitén), *Nothofagus antárctica* (ñire), *Salix fragilis* (sauce) and *Schinus patagonicus* (laura).

Shrubs are branched, with few leaves or no leaves, thorny and with strong underground roots. Their height ranges from about 0.5 meters to 2 meters. The largest are those growing near water courses. The most frequent shrub species are *Junellia tridens* (mata negra), *Colliguaja integerrima* (coliguay), *Mulinum spinosum* (neneo), *Nassauvia glomerulosa* (cola piche), *Retamilla patagonica* (malaespina), *Schinus jhonstonii* (molle), and *Senecio filaginoides* (charcao).

Among the most abundant herbaceous species in the region are *Jarava humilis* (coirón llama), *Poa ligularis* (coirón poa), *Grandelia chiloensis* (melosa) and *Calceolaria polyrhiza* (flor de patio). Their height may range from about 30 cm to 1 m.

Some of the species that may be found are listed below.

Stratum	Scientific name	Common name
Trees	*Austrocedrus chilensis*	Ciprés
	Lomatia hirsuta	Radal
	Maytenus boaria	Maitén
	Nothofagus antarctica	Ñire
	Salix fragilis	Sauce
	Schinus patagonicus	Laura
Shrubs	*Acantholippia seriphioides*	Tomillo del campo
	Adesmia boronioides	Paramela
	Adesmia volckmanii	Mamuel choique
	Anarthrophyllum strigulipetalum	Mata fuego - neneo macho
	Atriplex lampa	Zampa
	Azorella monantha	Leña de piedra
	Baccharis magellanica	Mosaiquillo
	Benthamiella patagonica	Bentamiela
	Berberis microphylla	Calafate
	Chuquiraga aurea	Uña de gato
	Chuquiraga avellanedae	Quilembay
	Colliguaya integerrima	Coliguay
	Condalia microphylla	Piquillín
	Cortaderia selloana	Cortadera - Hierba de las pampas
	Corynabutilon bicolor	Mata mora
	Discaria articulata	Espino negro
	Efhedra chilensis	Efedra - Pingo-pingo
	Empetrum rubrum	Murtilla
	Ephedra ochreata	Solupe
	Grindelia chiloensis	Botón de oro
	Grysebachiella hieronimi	Mata hedionda
	Haplopappus glutinosus	Buchú
	Junellia ligustrina	Verbena
	Junellia tridens	Mata negra
	Junellia scoparia	Junellia - Canastillo
	Junellia succulentifolia	Junnellia
	Lycium ameghinoi	Mata laguna
	Lycium chilense	Yaoyin
	Mulinum spinosum	Neneo
	Mutisia oligodon	Mutisia oligodon
	Nassauvia glomerulosa	Cola piche
	Pleurophora patagonica	Tomillo rosa
	Prosopis denudans	Algarrobillo
	Retamilla patagonica	Malaspina
	Ribes cucullatum	Parrillita - Parrilla de hoja chica
	Senecio filaginoides	Charcao
	Senna arnottiana	Tara
	Schinus jhonstonii	Molle
	Stillingia patagonica	Mata crespa
	Suaeda divaricata	Vidriera

Table 20. Characteristic species in the tree and shrub strata.

Stratum	Scientific name	Common name
Herbaceous	*Acaena splendens*	Cepa caballo
	Alstroemeria patagonica	Amancay - Lirio amarillo
	Amsinckia calycina	Ortiga - Planta amarilla
	Anemone multifida	Anémona
	Arjona tuberosa	Macachin
	Astragalus cruckshanksii	Violeta
	Astragalus pehuenches	Hierba loca - Adormidera
	Austrocactus patagonicus	Cactus patagónico
	Bromus setifolius	Cebadilla patagónica
	Calceolaria biflora	Topa-topa - Arguenita
	Calceolaria polyrrhiza	Taquito de reina
	Calceolaria uniflora	Zapatito de la virgen
	Cerastium arvense	Cerastio
	Cheilanthes glauca	Helecho Doradilla
	Chenopodium multifidum	Paico
	Chloraea alpina	Orquídea de flor dorada
	Chloraea gaudichaudii	Orquídea de campo
	Eringium paniculatum	Cardoncillo
	Erodium cicutarium	Alfilerillo
	Euphorbia collina	Pichoa
	Festuca gracillima	Coirón fueguino
	Festuca pallescens	Coirón dulce - Coirón blanco
	Gamocarpha selliana	Pata de huillin
	Gavilea odoratissima	Orquídea
	Grandelia chiloensis	Melosa
	Grindelia anethifolia	Peinecillo
	Haplopappus prunelloides	Haplopapo
	Hipochoeris incana	Clavelito
	Hoffmannseggia trifoliata	Pata de perdiz - Porotillo de campo
	Hordeum comosum	Cola de zorro
	Maihueniopsis darwini	Chupasangre
	Montiopsis gayana	Calandrinia
	Natanthus patagonicus	Coliflor del monte
	Oreopolus glacialis	Tortilla de huevos
	Oxalis adenophylla	Cuye colorado
	Oxalis nahuelhuapiensis	Vinagrillo
	Plantago major	7 Venas - Llanten
	Poa lanuginosa	Pasto hebra
	Poa ligularis	Coirón poa
	Quinchamalium chilense	Quinchamalí
	Rodophiala mendocina	Rodofiala amarilla - Ajo del diablo
	Scutellaria nummulariifolia	Escutelaria
	Sisyrinchium macrocarpum	Sisirinco
	Stipa humilis	Coirón llama
	Stipa neaei	Coirón pluma
	Stipa speciosa	Coirón amargo
	Tarasa humilis	Tarasa
	Taraxacum officinale	Diente de león
	Tristagma patagonicum	Estrellita blanca
	Tropaeolum incisum	Taco de reina
	Valeriana carnosa	Ñancu-lahuén
	Verbascum thapsus	Gordolobo - Verbasco
	Viola vulcanica	Viola chata
	Xanthium spinosum	Abrojo

Table 21. Characteristic species in the herbaceous stratum.

During the field survey conducted on May 12, 2017, sampling sites were established to be used for future surveys. The information determined in the field can be viewed in Appendix 07 – Biota Baseline.

Survey transects		Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
		x	y	x	y
FL1	Begins	4839490.38	2599365.13	4839692.07	2599454.78
	Ends	4839554.08	2599341.91	4839755.77	2599431.55
FL2	B	4840007.12	2601813.54	4840208.81	2601903.18
	E	4839968.39	2601802.23	4840170.08	2601891.88
FL3	B	4840098.82	2603343.34	4840300.51	2603432.99
	E	4840064.59	2603321.88	4840266.28	2603411.5
FL4	B	4839314.38	2602865.92	4839516.07	2602955.57
	E	4839281.44	2602841.51	4839483.13	2602931.16
FL5	B	4836978.16	2603290.99	4837179.84	2603380.64
	E	4836969.56	2603251.68	4837171.25	2603341.33
FL6	B	4836377.34	2605063.88	4836579.03	2605153.53
	E	4836350.54	2605095.55	4836552.22	2605185.21
FL7	B	4837574.05	2608875.39	4837775.74	2608965.05
	E	4837615.05	2608880.17	4837816.74	2608969.83
FL8	B	4836431.36	2606807.81	4836633.04	2606897.47
	E	4836417.40	2606845.87	4836619.08	2606935.53
FL9	B	4840881.37	2604429.60	4841083.07	2604519.25
	E	4840914.01	2604453.81	4841115.70	2604543.46
FL10	B	4839995.22	2606427.27	4840196.91	2606516.93
	E	4840004.73	2606466.2	4840206.42	2606555.85

Table 22. Vegetation Survey Transects.

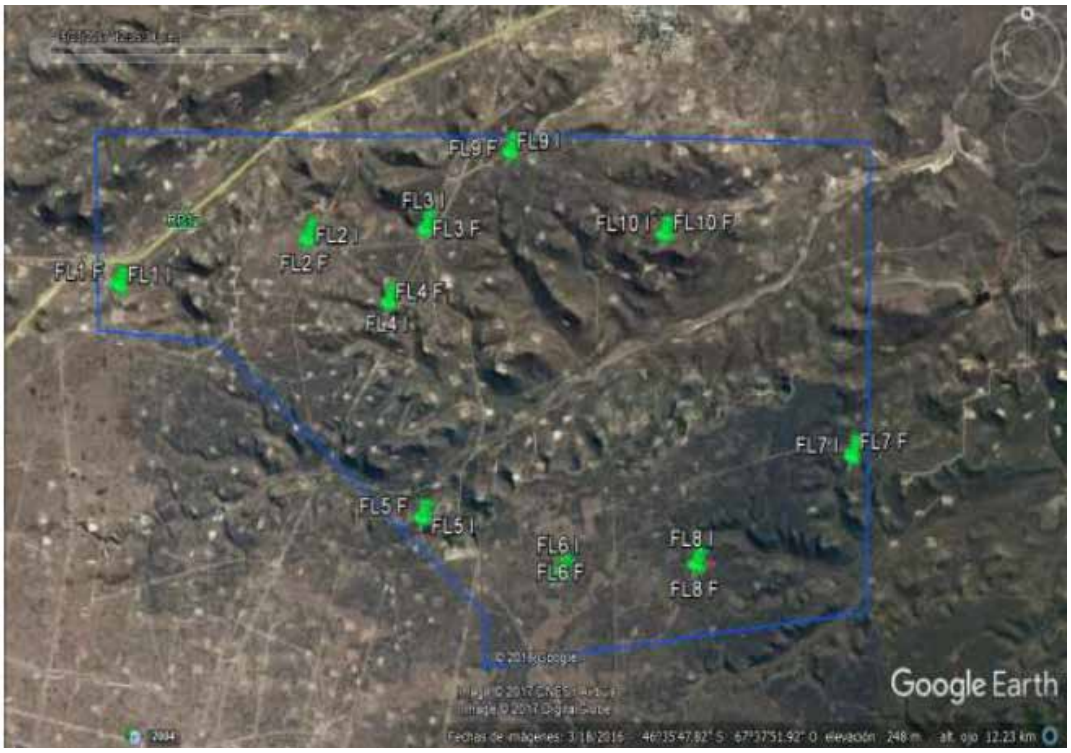


Figure 22. Location of vegetation survey transects.

Source: Google Earth

Figure 23. View of beginning of Transect FL1

Figure 24. View of beginning of Transect FL2.

Figure 25. View of beginning of Transect FL 3.

Figure 26. View of beginning of transect FL4.

Figure 27. View of beginning of transect FL5.

Figure 28. View of beginning of Transect FL6.

Figure 29. View of beginning of Transect FL7.

Figure 30. View of beginning of Transect FL8.

Figure 31. View of beginning of Transect FL9.

Figure 32. View of beginning of Transect FL10.

7.2.2 NATIVE AND INTRODUCED FAUNA

A mentioned above, the project area is located in the Patagonian Steppe, where it is possible to find a large number of animal species in spite of the climate conditions.

The most relevant land mammals on the Patagonian steppe are *Chaetophractus villosus* (big hairy armadillo), *Conepatus humboldtii* (Humboldt's hog-nosed skunk), *Lama guanicoe* (guanaco), *Lepus europaeus* (European hair), *Lestodelphys halli* (Patagonian opossum), *Microcavia australis* (southern mountain cavy), *Pseudalopex culpaeus* (Andean fox), *Pseudalopex griseus* (South American grey fox), and *Zaedyus pichiy* (dwarf armadillo). There are also rodents such as *Eligmodontia typus* ("laucha colilarga") y ferrets such as *Galictis cuja* (lesser grison).

The main reptiles in the area include *Bothrops ammodytoides* (South American pit viper), *Liophis sagittifer* (snake), *Micrurus phyrrhocryptus* (coral snake) and several lizard species.

Representative birds of the steppe include *Buteo polyosoma* (red-backed hawk), *Caracara plancus* (southern crested-caracara), *Eudromia elegans* (elegant crested-tinamou), *Mimus patagonicus* (Patagonian mockingbird), *Phalacrocorax gaimardi* (red-legged cormorant), *Pterocnemia pennata* (lesser rhea), *Sturnella loyca* (long-tailed meadowlark), *Turdus falcklandii* (austral thrush), *Vanellus chilensis* (southern lapwing), *Zonotrichia capensis* (rufous-collared sparrow), etc.

Characteristic species of the region are listed below.

	Scientific name	Common name
Mammals	*Conepatus humboldtii*	Humboldt's hog-nosed skunk
	Chaetophractus villosus	Big hairy armadillo
	Eligmodontia typus	Laucha colilarga
	Galictis cuja	Lesser grison
	Lama guanicoe	Guanaco
	Lepus europaeus	European hair
	Lestodelphys halli	Patagonian opossum
	Pseudalopex culpaeus	Andean fox
	Pseudalopex griseus	South American grey fox
	Zaedyus pichiy	Dwarf armadillo
Reptiles	*Bothrops ammodytoides*(	South American pit viper
	Liophis sagittifer	Snake
	Micrurus phyrrhocryptus	Coral snake

Table 23. Characteristic mammal and reptile species.

	Scientific name	
Birds	*Buteo polysoma*	Red-backed hawk
	Buteo ventralis	Rufous-tailed hawk
	Calidris canutus	Red knot
	Caprimulgus longirostris	Band-winged nightjar
	Caracara plancus	Southern crested-caracara
	Casmerodius albus	Great egret
	Cathertes aura	Turkey vulture
	Charadius falklandicus	Two-banded plover
	Chionis alba	Snowy sheathbill
	Cygnus melancoryphus	Black-necked swan
	Eudromia elegans	Elegant crested-tinamou
	Falco peregrinus	Peregrine falcon
	Falco sparverius	American kestrel
	Haematopus leucopodus	Magellanic oystercatcher
	Haematopus palliatus	American oystercatcher
	Larus maculipennis	Brown-hooded gull

	Larus dominicanus	Kelp gull
	Lophonetta specularioides	Crested duck
	Macronectes giganteus	Southern giant petrel
	Melanoleucus geranoaetus	Black-chested buzzard eagle
	Mimus patagonicus	Patagonian mockingbird
	Numenius phaeopus	Whimbrel
	Nyctocorax nyctocorax	Black-crowned night-heron
	Oreopholus ruficollis	Tawny-throated dotterel
	Phalacrocorax gaimardi	Red-legged cormorant
	Phalacrocorax olivaceus	Neotropic cormorant
	Phoenicopterus chilensis	Chilean flamingo
	Pluvianellus socialis	Magellanic plover
	Podiceps major	Great grebe
	Pterocnemia pennata	Lesser rhea
	Sterna eurygnatha	Sandwich tern
	Sterna hirundinacea	South American tern
	Sterna maxima	Royal tern
	Sturnella loyca	Long-tailed meadowlark
	Tachyceres leucocephalus	Chubut steamer-duck
	Tinamotis ingoufi	Patagonian tinamou
	Tyto alba	Barn owl
	Upucerthis dumetaria	Scale-throated earthcreeper
	Vanellus chilensis	Southern lapwing
	Zenadida auriculata	Eared dove
	Zonotrichia capensis	Rufous-collared sparrow

Table 24. Characteristic bird species.

Monitoring transects were established during the field survey performed on May 12, 2017 as part of the Biota Baseline Study (see Appendix 07). Species survey (direct and indirect identification) results and conclusions are included in the Appendix.

Monitoring points	Gauss Krüger Coordinates Posgar 94 Band 2		Gauss Krüger Coordinates Campo Inchauspe Argentina Zone 2	
	x	y	x	y
FA1	4840170.15	2601908.50	4840371.84	2601998.15
FA2	4837191.17	2603693.98	4837392.86	2603783.63
FA3	4836539.75	2607209.88	4836741.43	2607299.54
FA4	4841027.80	2605282.87	4841229.5	2605372.53
FA5	4839665.76	2606455.53	4839867.45	2606545.19

Table 25. Location of fauna survey points.

Figure 33. View of fauna survey points.

Source: Google Earth

Survey index cards for species frequently found on the monitoring transects are provided below.

Field survey index card	
Scientific name: *Lama guanicoe* **Common name:** Guanaco **IUCN Red List:** Least concern	 General view  Detail
Comments: Mammal with body weight 100-140 kg. The tallest animal in South America. Similar to vicuna in its graceful appearance, long neck and slender legs. Distinguished from vicuna because it is larger and robust, has no fleece on chest, has calluses on inner side of front legs and coloring. Hair is wooly and thick, tawny red on back, lead grey on head, face and ears, and pure white on underside. Lives in open areas and rarely found in forests.	

In addition, a Baseline Study of Birds and Bats was performed (see Appendix 08) and monitoring transects were established. The results of the species survey (direct and indirect identification) and conclusions are attached in the Appendix.

Survey index cards for species frequently found on the monitoring transects are provided below.

Field survey index card	
Scientific name: *Aesthenes pyrrholeuca* **Common name:** Lesser canastero **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures approximately 15 cm. Shy. Hidden. Flight short and low, diving into vegetation. Long tail (not held erect), fluttering in flight. Orange throat spot. Bill thin. Inhabits shrubby and Patagonian steppes, marsh vegetation and open areas of Araucano forest.	

Field survey index card	
Scientific name: *Buteo polysoma* **Common name:** Red-backed hawk **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 54 cm and weights 3 kg approximately. Perched, wings not longer than tail white with subapical band black. Back grey in male, rufous in female. Belly white. Bars on flanks. Variety of plumage. Feeds on rodents, small birds and insects. Lives in environments such as open forests, shrubbery and steppes.	

Field survey index card	
Scientific name: *Geranoaetus melanoleucus* **Common name:** Black-chested buzzard-eagle **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures about 70 cm. Breast finely barred, wings, back, neck and head grey. Juveniles speckled brown. Bird d of prey that feeds on mammals such as rabbits, hares, skunks and southern vizcachas; birds such as guans, and also on carrion. Lives in areas with predominantly low vegetation.	

Field survey index card	
Scientific name: *Lessonia rufa* **Common name:** Rufous-backed negrito **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures about 11 cm. Feeds on small invertebrates and eggs. Lives in open areas, preferably with short grasses and usually in low-lying, humid areas.	

Field survey index card	
Scientific name: *Milvago chimango* **Common name:** Chimango caracara **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 37 cm. Often on roads, scavenging. Screech *yay*... Smaller than the southern crested-caracara, paler (lacks crest) and in flight neck seems shorter. Brown. Underparts buffy (barred in S). Whitish tail with slight barring and blackish band on tip. Buffy patch on wing. Whitish legs. Juvenile: whitish wing-bars. Feet sky-blue. Several habitats.	

Field survey index card	
Scientific name: *Mimus patagonicus* **Common name:** Patagonian mockingbird **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: About 22 cm tall. Plain back. Two conspicuous dotted white bars on coverts. Tail shortish with white tip. Underparts buffy-ochre. Andean and Patagonian shrubby steppes. Southern population is Migrator C.	

Field survey index card	
Scientific name: *Phrygilus carbonarius* **Common name:** Carbonated sierra-finch **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Measures about 15 cm and weighs about 23 grams. Male with back dark grey streaked with black; underparts, wings and tail black. Bill and legs yellow. Female's back brownish grey streaked with dark brown. Breast streaked, underparts white. Pale eye-ring. Feeds on seeds and grain. Lives in semi-open shrubby steppes.	

Field survey index card	
Scientific name: *Phrygilus fruticeti* **Common name:** Mourning sierra-finch **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 15 cm. nasal *pir…piri..piii…piripi* when perched or during display, gliding with wings below horizontal. Blackish. Juvenile: dark brown. Dorsal streaking; breast, wings and tail black. Wing coverts edged in white. Rest of underparts whitish. Bill and legs orange. Female: brownish-grey, streaked black. White moustache. Lives in Andean and Patagonian steppes.	

Field survey index card	
Scientific name: *Sturnella loyca* **Common name:** Long-tailed meadowlark **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 22 cm. screaming song with warbles, whistles and nasal notes, from low perch. White eyebrow, red at origin. Underwing coverts white. Female: white throat with black on sides. Lives in Andean, Patagonian and mountain grasslands and steppes.	

Field survey index card	
Scientific name: *Upucerthia dumetaria* **Common name:** Scale-throated earthcreeper **IUCN Red List:** Least concern **Migrator:** C	 General view  Detail
Comments: Height about 23 cm. Modest coloring and noticeable long, curved bill. Feathers greyish-brown with throat and underparts whitish with conspicuous "scaled" appearance. Feeds on insects, spiders, scorpions and other invertebrates. Nests in caves, banks and gullies. Widely distributed in the region, throughout the extra-Andean zone.	

Field survey index card	
Scientific name: *Zonotrichia capensis* **Common name:** Rufous-collared sparrow **IUCN Red List:** Least concern **Migrator:** No	 General view  Detail
Comments: Measures 12 cm. One of the most widely known small birds. Half-crest, base grey continuing in a black line below and a white supercilium; cheeks darker grey; throat and underparts white; half-collar black with some reddish; back mottled black and cinnamon. Juvenile: without grey or cinnamon, underparts streaked black. Lives in almost all habitats, including inhabited areas.	

7.2.3 QUANTITY AND CONSERVATION STATUS OF NATIVE SPECIES OF COMMON AND/OR SCIENTIFIC INTEREST

One of the species currently being researched by a group of professionals at Puerto Deseado Research Center is *Lycalopex culpaeus (*Andean fox). The aims of the studies are to gain knowledge, control and conservation of the species[1]. It is worth noting that no *Lycalopex culpaeus* specimen was sighted and no spoor observed during the field survey.

At Lobería Punta Sur, the main attraction is *Otaria flavescens* (South American sea lion). This mammal species was declared a Municipal Natural Monument in Caleta Olivia City. Marine and shorebirds representative of the region can be sighted from the coast near the city.

The Project Area is about 16 km distant from the sea lion rookery at Lobería Punta Sur – far enough that species are not expected to be affected.

7.3 PERCEIVED LANDSCAPE

The intrusion of any artificial element in natural surroundings alters the landscape. In general terms, the visual effect of wind farms is directly proportional to wind turbine number, size (tower height, blade length) and, from a distance, color compared to the palette of the surroundings. It is inversely proportional to distance from the potential observer of the view where wind turbines are located.

Perceived landscape is determined by features of the relief, which provide the primary distinctive tone.

Landscape perception is considered subjective from an aesthetic standpoint, taking into account that what one person may consider unpleasant may be pleasant to others. To quantify the effect of a wind farm on perceived landscape, aspects such as the following are considered.

- Presence. The absence of a wind turbine implies the disappearance of its visual effect. The greater the number of wind turbines, the greater will be the area of visual impact.
- Location. The area is not mountainous, which would be considered to have higher landscape sensitivity. The wind turbines will be visible because there are no natural visual obstacles in the surroundings. Nevertheless, from a great distance, wind turbines' stylized shape helps blend them into the landscape, partially mitigating the visual impact on the horizon.
- Wind farm architecture. Because of the simplicity of the pattern in which wind turbines will be arranged, they are easily perceived as an orderly distribution, which may or may not be attractive to the observer. In addition, there are other constituents of the wind farm such as auxiliary buildings and internal roads.
- Warning lights. These are required to make the wind turbines visible to aircraft, and must be installed in the number and kind required by the ANAC (National Civil Aviation Association). Nearby communities would see these flashing lights at night, though in this case it will not happen thanks to the distance from the nearest populated centers.
- Speed of rotation. When the blades are moving more slowly, the wind turbine may have less effect on landscape perception. As blade length increases, its rotational speed decreases. Large wind turbines such as will be used in this Project rotate more slowly and therefore create less visual impact.

[1] UNPA (Universidad Nacional de la Patagonia Austral)

- Shadow effect. Tall structures project shadows which can potentially affect drivers and/or occasional passers-by when the rotor blades block sunlight intermittently, creating shadow flicker. Although shadow flicker is harmless in terms of health and safety, it may under certain circumstances be disturbing. This effect is lessened with rotation rates of 17 rpm in 3-blade wind turbines. The project site is an oilfield and no residents that could be affected by shadow flicker have been identified. The wind turbine closest to Provincial Route 12 is located at a distance of approximately 600 meters from it.

7.3.1 VISUAL IMPACT

Secretariat of Energy Resolution No. 77/98 states that any power generation and transmission facility should consider the relationship between the construction and the landscape both in its **direct** aspects, i.e. physical interposition of structures, supports, towers and conductors, and **indirect** aspects, related to degradation of the observer's perception of natural, architectural, historical or landscape areas as a result of the intrusion of foreign objects.

The Resolution establishes that in order to identify the sensitivity of natural resources, predict their impact, and reduce any adverse visual impact, designers should base their work on three (3) important aspects: visibility, context and intensity, which together form the conceptual structure for the evaluation of such impact. To evaluate impact intensity of the project, a qualitative-quantitative method was applied, which consisted of answering several questions that classify the zone of influence and type of impact. Each answer is assigned a score, and aggregate score is subsequently calculated.

It provides values from 18 to 180, but as such values are not easy to read and interpret, it was transformed mathematically into a scale of 1 to 12, thereby adapting it to the intensity values in the chosen evaluation method. In addition, each range was assigned a color to facilitate interpretation.

Visual impact	Range	Color
Low	1-4	
Moderate	5-8	
High	9-12	

Table 26. Assessment for visual impact.

The questions are distributed into the following 3 groups:

- Wind farm visibility
- Context of visibility
- Visual intensity

Wind farm visibility

Is the wind farm located within and area with scenic value?

Very high	
High	
Moderate	
Low	1

The wind farm is located at a topographic elevation that is:

Higher than the principal observer.	5
At the same level as the principal observer.	
Lower than the principal observer.	

Is wind farm visibility to principal observers seasonal?

Wind farm is always visible.	7
Wind farm is visible at critical times.	
Wind farm is visible at non-critical times.	
Wind farm is not visible throughout the year.	

Visual obstruction caused by windfarm is:

Very significant	
Moderately significant	6
Not significant	

Principal observers are located in:

Landscaped private property	
Residential area	
Recreational areas	
Schools /public buildings / hospitals zone	
Rural zone	
Industrial zone	
Commercial zone	
Peri-urban zone	
Roads	6
Degraded areas	

Does the windfarm visually obstruct views that are important to the zone?

Yes, it produces significant visual obstruction.	
Yes, but visual obstruction is moderate.	
It does not cause relevant visual obstruction of the view.	1

Context of visibility

The surroundings of the windfarm are:

Landscaped private property	
Residential area	
Recreational areas	
Schools / public buildings / hospitals zone	
Rural zone	
Industrial zone	
Commercial zone	
Peri-urban zone	
Roads	
Degraded areas	5

There are other similar wind farms at a distance of:

More than 2500 meters or none in the zone	1
1000 to 2500 meters	
Less than 1000 meters	
Adjacent	

In which of the following situations are the principal observers of the windfarm?

At home	
At public leisure sites	
At work	
In transit	6

Are wind farm characteristics incompatible with its surroundings?

Yes, because the structure is foreign to its surroundings.	
Yes, because it is located in an area with projects that have already been defined.	
Yes, but because of its constructional characteristics, which can be adjusted.	
No. Its characteristics are compatible with those of its surroundings.	7

Might there be opposition to the installation of the wind farm due to its visual impact?

It needs to be hidden with complex screens or is impossible to hide.	
Vegetation screens can be used.	
It does not need to be hidden.	4

Does the wind derivatives need to be camouflaged?

It needs to be hidden with new screens or is impossible to hide.	
Existing vegetation screens can be used.	
It does not need to be hidden.	4

Visual intensity

The principal observer considers that the wind farm is:

a very prominent structure	
a relatively prominent structure	7
not a prominent structure	

Contrast between the line and the background

Very significant	
Moderately significant	6
Not very significant	

To the principal observer, visual perception of the wind farm is:

A structure contiguous to his/her immediate setting (<100m)	
A relatively nearby structure (100m < observer < 500 m)	
A distant structure (> 500 m)	1

The wind farm should be considered a structure whose duration is:

Permanent	7
Semi-permanent	
Temporary	

The wind farm should be considered a structure whose extension is:

Very large (covers a large space)	5
Not very large	
Isolated	

The scale of the wind farm compared to other visual elements in the surroundings is:

Much larger	8
Similar	
Smaller	

Total visual impact is composed of three criteria involving visibility, context and intensity. The final results are presented below. The visual impact variable was considered so that the evaluator can easily interpret project visual impact level. It is the arithmetic average of the scores assigned to all questions.

Criteria	Subtotal impact
Visibility	26
Context	27
Intensity	34
Total	87
Visual impact (Intensity scale 1 to 12 for Cañadón León) – **Moderate**	5

Table 27. Visual impact value.

7.4 SOCIOECONOMIC AND CULTURAL SETTING

7.4.1 DEMOGRAPHICS

7.4.1.1 POPULATION

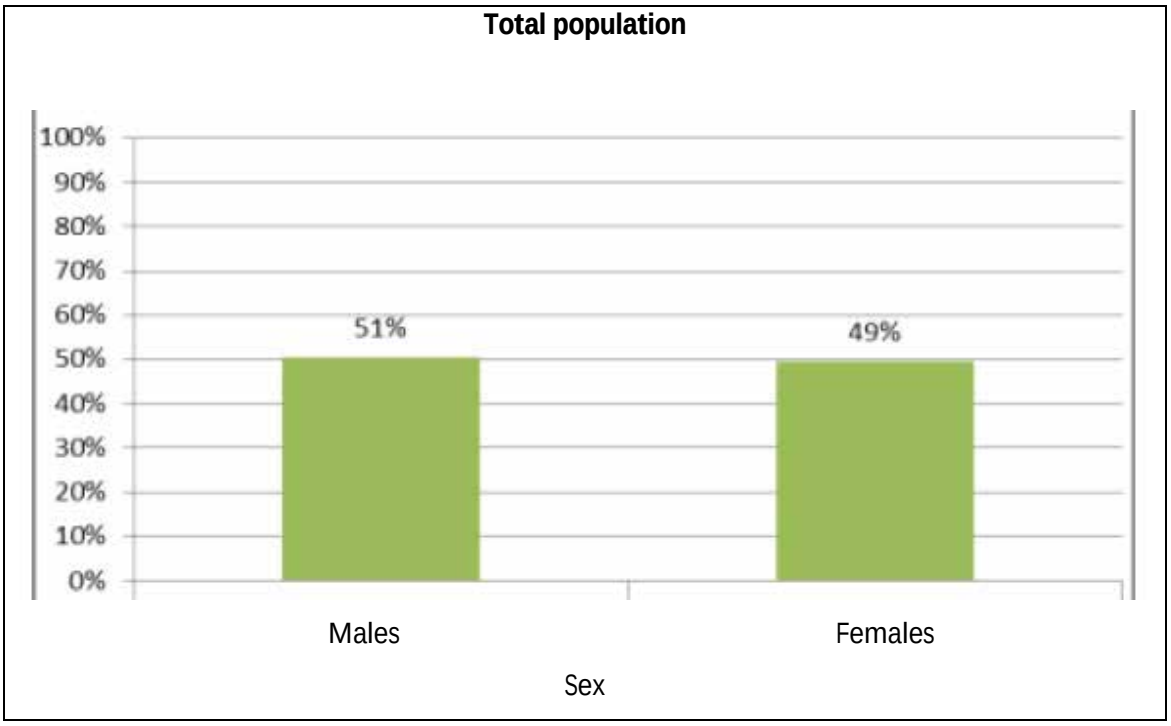
The 2010 National Population Census determined a total population of 51,733 persons for Caleta Olivia, in Santa Cruz Province. Of these persons, 51% are male and 49% female.

Of the total population, 89% does not have unmet basic needs (UBN), while 11% has UBN.

Locality	Total population	Sex	
		Male	Female
Caleta Olivia	51,733	26,177	25,556

Table 28. Caleta Olivia population.

(Source: INDEC. 2010 National Census on Population, Households and Housing.)



Graph 02. Caleta Olivia population.

(Source: INDEC. 2010 National Census on Population, Households and Housing.)

7.4.2 SOCIOECONOMIC INDICATORS

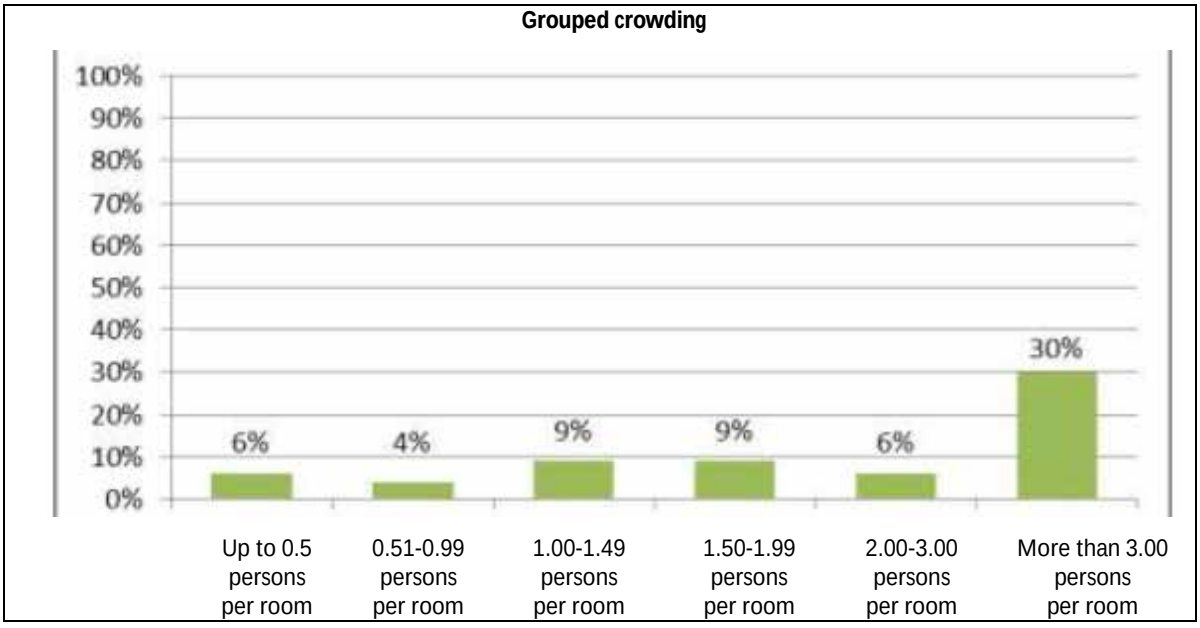
There are 15,553 households in Caleta Olivia, regarding which the 2010 National Census on Population, Households and Housing provides the following data.

Thirty percent of housing units have more than 3 persons per room, 18% have 1-2 persons per room, 10% have 1 person per room and 6% have 2-3 persons per room.

Locality	Housing units	Grouped crowding (persons per room)					
		Up to 0.5 persons per room	0.51-0.99 persons per room	1.00-1.49 persons per room	1.50-1.99 persons per room	2.00-3.00 persons per room	More than 3.00 persons per room
Caleta Olivia	100%	6%	4%	9%	9%	6%	30%

Table 29. Grouped crowding.

(Source: INDEC. 2010 National Census on Population, Households and Housing.)



Graph 03. Grouped crowding.

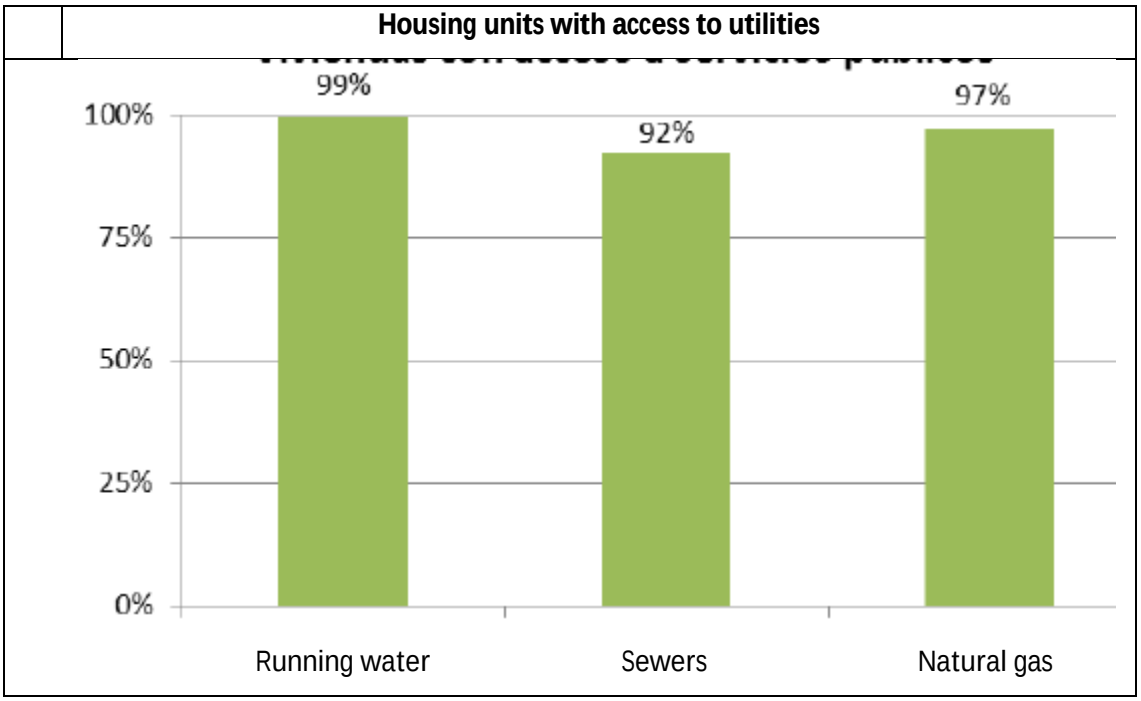
Source: INDEC. 2010 National Census on Population, Households and Housing.

Regarding utilities, of the 15,553 housing units, 99% has running water, 92% has access to public sewer network and 97% has access to natural gas.

Locality	Total housing units	Number of housing units with access o utilities		
		Running water	Sewers	Natural gas
Caleta Olivia	15,553	15,458	14,350	15,147

Table 30. Number of housing units with access to utilities.

Source: INDEC. 2010 National Census on Population, Households and Housing.



Graph 04. Number of housing units with access to utilities.

Source: INDEC. 2010 National Census on Population, Households and Housing.

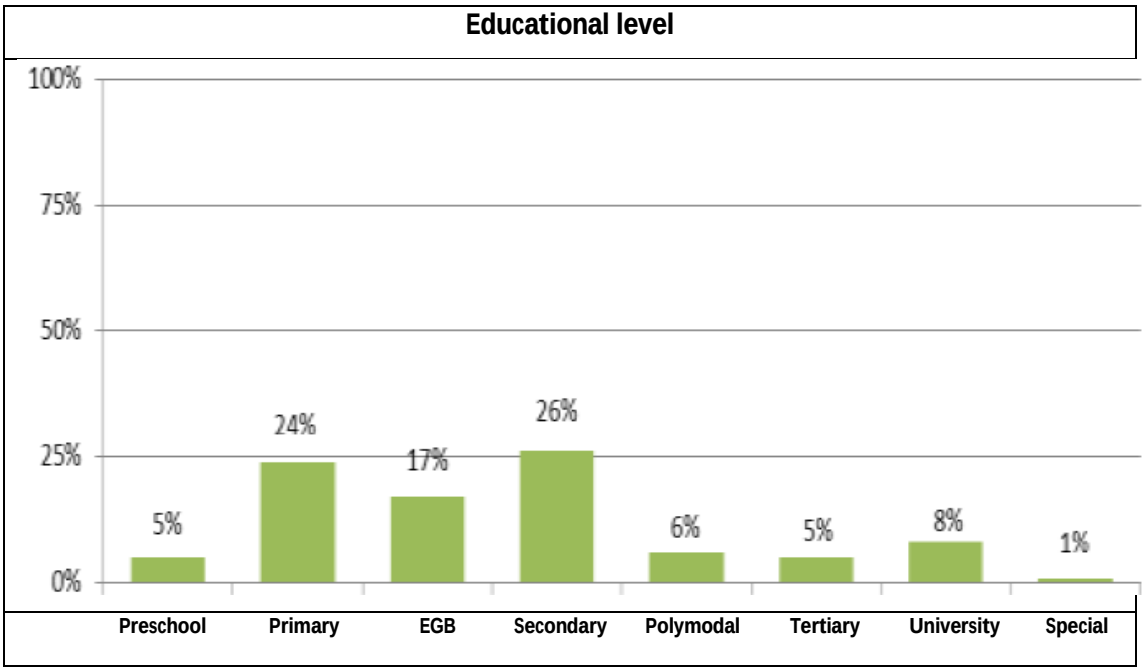
Finally, with regard to educational level attained by the study population, 41% completed primary school and Basic General Education (EGB) or is currently at those levels, while 32% completed or is at secondary or polymodal school. Thirteen percent completed or is at university or tertiary level, and 5% completed or is at initial educational level. Finally, 1% completed or is at special schools.

For the population aged 10 years or older, the literacy rate is 79% of total population.

Locality	Males and females who are at or completed the level (%)							
	Preschool	Primary	EGB	Secondary	Polymodal	Tertiary	University	Special
Caleta Olivia	5%	24%	17%	26%	5%	6%	8%	1%

Table 31. Population according to maximum educational level attained.

Source: INDEC. 2010 National Census on Population, Households and Housing.



Graph 05. Population according to maximum educational level attained.

Source: INDEC. 2010 National Census on Population, Households and Housing.

7.4.3 SERVICE INFRASTRUCTURE

7.4.3.1 ROADS

Caleta Olivia City can be accessed from the north along National Route No. 3 and from the south along Provincial Route No. 12, both of which are paved.

Figure 34. View of Provincial Route 12.

HOSPITALS

Caleta Olivia has a Zonal Public Hospital with general medical services and the Meprisa Private Hospital with high complexity services. In addition, there are several private clinics, sanatoriums and doctors' offices.

EDUCATION

All educational levels, from preschool to higher education, are available in the city, as well as adult education and special education.

HOTELS

Caleta Olivia has a wide range of hotels. Among the most important are Patagonia Hotel and Hotel Robert.

PORT

Puerto Caleta Paula commercial and public port is located 3.5 km south of Caleta Olivia city, on a 110-hectare property on a natural cove in San Jorge Gulf facing the Argentine Sea. The port is currently apt for freezer trawlers, fresh trawlers and coastal trawlers, as well as merchant vessels up to 140 m in length.

UTILITIES

Power, potable water and sewer system are provided by the company Servicios Públicos Sociedad del Estado, and natural gas is provided by the company Distrigas S.A.

PUBLIC SECURITY

Caleta Olivia City has 5 police stations (First, Second, Third, Fourth and Fifth), one detention center and one family services station. There are two fire stations (Fifteenth and Sixteenth).

7.4.4 INVENTORY OF RECREATIONAL AND AESTHETIC RESOURCES. CULTURAL ASPECTS OF RELEVANCE TO THE PROJECT.

Within the city, aesthetic and recreational value is provided by the seafront promenade with its extensive view towards Caleta Paula Port, considered to be one of the largest and most attractive on the Argentine coast.

There are beaches in the area which are apt for recreational activities and sports.

The Municipal Museum of Man and His Environment is a culturally relevant facility. It displays remains of indigenous manifestations such as arrows, scrapers, knives, bolas, and a reconstruction of an ancient dwelling with its equipment. There is also a photographic record of the early days of Caleta Olivia and its first settlers.

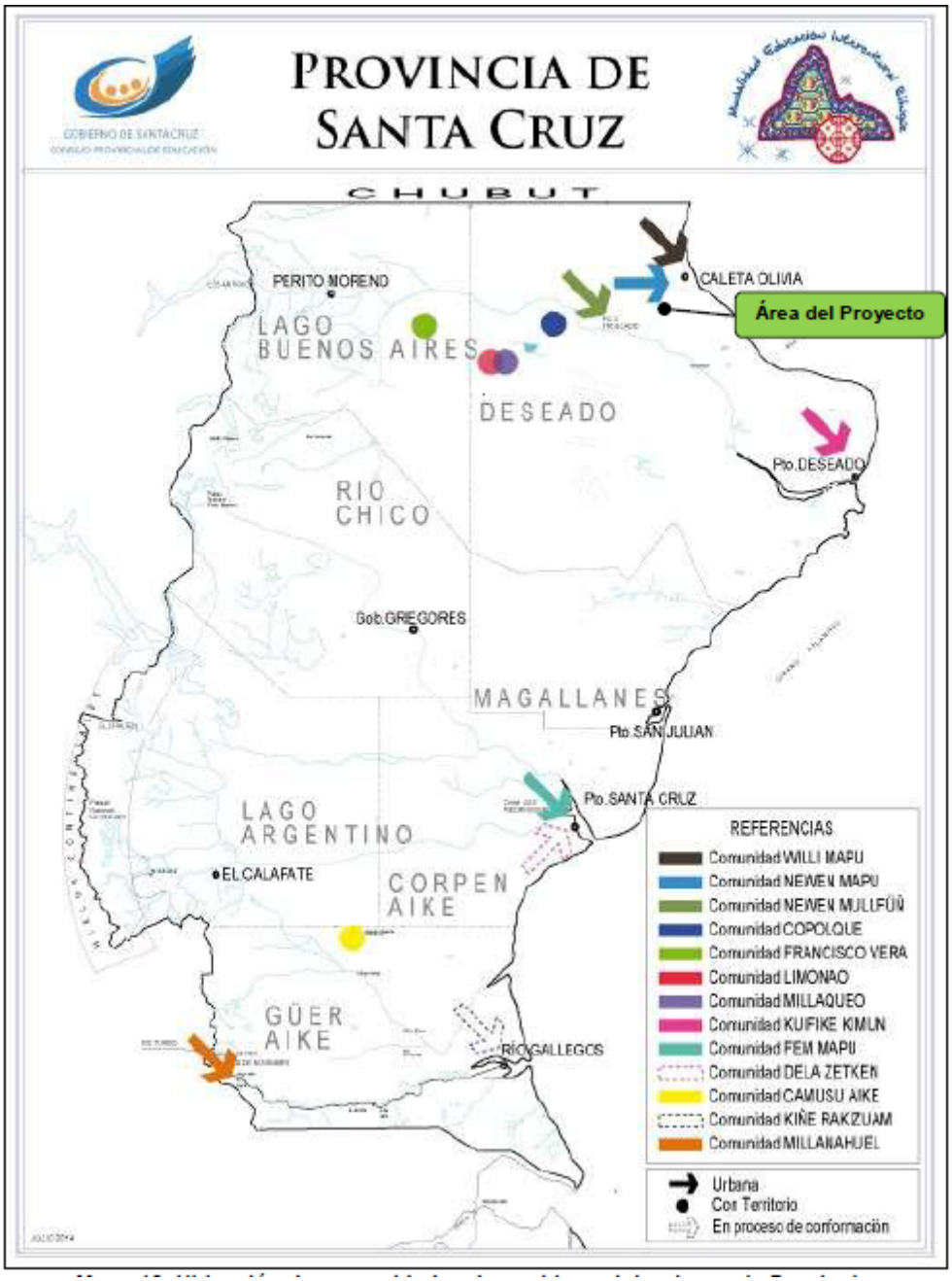
Another relevant cultural attraction in the city is the Monument to the Oil Worker – a symbol of the economic activity that transformed the village into a city.

Finally, according to data from the RENACI (National Registry of Indigenous Communities) and Santa Cruz Provincial Government, the following maps show that there are Mapuche indigenous communities near the Project Area with urban settlements listed below.

Mapuches “Willi Mapu” and “Newen Mapu”: these communities are in Caleta Olivia city, about 18 km away from the Project Area. They were established in 2011. “Newen Mapu” includes 8 families.

Mapuches-Tehuelches “Nehuen Mullfüñ”: this community is in Pico Truncado, approximately 30 km away from the Project Area. It was established in 2011 and includes 17 families.

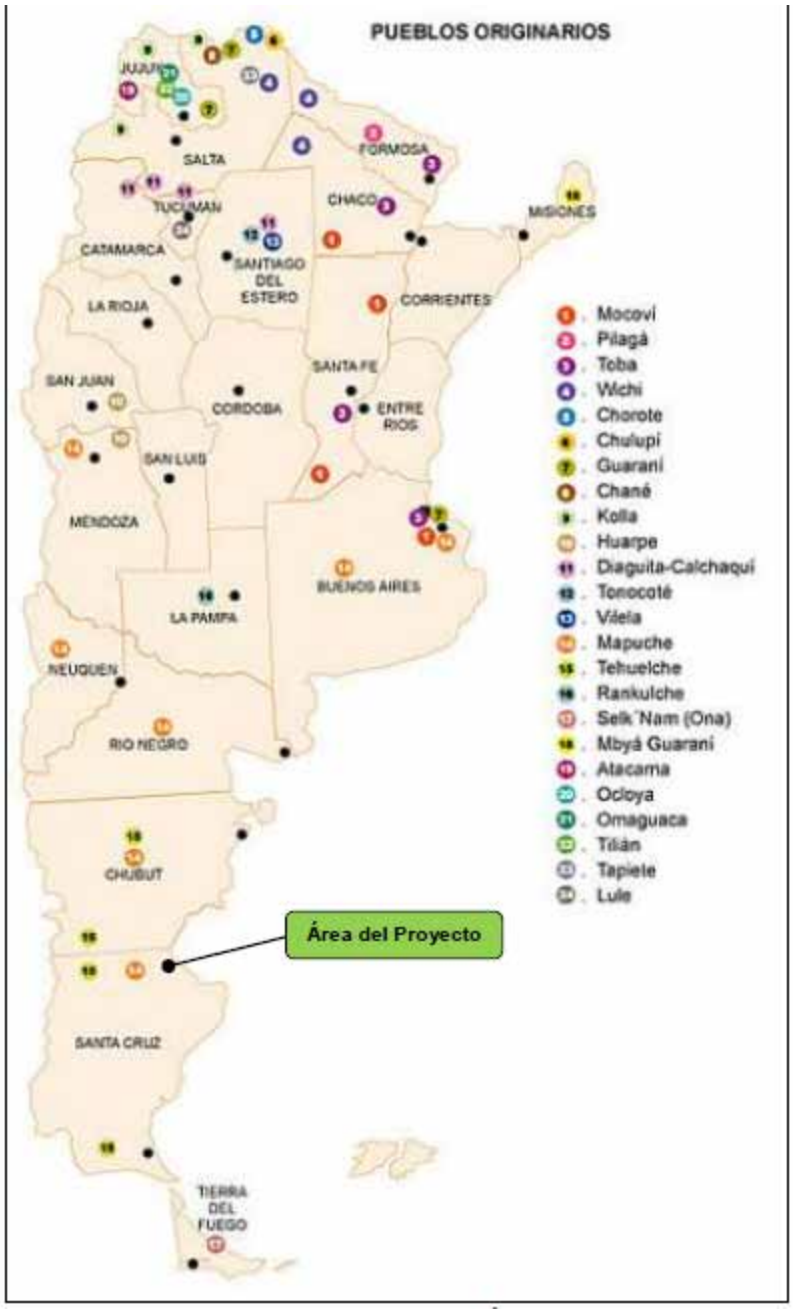
To conclude, it is worth noting that since these communities are outside the Project Area, they will not be affected by the project.



Map 12. Location of indigenous peoples in the province.

(Source: Santa Cruz Provincial Government)

Área del Proyecto	Project Area
Comunidad	Community
Urbana	Urban
Con Territorio	With territory
En proceso de conformación	Undergoing establishment process
REFERENCIAS	REFERENCES



Map 13. Indigenous peoples – Republic of Argentina

(Source: RENACI)

PUEBLOS ORIGINARIOS	INDIGENOUS PEOPLES
Área del Proyecto	Project Area

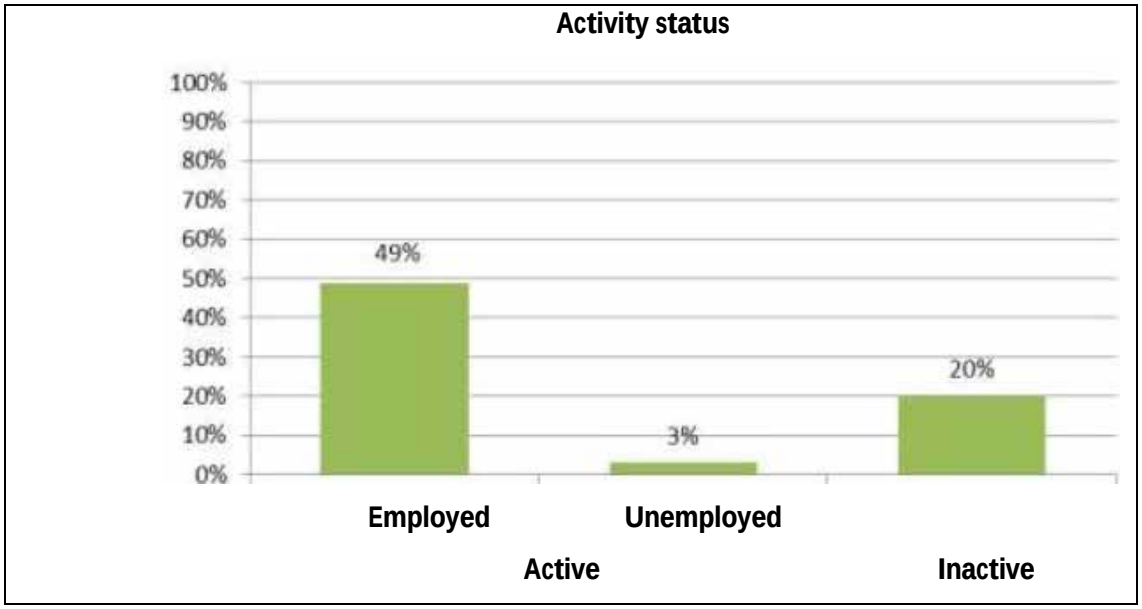
7.4.5 ECONOMIC ACTIVITIES IN PROJECT AREA OF INFLUENCE

The economically active population accounts for 52% of the population aged 14 years or older and able to work. Of this percentage, 49% is employed and 3% unemployed. Inactive population accounts for 20%.

City	Population aged 14 years or older	Activity status		
		Active		Inactive
		Employed	Unemployed	
Caleta Olivia	37,177	25,130	1,646	10,401

Table 32. Population according to activity status.

Source: INDEC. 2010 National Census on Population, Households and Housing.



Graph 06. Activity status.

Source: INDEC. 2010 National Census on Population, Households and Housing.

Activities in the study area are mainly related to oil business, which extracts non-renewable resources such as crude oil and natural gas. Most wells are located in the Departments of Deseado and Lago Buenos Aires. Craft and industrial fishing (Puerto Caleta Paula) are other important activities in the region, the main catch being hake. South of 41°, Illex squid and centolla (southern king crab) are extracted. Another activity is sheep raising, for both wool and meat, throughout the province. Wind power is one of the newest activities in the zone, and is concentrated in the study area.

About 40 km away from the study area, in the Pico Truncado area of Deseado Department, the "Jorge Romanutti" wind farm is currently operational.

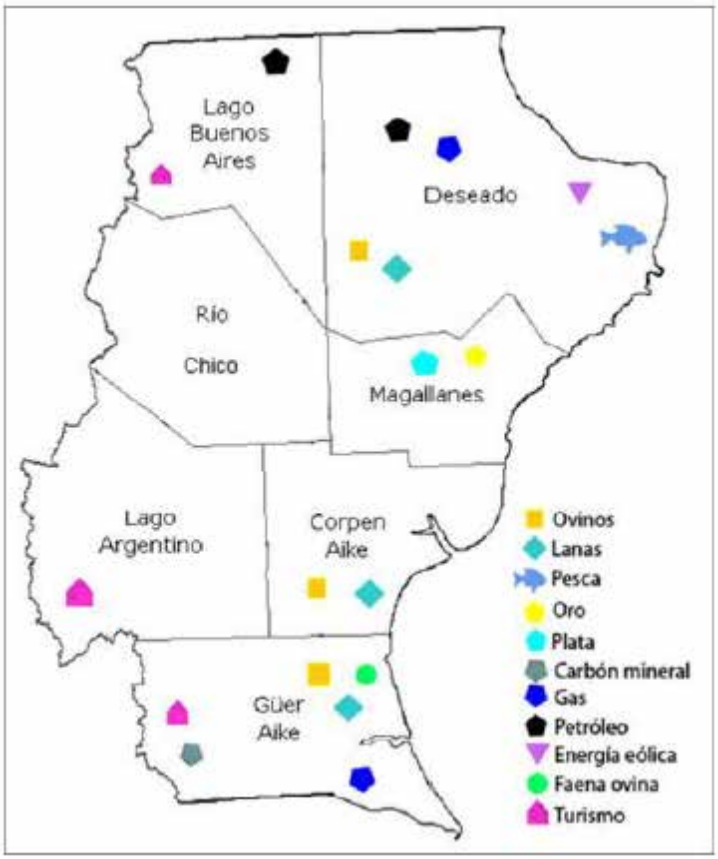


Figure 04. Relevant productive activities in the Departments of Santa Cruz Province.

(Source: DINREP)

Ovinos	Sheep
Lanas	Wool
Pesca	Fishing
Oro	Gold
Plata	Silver
Carbon mineral	Mineral coal
Gas	Gas
Petróleo	Oil
Energía eólica	Wind power
Faena ovina	Sheep slaughter
Turismo	Tourism

Figure 35. Oil drilling in the area.

7.4.6 NATIONAL, PROVINCIAL AND MUNICIPAL PROTECTED AREAS

The following are the protected areas nearest the Project:

- **Humedal Caleta Olivia** (wetland). Provincial and Municipal Nature Reserve. Provincial Law 2563 and Ordinance 3144/00.
- **La Caleta.** Municipal Nature Reserve. Decree 688/92.
- **Barco Hundido.** Provincial Reserve. Law 2605.
- **Meseta Espinosa – El Cordón.** Hydrogeological Reserve Area.
- **South American Sea Lion.** Municipal Natural Monument.

Due to the fact that the nature reserves Humedal Caleta Olivia, La Caleta, Barco Hundido and South American Sea Lion are not within the Project Area, they will not be affected by the Project.

7.5 CULTURAL HERITAGE

7.5.1. ARCHAEOLOGICAL HERITAGE

In June 2016, a field survey was conducted and the Archeological Impact Study (EIArq) was prepared for the Cañadón León Wind Farm project (See Appendix 09 – Archeological Impact Study) by Archaeologist Licentiate Matías Ambasch, with Archaeologist Licentiate Pablo Andueza in charge of office work.

Prospecting found no archaeological remains. Nevertheless, road construction and other tasks involving earthworks might bring about fortuitous findings underground.

The absence of archaeological materials might be due to the fact – among many others – that the area is already under relatively high anthropic development and impact. Another variable may be that most of the survey area is located on the plateau zone, which may be more related to places of seasonal transit in population dynamics, and therefore site formation tends to be low or null (Ambasch and Andueza, 2014).

Therefore, based on the aforementioned archaeological situation and background evaluated, the Project is defined as having Low Archaeological Sensitivity.

Notwithstanding, it should be mentioned that given the characteristics of the sandy surface soil that predominates over large stretches of relief, and the strong wind erosion that moves the surface cover, the possibility of potential findings as a result of any movement of the surface cannot be dismissed. Systematic management is therefore required, for which a plan of procedures is attached hereto. It is recommended that this plan should be made known to the personnel involved.

Considering the above, archaeological risk is predicted to have null impact. It should be stressed that this consideration is valid as long as the pre-established recommendations and those described in the Archaeological Impact Study are followed. The application of these recommendations is reinforced by national and provincial legislation in force.

7.5.2 PALEONTOLOGICAL HERITAGE

With the aim or preserving any fossil remains of systematic interest that may be found in the sedimentary units affected during the construction of Cañadón León Wind Farm, a Paleontological Impact Study was conducted (See Appendix 10 – Archaeological Impact Study).

A field survey was conducted during July 2017 to recognize the different rocks outcropping in the site proposed for installation of wind turbines and its surroundings, supported by literature and regional background.

The main focus was on adequate stratigraphic levels which, due to their lithology, depositional environment and erosion level, have greater potential for fossil preservation. GPS, geological maps, topographic maps and satellite images were used in the field to record the tracks covered in the study area. Office work was performed with the help of images, maps, photographs and literature.

The search for fossil remains was performed following the usual method, which consists of a walk and detailed observation of the area, prioritizing areas where vegetation cover and/or soil enable geological units to be identified, with the aim of identifying macroscopic fossil remains.

This study is based on National Law 25743 of June 2003 on the Protection of Archaeological and Paleontological Heritage, and Law 3137 of July 2010 on archaeological and paleontological heritage of Santa Cruz Province, which replaces the previous Law 2742 of 1997. The enforcement authority is the Office of the Director of Cultural Heritage, which depends on the State Secretariat of Culture of Santa Cruz Province.

At the point 46°35'24.71"S 67°42'7.85"W, numerous Ostrea specimens were observed in the Monte León Formation. The paleontological importance of this unit has been described above. The points where wind power generation units will be built are located on the fluvial terraces, which have little paleontological background and relatively low potential for fossil preservation.

The fluvial terrace which will be directly affected by the Project under evaluation corresponds to Level I of the Rio Deseado Fluvial Terraces System, dating back to the Lower Pliocene (Martinez, 2001). Lithologically, it consists of gravel and sand with carbonate cement, with cross stratification, and to a lesser extent, parallel stratification. Individual clasts can be greater than 10 cm, and are generally ovoid, sometimes imbricate according to the paleo-flow direction. These deposits were generated by multi-channeled fluvial systems with crisscross patterns, which present major variations in power according to the paleo-relief on which

deposition occurred, and also lateral facies variations. Lateral facies range from conglomerate to sandy, with the latter having greatest potential for preservation of fossil remains.

Considering that the excavations for installing the wind turbines will be 18 m across and 2.65 m deep, they might reach underlying levels of the Monte León Formation. It is therefore suggested that the potential finding of fossiliferous levels in this unit should be considered during excavation.

Figure 36. Outcropping of Monte León Formation. 46°35'24.71"S 67°42'7.85"W

Figure 37. Fossil oysters from Monte León Formation.

46°35'24.71"S 67°42'7.85"W

From the field survey and analysis of literature and satellite images, it is concluded that there is no paleontological impediment to the project.

Notwithstanding, and considering the limitations of the field surveys, the report suggests a series of actions to be followed in case of any findings.

8. LEGAL FRAMEWORK

The following federal and provincial regulations may apply to this Project.

8.1 NATIONAL LEGISLATION ON ENVIRONMENT AND ON LABOR

- **National Constitution. Article 41.** Establishes the environmental rights of all inhabitants (healthy, balanced environment, apt for human development, enabling productive activities to satisfy present needs without compromising the needs of future generations; and the duty to preserve the environment). **Article 43.** Any person may file an expedited and rapid lawsuit for "amparo" (protection), as long as there is no other more appropriate legal procedure "… They may file this lawsuit against any form of discrimination and with relation to rights that protect the environment…". **Article 75.** Establishes the attributes of the National Congress with relation to recognition of the ethnic and cultural preexistence of Argentine indigenous peoples and ensures the participation of these peoples in the management of their natural resources and other interests affecting them. The provinces may concurrently exercise these attributions. **Article 124.** Recognizes the eminent domain of the Provinces over their natural resources. Such eminent domain entitles the Provinces to regulatory powers and jurisdictional powers over their natural resources.
- **Law No. 19,549. Creates the figure of Counsel for the Defense of the People of the Nation.**
- **National Law No. 19,552.** Electric transmission line administrative easements – regulates the conditions and restrictions to property based on the need to extend the electrical transmission system.
- **National Law No. 19,587, Decree No. 351/79 as amended. On workplace health and safety.** Establishes basic guidelines for a preventive policy for mitigation and control of workplace hazards, tending to: i) protect life, preserve and protect workers' psycho-physical integrity; ii) prevent, reduce, eliminate or isolate the risks of different workplaces or jobs; iii) encourage and develop a positive attitude to prevention of accidents or diseases that may derive from job activity. **Resolution No. 592/04** establishes Regulations for Execution of Work with Voltage in Electrical Installations Higher than One Kilovolt. Establishes that it is mandatory for employers that work with voltage to make available to the health and safety committees the Training Programs for workers who perform such tasks. **Resolution No. 3,068** establishes the regulation for Execution of Work with Voltage at Electrical Facilities with voltage equal to or higher than ONE KILOVOLT (1 KV). **Decree No. 911/96** establishes the Regulation for Health and Safety for the Construction Industry.
- **Law No. 20,284. Preservation of the air resource.** Establishes that any source of atmospheric contamination must be regulated and that each Province shall determine maximum emission levels.
- **Law No. 20,744. Law of Work Contracts. Regulatory Decrees 762/14 and 759/14.** Incidental Service Companies and User Companies.
- **Law No. 21,386. Natural and Protected Areas.** Covers world heritage, cultural and natural protected areas. Establishes the duty of not deliberately taking any measure that could harm, directly or indirectly, any cultural or natural heritage. Also provides that National Parks Administration shall be the enforcement authority for the matter.
- **Law No. 22,344. Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES.** Argentina adhesion

- **Law No. 22,421. Conservation and recuperation of fauna**. This law considers at federal level hunting, harassment, capture or destruction of young, nests, eggs or dens; possession, transit, use, trade or transformation of wildlife and its products or byproducts. **Law No. 26,447** replaces **Article 35** on protection and management of wildlife in protected areas or monuments under federal administration. **Resolution 1030/2004**. Determines classification scores for amphibian, reptile and mammal species. **Resolution 348/2010**. Determines classification scores for birds.
- **Law No**. **22,428 and Regulatory Decree No. 681/81. Soil conservation and recovery.** Declares soil conservation and recovery of soil productive capacity to be of general interest.
- **Law No**. **23,778. Montreal Protocol on substances that deplete the ozone layer**. Argentina adhesion.
- **Law No**. **23,992. Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal**. Argentina Adhesion.
- **Law No. 24,051. Hazardous Waste and Decree No. 893/03.** Regulate the generation, manipulation, transportation, treatment and final disposal of Hazardous Waste.
- **Law No. 24,295. United Nations Framework Convention on Global Climate Change**. Argentina adhesion.
- **Law No**. **24,375. International Convention on Biological Diversity**. Argentina adhesion.
- **Law No**. **24,449 and Decree No. 779/95. National Transit Law, limits on contaminating emissions, noise and parasitic radiations**.
- **Law No. 24,557. Workplace risks and regulatory decrees**. The aims of this law are to i) reduce claims through a preventive approach to workplace risks, ii) repair damages caused by workplace accidents and occupational diseases, including rehabilitation of affected workers; iii) promote requalification and repositioning of affected workers; iv) promote collective labor negotiation for improvement of preventive and compensatory measures; and v) oblige all actors to adopt legally provided measures to effectively prevent workplace risks. Among other points, the Law establishes mandatory coverage by Labor Risk Insurance Companies (ART) and agreement and compliance with Improvement Plans between the Employer and the relevant ART. When personnel has employee status, Health and Safety Services must be provided by licensed professionals and there must be compliance with the Improvement Plans agreed upon with the ART.
- **Law No. 25,019 and Decree No. 1597/99. Wind and Solar Power**. Declares wind and solar power generation to be of national interest throughout the national territory and establishes mechanisms to foster the development of projects.
- **Law No**. **25,438. Kyoto Protocol of the United Nations Framework Convention on Climate Change**. Argentina adhesion.
- **Law No. 25,557 and Regulatory Decree 170/96. Workplace Risks.** Prevention of risks and compensation for job-related damages suffered by workers. Establishes the figure of Labor Risk Insurance Companies (ART) for private control over Health and Safety conditions in the workplace.
- **Law No. 25,670 on PCBs and Decree No. 853/07. Assumptions for PCB Management and Elimination.** Establishes the basic environmental protection assumptions for PCB management and elimination throughout national territory.
- **Law No. 25,675. General Environmental.** This law of public order has installed in Argentina a legal order, with substantial and procedural provisions, regulating Article 41 of the National Constitution which establishes that any **environmental damage**

"will generate as a priority the obligation to repair". It establishes environmental policy aims and principles, and determines instruments for environmental management such as evaluation of environmental impact, environmental diagnosis and citizen participation, interjurisdictional management institutions an environmental judicial competency.

- **National Law No. 25,688. Regime for Environmental Management of Water**. This law establishes the minimum environmental assumptions for preservation and rational use of water.
- **National Law No**. **25,743 and Decree 1022/04. Protection of Archaeological and Paleontological Heritage**. Establishes the preservation, protection and custody of Archaeological and Paleontological Heritage as part of National Cultural Heritage and its scientific and cultural use. The regulation provides that Archaeological Heritage comprises movable or immovable assets or remains of any kind found on the surface, subsurface or submerged in jurisdictional waters, which could provide information on sociocultural groups that lived in the country from pre-Columbian times to recent historical times. It establishes that any archaeological and paleontological materials found are domain of the State with jurisdiction at the finding site.
- **National Law No. 25,916. Household Waste Management.** Establishes the minimum assumptions for management of household waste.
- **National Law No. 26,190. Renewable Energy Sources**. Incentive measures for production of electric power from renewable resources.
- **Law No**. **26,305. Convention for the Protection and Promotion of the Diversity of Cultural Expressions**. Argentina adherence.

8.2 PROVINCIAL LEGISLATION ON ENVIRONMENT AND ON LABOR

- **Santa Cruz Provincial Constitution, Article 52.** Claims eminent domain of the Province over natural resources, renewable or not, covering the ground, underground, adjacent sea, coasts, sea bed, continental shelf and air space, and over minerals and fossils, especially hydrocarbon reservoirs, fishing resources and energy sources. **Article 73** specifies the right to enjoy a healthy environment.
- **Law No. 786, as amended by Laws 2,549 and 2,580. Protection of Natural Heritage.** Regulates the protection of Provincial Parks, Natural Monuments and Provincial Reserves. Prohibits in them any economic exploitation.
- **Law No. 949. Workplace Health and Safety**. Approves the Health Code applicable to industrial activities that may affect public health and complementary regulations.
- **Law No. 1,313. Air.** Adheres to **National Law No. 20,284,** without regulating with any specific local parameters.
- **Law No. 1,451 as amended by Laws 2,480; 2,625 and 2,701. Provincial Water Code.** Regulates the study, use and conservation of non-maritime provincial public waters, except private waters which are subject to provisions issued by competent authority. **CAP (Provincial Agrarian Council) Resolution No. 988/2002** designates the Provincial Department for Water Resources, which depends on the Provincial Agrarian Council, as enforcement authority for the Law. In addition, **Ruling No. 4/1996** of the Provincial Department for Water Resources regulates the protection of water resources, establishing a table of parameters and permitted discharge levels, quality standards for water sources, sampling techniques and analysis methods.
- **Law No. 229. Soils**. Regulates soil conservation and use of provincial natural resources.
- **Law No**. **1,427. Wildlife protection**. Establishes the responsibility of the Province for creating nature refuges and sanctuaries; fostering raising in captivity; establishing

hunting provisions, zones, seasons and bans; and controlling harmful species. It enables the enforcement authority to declare as protected any endangered wild animal species. **Decree No. 468/1995** designates the Provincial Agrarian Council as enforcement authority for the Law.

- **Law No. 2,472. Protection of Cultural Heritage.** Defines as integral assets for the law any that "…due to their exceptional value from the standpoint of history, art and science, deserve to be preserved and known by the population over generations, as permanent features of the identity of Santa Cruz" and classifies as part of the Heritage any monuments, historical sites, archaeological and paleontological sites.
- **Law No. 2,658, as amended by Law 2,792, which amends Articles 4 and 6 of Decree No. 7/2006. Environmental Impact Assessment**. Establishes a clear, precise outline for Environmental Impact Assessment, from the presentation of the Manifesto of Environmental Impact to the securement of the Statement of Environmental Impact.
- **Law No. 2,567, as amended by Law No. 2,703 and Regulatory Decree No. 712/2002. Hazardous Waste**. Establishes guidelines for generation, manipulation, transportation and final disposal of Hazardous Waste in the Province. **SSMA (Sub-secretariat of Environment) Rulings No. 2/2002 and 3/2002** approve the list of basic requirements of the Provincial Registry of Hazardous Waste Generators, Transporters and Operators. **SSMA Ruling No. 4/2002** creates the Provincial Registry of Technologies to be Implemented for Hazardous Waste Treatment.
- **Law No. 2,829. Household Waste.** Adheres to **National Law No. 25,916**. Prohibits disposal of household waste in open dumps. Establishes responsibility of municipalities regarding collection and transportation of waste. **Ruling No. 183-SMA/2007.** Opens registration of Urban Solid Waste Operators, created in Provincial Law 2829.

8.3 LEGISLATION ON POWER

- **SE (Secretariat of Energy) Resolution No. 304/99. Conditions and requirements to be fulfilled by owners of wind facilities for power generation to enter the MEM (Wholesale Electricity Market).** Requires companies to conduct the Environmental Impact Assessment for the project, considering the parameters of the natural system and the social system, in accordance with the method provided in **Resolution No. 149/90**, in points 4.2.4 (Preliminary diagnosis of the environmental system); 4.2.4.2 (Natural Sub-system) and 4.2.4.3 (Social Sub-system).

National Electricity Regulatory Agency (ENRE)

- **ENRE Resolution No. 178/07.** Establishes the minimum contents for the Environmental Management Plan.
- **ENRE Resolution No. 197/11, as amended.** Requires MEM (Wholesale Electricity Market) generating companies to prepare an implement an Environmental Management System (SGA).
- **ENRE Resolution No. 555/2001, as amended.** Establishes minimum contents for the Plan and the Environmental Management Manual for generators, transmitters and distributors. Requires that they implement and certify an **Environmental Management System** which includes programs for i) solid and semisolid waste management, ii) liquid effluent and atmospheric emission management, iii) prevention of environmental emergencies and iv) monitoring and recording environmental parameters and emissions and discharges of different kinds.

9 IDENTIFICATION, DESCRIPTION AND EVALUATION OF ENVIRONMENTAL IMPACTS

9.1 PROJECT ACTIONS WITH POTENTIAL IMPACT

Firstly, any tasks to be performed during the different phases of the Wind Farm Project and which might affect the environment are identified.

9.1.1 CONSTRUCTION PHASE

Activity	Tasks
Earthworks	Earthworks related to construction of foundations, crane pad, temporary/permanent installations, Temporary Waste Area, supply/equipment storage area, trenching, sewage treatment system, among others. Includes temporary or permanent disposal of material produced by earthworks.
Vehicle circulation and operation	Circulation and operation of heavy equipment (excavators, loaders, bulldozers, etc.), trucks and cranes for movement of materials and supplies (includes concrete mixers), trucks and cranes for installation of wind turbines, and light vehicles for transportation of personnel.
Electric generator equipment operation	Operation of equipment to generate electricity as a source of power to support construction work.
Construction of permanent facilities	Mounting wind turbines, construction of principal substation, control and maintenance building, sewage treatment system, among others.
Site clearing	Clearing the site involving removal of vegetation cover.
Restitution of affected ground	Actions to reclaim the landscape in order to mitigate impacts when work is completed on foundations, trenching and internal roads.
Inadequate waste management	Involves inadequate management of solid and semisolid waste: iron (scrap), household (food, packaging, etc.) and hazardous (grease or any solid contaminated with hydrocarbon derivatives); hazardous liquid waste (fuel, vehicle and transformer oil) and wastewater from toilets (blackwater) and dining / kitchen facilities (greywater).
Concrete plant operation	Activities tending to improve ground resistance to transit by improving its load capacity.
Ground compaction	Activities tending to improve ground resistance to transit by improving its load capacity.

Table 33. Construction Phase activities with impact.

9.1.2 OPERATION AND MAINTENANCE PHASE

Activity	Tasks
Vehicle circulation and operation	Light vehicle circulation during general maintenance tasks or circulation and operation of trucks/cranes during annual maintenance or repairs due to contingencies to the wind turbines.
Presence of permanent facilities	Presence of all permanent facilities at the wind farm: wind turbines, main substation, control and maintenance building, among others.
Operation of wind turbine equipment	Wind turbine operation and maintenance tasks.
Inadequate waste management	Involves inadequate management of solid and semisolid waste: iron (scrap), household (food, packaging, etc.) and hazardous (grease or any solid contaminated with hydrocarbon derivatives); hazardous liquid waste (fuel, vehicle and transformer oil) and wastewater from toilets (blackwater) and dining / kitchen facilities (greywater).
Use of wind power sources	Benefits to Quality of Life of persons as a result of the use of wind turbines as a clean source for electric power generation.

Table 34. Operation and Maintenance Phase activities with impact.

9.1.3 CLOSURE PHASE

Activity	Tasks
Dismantling wind turbines	Tasks to dismantle and remove wind turbine parts. Includes dismounting parts and placing on transportation vehicles.
Vehicle circulation and operation	Circulation and operation of heavy equipment (excavators, loaders, bulldozers, etc.), trucks and cranes for removing scrap and demolition residues.
Filling, leveling, scarifying and re-vegetation.	Actions to reclaim the landscape in order to mitigate impacts when work is completed on foundations, trenching and internal roads.
Inadequate waste management	Involves inadequate management of solid and semisolid waste: iron (scrap), household (food, packaging, etc.) and hazardous (grease or any solid contaminated with hydrocarbon derivatives); hazardous liquid waste (fuel, vehicle and transformer oil) and wastewater from toilets (blackwater) and dining / kitchen facilities (greywater).
Use of wind power sources	Loss of benefits to Quality of Life of persons as a result of the use of wind turbines as a clean source for electric power generation.
Demolition /	Excavation, removal of wind turbine foundations and removal of

removal of foundations and permanent structures	main substation / other facilities.
Unemployment	Creation of unemployment due to dismissal of direct personnel and reduction of jobs at service companies related to the Wind Farm.

Table 35. Closure Phase actions with impact.

9.2 POTENTIALLY IMPACTED ENVIRONMENTAL FACTORS

According to the above description of the physical and inert, biotic and socioeconomic settings, the following factors and subfactors have been identified in the receiver system, which may be affected by Project actions.

System	Setting	Factor	Subfactor	Description	
NATURAL PHYSICAL	Inert	Air	Air quality	Perception through the senses of particulate matter and combustion gases. Includes effect of Greenhouse Gases on the ozone layer.	
		Water	Surface water	Effect on surface water resources, both permanent (watercourses, ponds and lakes) and temporary (lowlands and runoff).	
			Ground water	Effect on phreatic level and water extraction for preparing concrete.	
		Ground	Topography	Effect on landforms.	
			Edaphology	Chemical or physical alteration of soil surface horizon.	
			Erosion	Degradation and conveyance of soil or rock caused by different agents (wind, water, temperature, human activity, etc.)	
			Restriction to land use	Limitation of land use as a result of Project activity.	
	Biotic	Vegetation	Shrub stratum	Quality of habitat	Effect on quality of habitat, understood as environmental capacity to provide appropriate conditions for persistence of an individual and/or a population.
				Bio diversity	Effect on diversity of specimens present in the Project Area.
				Endangered species	Effect on endangered species according to Red List and IUCN classifications.

			Herbaceous stratum	Quality of habitat	Effect on quality of habitat, understood as environmental capacity to provide appropriate conditions for persistence of an individual and/or a population.
				Bio diversity	Effect on diversity of specimens present in the Project Area.
				Endangered species	Effect on endangered species according to Red List and IUCN classifications.
			Vegetation in protected natural areas	Effect on plant species present in Protected Natural Areas near Project Area.	
		Wildlife	Mammals	Behavior	Effect on behavior of individuals in response to external stimuli from the environment. Includes migration, adaptation, feeding and breeding habits, among others.
				Quality of habitat	Effect on quality of habitat, understood as the ability of the environment to provide appropriate conditions for persistence of an individual and/or population. Includes actions on sites used for shelter, feeding and breeding.
				Biodiversity	Effect on diversity of specimens present in the Project Area.
				Endangered species	Effect on endangered species according to Red List and IUCN classifications.
			Birds	Behavior	Effect on behavior of individuals in response to external stimuli from the environment. Includes migration, adaptation, feeding and breeding habits, among others.
				Quality of habitat	Effect on quality of habitat, understood as the ability of the environment to provide appropriate conditions for persistence of an individual and/or population. Includes actions on sites for shelter, feeding and breeding.

				Biodiversity	Effect on diversity of specimens present in the Project Area.
				Endangered species	Effect on endangered species according to Red List and IUCN classifications.
			Reptiles / Amphibians	Behavior	Effect on behavior of individuals in response to external stimuli from the environment. Includes migration, adaptation, feeding and breeding habits, among others.
				Quality of habitat	Effect on quality of habitat, understood as the ability of the environment to provide appropriate conditions for persistence of an individual and/or population. Includes actions on sites for shelter, feeding and breeding.
				Biodiversity	Effect on diversity of specimens present in the Project Area.
				Endangered species	Effect on endangered species according to Red List and IUCN classifications.
			Wildlife in protected natural areas	Effect on wildlife species present in Protected Natural Areas near Project Area.	
	Perceptive	Landscape	Visual impact	Effect on visual perception of the permanent population living near the project area and occasional passers-by.	
SOCIOECONOMIC	Socioeconomic	Personnel hired	Personnel health	Effect on personnel psycho-physical health and job-related workplace hazards.	
			Direct and indirect employment	Effect on local or regional population's employment as a result of job source development.	
		Health of nearby	Noise disturbing the neighborhood (IRAM 4062)	Effect on health and quality of life of nearby population related to noise disturbance and the psycho-physical stress caused by it.	

		population	Other effects on population health	Effect on health of nearby population caused by exposure to external agents such as suspended particulate matter, increased traffic, electromagnetic fields, shadow flicker, among others.
		Socio-economic setting	Economic activity	Effect on regional economy with modification of flow of income.
			Cultural heritage	Effect on cultural, historical, archaeological and paleontological resources.
		Infrastructure	Electricity	Effect on local and regional electricity infrastructure. Includes construction of a connection HVL, change in regional installed capacity and consequent change in energy mix.
			Roads	Effect on land transportation infrastructure including national or provincial routes, byroads, etc. Includes variation in traffic flow, changes in thoroughfares, among others.

Table 36. Impacted factors and subfactors.

9.3 METHODOLOGY FOR IMPACT ASSESSMENT

The methodology used for impact assessment was based on Conesa Fernández Vitora - *Guía metodológica para la evaluación del impacto ambiental*, 1997). It involved preparing a double entry matrix or cause-and-effect matrix, where columns are environmental factors and rows are impacting actions.

Impact Importance is a qualitative assessment which results from the degree of incidence or intensity of the alteration and the characterization of the effect, which involves a series of qualitative attributes such as extent, type of effect, time to manifestation of impact, persistence, reversibility, recoverability, synergy, accumulation and periodicity. These factors were individually assessed by the multidisciplinary team as specified below. The meaning of these factors is described below.

1. Sign. The beneficial (+) or detrimental (-) effect of the different actions impacting the factors considered.

2. Intensity (IN). The degree of incidence of the action on the factor, i.e., degree of destruction on the factor.

3. Extent (EX). The theoretical area of influence of the impact with relation to the surroundings of the project with relation to percentage of surrounding area where the effect is felt.

4. Moment (MO). Time to manifestation of impact, or moment, is the time between the occurrence of the action and the beginning of the effect on the environmental factor considered.

5. Persistence (PE). Estimated time for which the effect will last – from the moment it appears to the moment when the affected factor would recover its original condition. Persistence is independent of reversibility.

6. Reversibility (RV). The possibility of returning by natural means to the initial conditions that existed prior to the impacting action, once said action stops acting on the environment.

7. Recoverability (MC). The possibility of reconstruction, total or partial, of the factor affected by the project, i.e., the possibility of returning to the original conditions prior to the effect, by means of human intervention (corrective actions).

8. Synergy (SI). Reinforcement among two or more single effects. The full effect caused by actions occurring simultaneously is greater than the effect that would be expected if the actions causing them were independent rather than simultaneous.

9. Accumulation (AC). The progressive increase in the effect when it persists continuously or when the action causing it is repeated.

10. Periodicity (PR). Regularity of the effect. May be cyclical or recurrent (periodical effect), unpredictable over time (irregular) or constant over time (continuous effect).

The following Table shows the variation for each of the above items.

SIGN	
Beneficial effect	+
Damaging effect	-
EXTENSION (EX) (area of influence)	
Isolated	1
Partial	2
Extensive	4
Total	8
Critical	(+4)
PERSISTENCE (PE) (Permanence of the effect)	
Fleeting	1
Temporary	2
Permanent	4
SYNERGY (SI) (Reinforcement among single effects)	
No synergy (single)	1
Synergic	2
Highly synergic	4
EFFECT (EF) (Cause-effect relationship)	
Indirect (secondary)	1

Direct	4
RECOVERABILITY (MC) (Reconstruction by human action)	
Immediately recoverable	1
Recoverable in the medium term	2
Mitigable	4
Irrecoverable	8
INTENSITY (IN) (Degree of destruction)	
Low	1
Medium	2
High	4
Very high	8
Total	12
MOMENT (MO) (Time to manifestation of impact)	
Long term	1
Medium term	2
Immediate	4
Critical	(+4)
REVERSIBILITY (RV)	
Short term	1
Medium term	2
Irreversible	4
ACCUMULATION (AC) (Progressive increase)	
Single	1
Accumulative	4
PERIODICITY (PR) (Regularity of effect)	
Irregular or discontinuous	1
Periodical	2
Continuous	4

Table 37. Assessment of the impact importance

Impact Importance (I). Each subfactor is analyzed by means of matrices regarding the potentially impacting actions, using the following equation:

$$I = \pm(3 \times IN + 2 \times EX + MO + PE + RV + SI + AC + EF + PR + MC)$$

Equation 01. Calculation of Impact Importance (I).

Weighted Impact Importance (IP). In order to determine the relative importance of each subfactor with respect to the other subfactors analyzed, a base of **1000 importance units (UIP)** is considered for the total subfactors. This 1000 UIP basis is used to weight each subfactor.

The weighted value for each environmental subfactor arises from the analysis performed by the multidisciplinary team based on the field survey and experience with similar work. As a reference, the weighting range used in UIP and its meaning regarding its degree of importance in the framework of potential project effects is provided below.

Weighting range (in UIP)	Degree of importance	Development
0 to 30	Low	Subfactor with low or null probability of being affected by impacting project actions.
31 to 70	Medium	Subfactor with probability of being affected by impacting project actions.
71 to 100	High	Subfactor with high probability of being affected by impacting project actions or with high environmental sensitivity.

Table 38. Weighting ranges.

Dividing each weight by the 1000 UIP base provides the **Weighted Percentage** for each subfactor.

$$weighted\% = \frac{subfactor\ UIP}{1000}$$

Equation 02. Weighted Percentage.

The Weighted Percentage is applied to each Impact Importance value, providing **Weighted Impact Importance.**

$$IP = \text{weighted } \% \text{ x I}$$

Equation 03. Weighted Impact Importance.

Calculating Impact Analysis Matrices. For each Project Phase, firstly, each box in the matrix is completed with the values obtained by applying Equation 01 to the impact analysis of each impacting action (rows) on each subfactor (columns). According to this equation, I values may range from a **minimum of 13** to a **maximum of 100**. Secondly, equations 02 and 03 are applied to obtain IP.

To sum up, the **Impact Importance (I**) value obtained for the impacting action on the subfactor is placed in the first column of each **Individual Effect Matrix for each subfactor**. **Weighted Impact Importance (IP)** is placed in the second column (in the box contiguous to the I value). When all boxes have been filled, they are assigned a color representing degree of severity of the effect (positive/negative) of the action on the subfactor (see **Appendix 11 – T-EIS**) using the colors specified below.

Negative values			
Compatible **(I equal to or less than 25)**	**Moderate** **(I 26 to 50)**	**Severe** **(I 51 to 75)**	**Critical** **(I greater than 75)**

Positive values			
Compatible **(I equal to or less than 25)**	**Moderate** **(I 26 to 50)**	**Severe** **(I 51 to 75)**	**Critical** **(I greater than 75)**

The following are added on the **Impact Analysis Matrices**:

i. **Impact Importance (I)** values of rows and columns.
   - Sum of values **per row** provides **accumulative impact of action** on the different subfactors.
   - Sum of values **per column** provides the **effect of different impact actions on the subfactor**.

ii. Weighted Impact Importance (IP) values of rows and columns
   - Sum of values **per row** provides **weighted accumulative impact of action** on the different subfactors.
   - Sum of values **per column** provides the **weighted effect of different impact actions on the subfactor.**

9.4 RESULTS OF ENVIRONMENTAL ANALYSIS MATRICES

To facilitate visualization of the results provided by the impact analysis matrices, we have created tables showing absolute percentages obtained for each Project Phase, and showing whether the effect is NEGATIVE (harmful) or POSITIVE (beneficial).

9.4.1 CONSTRUCTION PHASE

Impacting actions	Absolute contribution % of impacting action	Effect
Restitution of affected land	25.5%	Positive
Earthworks	15.6%	Negative
Inadequate waste management	13.8%	Negative
Land clearing	13.4%	Negative
Vehicle circulation and operation	10.2%	Negative
Operation of concrete preparation plant	8.8%	Negative

Construction of permanent facilities	6.0%	Negative
Operation of electricity generating equipment	5.3%	Negative
Ground compaction	1.3%	Negative

Table 39. Impacting actions according to contribution to absolute global impact during Construction Phase

Impacting actions	Absolute contribution % of impacting action	Effect
Restitution of affected land	24.4%	Positive
Operation of concrete preparation plant	16.6%	Negative
Inadequate waste management	13.9%	Negative
Earthworks	13.1%	Negative
Land clearing	11.8%	Negative
Vehicle circulation and operation	8.0%	Negative
Construction of permanent facilities	7.1%	Negative
Operation of electricity generating equipment	4.7%	Negative
Ground compaction	0.4%	Negative

Table 40. Impacting actions according to contribution to absolute global impact (weighted) during Construction Phase

Analysis of the above tables shows that in both absolute and relative terms, the greatest percentage of impacting actions is negative (71.32% in the absolute analysis and 61.11% in the weighted analysis). It should be noted that these impacts are fleeting in persistence and short-term because they are related to the duration of construction work. The percentage increase in positive values from one analysis to the other is related to the high assessment value assigned to subfactors such as Behavior (of mammals and birds) during their weighting. Therefore, the positive effect of the impacting action of restoring affected land noticeably increases its percentage of influence compared to the other impacting actions. This reflects the Company's commitment to performing restoration and reclamation activities upon completion of the Construction Phase.

9.4.2 OPERATION AND MAINTENANCE PHASE

Impacting actions	Absolute contribution % of impacting action	Effect
Use of wind power sources	36.49%	Positive
Presence of permanent installations	21.55%	Negative
Operation of wind turbines	20.98%	Negative
Inadequate waste management	13.51%	Negative
Vehicle circulation and operation	7.47%	Negative

Table 41. Absolute Impacting actions according to contribution to global impact during Operation and Maintenance Phase

Impacting actions	Absolute contribution % of impacting action	Effect
Use of wind power sources	38.85%	Positive
Presence of permanent installations	27.39%	Negative
Inadequate waste management	14.91%	Negative
Operation of wind turbines	13.04%	Negative
Vehicle circulation and operation	5.81%	Negative

Table 42. Relative Impacting actions according to contribution to global impact during Operation and Maintenance Phase

Analysis of the Operation and Maintenance Phase shows that weighting the factors does not cause a major change on the absolute analysis, which indicates that there was a correct tendency during the assessment of the different subfactors and in the analysis of the influence of impacting actions on them. It also shows the positive impact of the wind farm startup as a source of alternative energy replacing fossil fuels or hydroelectric sources (36.5% in the absolute analysis and 38.9% in the relative analysis). Regarding negative actions, the most important are related to the presence of facilities, given their proximity to thoroughfares, and wind turbine operation, given its influence on most of the subfactors affected by this type of project.

9.4.3 CLOSURE PHASE

Impacting actions	Absolute contribution % of impacting action	Effect
Reclaiming affected land	34.91%	Positive
Dismantling wind turbines	27.75%	Positive
Inadequate waste management	11.56%	Negative
Use of wind power sources	10.68%	Negative
Unemployment	9.03%	Negative
Vehicle circulation and operation	5.51%	Negative
Demolition / removal of foundations and permanent facilities	0.55%	Negative

Table 43. Absolute impacting actions according to contribution to global impact during Closure Phase.

Impacting actions	Absolute contribution % of impacting action	Effect
Reclaiming affected land	30.99%	Positive
Dismantling wind turbines	28.69%	Positive
Inadequate waste management	12.17%	Negative
Unemployment	11.38%	Negative
Use of wind power sources	10.35%	Negative
Demolition / removal of foundations and permanent facilities	3.29%	Negative
Vehicle circulation and operation	3.14%	Negative

Table 44. Relative impacting actions according to contribution to global impact during Closure Phase.

Due to the fact that during the Closure Phase, actions tending to revert effects will be performed, or sources that generate impacts will cease to exist, the actions with greatest percentage effect are positive: reclaiming affected land and dismantling wind turbines. The positive actions have a major contribution because the Project does not involve large installations which are difficult to dismount, and the Company has planned them with the aim

of enabling Project Area restoration to its original condition. Action with negative effect is the same in both analyses, and related to inadequate waste management.

Finally, in the analysis of effects on subfactors during Closure Phase, Direct and Indirect Economic Activity and Employment stand out as being most affected (both positive). Although wind farm closure means the end of jobs, dismounting the equipment creates an economic flow in the region. Moreover, the existence of other wind farms is considered to indicate that service companies created in the region will relocate to provide services to other similar enterprises. The other subfactors in order of importance in the weighted analysis are related to environmental reclamation actions which have a positive effect on the subfactors Quality of Habitat in herbaceous and shrub strata, birds and mammals. The negative effects on subfactors are related to the activities to be performed during construction work (personnel's health and diffuse emissions affecting air quality) in a similar manner to those analyzed in the Construction Phase.

10. ENVIRONMENTAL MANAGEMENT

Guidelines of the Environmental Management Plan ("PGA") for Cañadón León Wind Farm are provided.

The Environmental Management Plan should be considered as a dynamic tool for each project phase, and should incorporate the conclusions of the study and environmental impact assessment, as well as experience gained during wind farm construction and operation.

The programs included in this Environmental Management Plan are minimum requirements, which should be understood and supplemented with the safety and environment regulations issued by YPF Energía Eléctrica S.A. ("YPF EE") and its controlling company YPF S.A.

Impact prevention and mitigation actions for all Project Phases are provided below.

10.1 PREVENTIVE MEASURES

Air factor

Construction Phase and Closure Phase

- If necessary, roads and areas will be moistened to prevent generation of particulate matter in suspension. The water used to moisten the roads will be provided from authorized sources.

Water factor

Construction Phase

- Roads and drain construction shall be adequately planned to avoid affecting runoff and temporary accumulations. Trenches for cables shall be covered promptly.
- Request permission from the provincial environmental authority to extract well water.

Ground factor

Construction Phase

- Plan construction of easements using existing roads and minimizing intervention on new sites.
- To enter and leave the Project Area, only preexisting access and service roads not wider than 6 meters shall be used, in accordance with SE Resolution No. 546/99. Such roads will be refurbished for such purpose. Throughout the Construction Phase, free circulation along roads and byways shall be ensured, minimizing any obstruction.
- Changes to topography shall be kept to a minimum during construction of internal roads.
- Trenches for laying cables and excavations for foundations shall be covered promptly.
- Notify other users of the project area (private parties using the area for livestock activities) in advance regarding scheduled tasks.
- Place safety signs warning of construction work near sites where work will be performed.

Operations Phase

- Maintenance of perimeter fencing at sites where there is a risk of electric shock, to prevent animals from entering.

Construction Phase, Operations Phase and Closure Phase

- Vehicle maintenance shall be performed outside the Project Area. If such tasks were performed within the project area, the ground must be protected with medium-density polyethylene sheeting.
- Any vehicles entering the Project Area shall be in perfect maintenance condition, thereby preventing potential fuel and/or oil spills.
- Have in place procedures for entering / circulating in the project area to indicate mandatory closing of gates and maintenance of cattle guards to prevent livestock from getting out.
- Any loose animals in the project area shall be reported to site owners.

Vegetation factor

Construction Phase

- Any unnecessary clearing, cutting bushes for firewood and intentional effects on autochthonous vegetation shall be prohibited.

Operation Phase

- Fixed installations, vehicles and transformer equipment shall be equipped with approved fire extinguishers, in accordance with regulations in force.

Closure Phase

- Perform reclamation using the species identified in the Environmental Baseline. Ensure adequate growth.

Construction Phase, Operations Phase and Closure Phase

- Due to the frequent strong winds in the area, if any welding is to be performed, maximum precautions must be taken to prevent sparks from scattering.
- Moving personnel and machinery outside work areas and roads shall not be allowed, in order to avoid any unnecessary effects on the herbaceous stratum. If strictly necessary, circulation shall be over the vegetation in order to minimize the effects on the environment.
- Vehicles involved in construction work shall be parked in previously established and identified areas at the access to the Project Area, far from any kind of flammable substance.

Wildlife factor

Construction Phase

- Birds will be monitored at different times during the project in order to identify any trends and take corrective action if necessary.
- Avoid construction work during breeding season.
- Control noise emissions from electricity generating equipment by performing preventive maintenance tasks.
- Endeavor not to intervene on sites where there is a large number of burrows.

- Prepare an adequate plan prior to beginning construction to ensure the smallest possible intervention on the project area.

Operation Phase

- Have perimeter fencing in place and maintain it adequately to reduce the risk of electrocution to species.
- Birds will be monitored during the different project phases in order to identify any trends and take corrective action if necessary.

Construction Phase, Operations Phase and Closure Phase

- Contractors will be required to present their Vehicle Technical Verification certificates with the aim of reducing diffuse emissions of combustion gas and noise from vehicles lacking maintenance.
- Company personnel, contracted personnel and/or third parties shall be educated regarding specific subjects of waste management, safety and health, and environment.
- Intentional effects on existing livestock and autochthonous wildlife shall be forbidden. Hunting shall not be allowed in the project area.
- If any livestock is present, it must be kept out by using appropriate equipment (electric fencing or protective fencing) and livestock owners shall be notified.

Landscape factor

Construction Phase and Closure Phase

- During summer months, moisten any ground where a lot of particulate matter is generated.
- Place a sign on the road to warn of presence of suspended dust.

Construction Phase, Operation Phase and Closure Phase

- If waste could be carried by the wind (cardboard, paper, packing tape, etc.), containers should be covered to prevent waste from flying away.

Socioeconomic factor

Construction Phase

- Personnel shall be trained in the procedure of notification in case of archaeological / paleontological findings.
- Provide adequate marking of the HVL for air traffic.
- Install equipment at a distance of not less than TWO HUNDRED METERS (200m) from roads under national or provincial jurisdiction.

Construction Phase and Closure Phase

- Avoid any construction activities during resting hours and at night.

Construction Phase, Operations Phase and Closure Phase

- Livestock must have permanent uninterrupted access to the different parts of the land; access to fields used for grazing shall not be blocked. Ensure adequate

maintenance and closure of fences and gates. New gates shall be provided at sites where the new HVL layout breaches existing fencing. These gates shall be painted in a special color, to be determined.

- For fences running parallel to the HVL, all wires in the fence shall be grounded and sectioned appropriately in order to prevent dangerous induced voltage, as provided in part 8 of ENRE Resolution No. 444/06.
- All personnel involved in Construction, Operations and Maintenance, and Closure tasks shall follow work procedures as established by YPF S.A.
- Any vehicles entering the Project Area shall be in perfect maintenance conditions, thereby preventing potential fuel and/or oil spills.
- Contractors will be required to show their Vehicle Technical Verification certificates in order to reduce diffuse emissions of combustion gas and noise from vehicles lacking maintenance.
- Moisten roads during summer.

Operational Phase

- Ensure that any electrostatic or induced coupling voltage either in normal or in emergency situations on the lower service voltage line do not damage its equipment, its connected loads, its personnel or third parties, as provided in part 8 of ENRE Resolution 444/06.
- Perform periodical maintenance of Grounding of objects that conduct electricity to prevent any electrical discharges that could affect potential passers-by.

10.2 MITIGATION MEASURES

Water factor

Construction Phase

- Agree on a construction plan with the owners of livestock within the Project Area to avoid disturbing their usual activities.

Closure Phase

- As part of the Closure Plan, no intervened runoff shall be left.

Ground factor

Construction Phase and Closure Phase

- Construction time shall be minimized.
- The least possible amount of earthworks shall be performed (given the relief conditions), respecting preestablished measurements and dimensions.
- Given the flatness of the site, earthworks for adapting access and service roads shall be minimal, avoiding levelling or cutting grades, and performing work only on the strips of paths to be removed, avoiding at all times extending work beyond those limits, either by machinery circulating and/or spills of leftover material.
- Soil shall be collected and stored according to identified edaphic horizons. It shall be covered with medium density polyethylene sheeting to prevent it from being carried away by the wind.

Operation Phase

- In the event of a spill of hazardous substances, the spill shall be contained and the affected area remediated by cleaning up the spill and sending any contaminated material to the Temporary Waste Storage Area. A container of absorbent powder, sand or diatomite shall be available to spread on the spill, as well as a plastic shovel to collect the soil affected and store it in a 200-liter covered container.

Vegetation factor

Construction Phase, Operations and Maintenance Phase and Closure Phase

- Any installations liable to cause explosion or fire shall have an adequate fire prevention system or sensor installed, and all areas shall be equipped with fire extinguishers appropriate for electrical incidents.

Wildlife factor

Operations and Maintenance Phase

- Project Area shall be inspected in order to identify any potential (i) waste accumulation sites that could attract birds of prey and/or carrion eaters; (ii) sites with temporary accumulations of water that could attract species that would use them as nesting and/or feeding sites; (iii) presence of nests at the top of wind turbines (gondolas).

Construction Phase, Operations and Maintenance Phase and Closure Phase

- Throughout the different project phases, birds will be monitored in order to identify any trends and take corrective action if necessary.

Landscape factor

Operations Phase

- The tips of the blades shall be painted with reflective paint so that they stand out both to birds and to aircraft. Anti-reflective paint shall be used on the blades to reduce the reflection from them on very bright days.

Socioeconomic factor

Construction Phase

- A Plan for Transportation of Equipment shall be prepared jointly with competent highway authorities in order to prevent risk of accidents during transportation of wind turbines.
- Electrical installation parts, in particular for overhead power lines, shall be designed using standardized materials and specifications in order to prevent or limit the occurrence of phenomena that disturb the electromagnetic field (no sharp angles; finishing shall be neat; clamps properly adjusted, etc.).
- Calculate **safety distances** in accordance with **part 7 of ENRE Resolution 444/06**. Submit calculation log, results and conclusions to the competent provincial environmental authority prior to beginning Construction Phase.

- Calculate **external stress** as provided in **part 10 of ENRE Resolution 444/06**. Submit calculation log, results and conclusions to the competent provincial environmental authority prior to beginning Construction Phase.

Construction, Operation and Maintenance, and Closure Phases

- Have a Contingency Plan in place considering rescue of personnel that may suffer an accident at upper levels, and have the means to attend to an injury due to falling from a height or electric shock.
- Before energizing the HVL and starting up the wind farm, they must be ensured to be in perfect condition for operation. For such purpose, a series of operations shall be performed including, among others, verification of compaction in foundations, condition of circulation along corridors for future maintenance, verification of grounding, etc.
- All safety requirement shall be met, such as warning signs, permanent communication, verification of use of safety equipment by personnel, coordination of teams, etc.

10.3 RESTORATION MEASURES

Actions for the restoration of affected sites to be performed during the Closure Phase with the aim of minimizing any environmental impacts are listed below.

- Preliminary environmental evaluation to ensure there are no signs of environmental liabilities.
- Restoration of geomorphology in the area by filling any trenches and ditches (former base foundations), respecting the lithological profile.
- Creation of conditions to foster natural recovery of the vegetation in the area, including scarification of the ground and planting native species, taking into account the distribution, cover and diversity of species identified in the Baseline Study.
- Any roads no longer needed after the Closure Phase shall be restored to their natural state, to the maximum extent possible.

10.4 RESTORATION MEASURES FOR ENVIRONMENTAL LIABILITY

If the preliminary environmental evaluation at the beginning of the Closure Phase shows existence of any environmental liabilities, action shall be taken in consequence to restore any affected sites in accordance with the regulations in force.

10.5 WORKPLACE HEALTH AND SAFETY AND ENVIRONMENTAL MANAGEMENT SYSTEM

As provided in ENRE Resolution 555/01, once the Operations Phase begins, the Wind Farm will implement and certify a Workplace Health and Safety and Environmental Management System pursuant to international standards. Accordingly, the Workplace Health and Safety and Environmental Management System Manual shall include i) organizational structure, ii) planning activities; iii) responsibilities; iv) emergency prevention program; v) practices, procedures and processes, and vi) resources for developing, implementing, reviewing and maintaining the Workplace Health and Safety and Environmental Management Policy.

10.5.1 RISK MANAGEMENT AND EMERGENCY PREVENTION PROGRAM

The Wind Farm will have in place a general risk management and emergency prevention program for any activities performed. The program is mandatory for both company personnel and contractor personnel.

The aim of the risk management and emergency prevention program is to reduce construction and operation risks to a tolerable, manageable level, from the standpoints of both safety and environment.

The pillars of the emergency prevention program are the following:

- Industrial process risk management
- Preventive and Corrective Maintenance Program
- Registration and investigation of safety and environmental incidents and improvement action management in a corporate GAMA tool.
- Health and Safety Plan
- Contingency Plan.

Any risks inherent to the processes are identified and managed according to the YPF S.A. corporate procedure "Management of Risks and Changes in Industrial Assets". This procedure classifies the different assets and projects according to risk level and defines mandatory studies for each range. These studies identify the specific process risks for each activity, as well as environmental and safety risks, and based on these, mitigatory measures are designed. The procedure itself requires periodical validation of those studies.

The Plant Manager will be responsible for the Preventive and Corrective Maintenance Program, which shall be reviewed and updated annually. Records will be kept of compliance, and such records will be audited at least once a year by YPF EE.

Any safety or environmental incidents with real or potential consequences will be recorded in accordance with the YPF S.A. procedure "Incident investigation registration". Basic causes will be investigated with the aim of identifying them and managing preventive improvement actions to prevent recurrence.

The Health and Safety Plan will be mandatory during the construction phase for all contractors, who must follow the guidelines established in the YPF S.A. procedure "Health, Safety and Environmental Requirements for Contractor Companies in Construction Projects."

The Wind Farm will have in place a Health and Safety Plan for all its activities during the operations phase, which must be within the framework of and YPF EE and YPF S.A. global programs and any applicable legal requirements. Records will be included in YPF EE and YPF S.A. procedures and specific instructions, and must include the following:

- Periodic training for employees and contractors
- Medical health check
- Issuance and control of work permits
- Facility safety inspection
- Regular audit of facility and procedural safety
- Program of safety and environmental meetings and committees
- Record and investigation of safety and environmental incidents

- Annual review of contingency plans
- Safety and environmental induction for new employees and contractors
- Updating of operational procedures
- Safety and environmental statistics.

10.5.2 MONITORING AND CONTROL PROGRAM

During the construction phase, daily monitoring shall be conducted of compliance with guidelines and application of procedures, using the established control system (periodic inspections, scheduled inspections and daily observations).

- Preventive Safety Observations:

A periodic and systematic verification system for compliance (by workers) with safe work execution modes and compliance with safety standards. Its aim is early detection and identification of any significant deviations that could create Unsafe Conditions in the workplace and/or Unsafe Actions by personnel, in order to prevent them.

- Daily inspections:

Basic inspections to be performed on a daily basis, using Safe Task Analyses (STA).

11 ENVIRONMENTAL MONITORING PLANS

The aim of the Environmental Monitoring Plan is to evaluate environmental management, identify any findings that will enable its optimization and correct any undesirable deviations. At the same time, it seeks to comply with legal and regulatory requirements defined by provincial enforcement authorities (Santa Cruz Secretariat of Environment) and national enforcement authorities (Ministry of Energy and National Electrical Regulatory Agency – ENRE). In particular ENRE Resolution 197/11 shall be applicable.

The following actions are provided in the Environmental Monitoring Plan:

a) Noise level measurement, according to IRAM standard 4062 ("Noises that disturb the neighborhood"). These measurements will be made annually or after any extraordinary natural phenomena (heavy rain or wind, lightning, etc.) which may have affected the proper operation of equipment.
b) Vibration measurement. Compliance with IRAM standard 407/89, "Guidelines for evaluation of human exposure to full-body vibrations" shall be verified periodically at the perimeters of the sites. These measurements shall be made annually or when a complaint is lodged by stakeholders.
c) Measurements of electric and magnetic field on the transmission line and the transformer substation. These measurements shall be made on an annual basis, in order to verify compliance with the Ministry of Energy and ENRE regulations in force.
d) Record of impact on birds. Due to the importance of the impact measured by the bird registry, the frequency and scope of monitoring shall meet the recommendations specified in the specialist report currently under preparation. In any case, this monitoring shall be conducted at least annually.
e) Measurement of workplace noise, lighting, drinking water and any other factors provided in the Law on Workplace Health and Safety and supplementary regulations. These shall be performed annually in order to ensure compliance with the regulations in force.
f) Measurement of impact on the community and stakeholders. Opinion surveys shall be conducted periodically among the surrounding community and identified stakeholders with the aim of learning of their opinions and adding them to Wind Farm management.

11.1 AUDITING PROGRAM

In order to ensure compliance with internal and external regulations on environment and safety, and to detect findings and opportunities for improvement to be managed, an Auditing Program will be implemented. The following shall be conducted annually:

- Internal audit on safety and environment
- External audit on compliance with ISO standard 14,000
- Inspection of compliance with legal environmental requirements.

11.2 MONITORING AFTER SITE CLOSURE

As part of site closure tasks, after wind farm life cycle ends, the following will be performed:

- Monitor vegetation restoration
- Monitor impact on birds, in accordance with recommendations in a specialist report.

12 COMMUNICATION ACTIONS

The communications program seeks to articulate the project with the social setting, mainly authorities and community, with the aim of minimizing any potential conflict.

The following actions are defined:

- Use signs to clearly identify company name
- Provide advance notification to competent authorities and third parties that may be affected by the construction work. Notification may be written or over the telephone; in the latter case, communication shall be recorded in a log.
- Provide periodic notification to the environmental authority regarding progress in construction work.

13 CONTINGENCY PLAN

National and provincial regulations require the Company to have in place a **Contingency Plan** similar to the one used in other areas of operation.

The content of the procedure to be followed in case of contingencies provides guidelines on the main actions to be taken in case of emergency. These guidelines shall be reviewed and corrected whenever there are major changes to the initial conditions that caused it.

Appendix 05 is a YPF S.A. contingency plan specifying the calls to be made in case of contingency in the Santa Cruz region. It provides a call procedure according to severity, for emergency situations such as fire, spills, accidents, incidents, drills, well out of control, lost persons, social conflict, sabotage and winter contingency, to which the initials **CS** are appended to indicate that they correspond to the Cañadón Seco site. Levels of gravity of events related to each contingency are provided, as well as for light vehicle driving according to the winter weather conditions. Finally, it contains the procedure for internal recording and communication of the contingency.

14 EXECUTIVE SUMMARY

This project was prepared by **YPF Energía Eléctrica S.A. (hereinafter YPF-EE)** in accordance with requirements of **Law No. 2,658 as amended by Law 2,792 which modifies Articles 4 and 6, and Decree No. 7/2006.** This Project will be located near **Cañadón Seco, Puerto Deseado, Santa Cruz Province.**

The aim of the Project analyzed in this Technical Environmental Impact Study (T-EIS) is the construction and startup of Cañadón León Wind Farm, which consists of 30 **V112-3,3 MW IEC IA 50/60 Hz wind turbines, one transformer substation (SET) and one High Voltage Line (132 kV)** to connect it. Given that wind turbine technology is currently undergoing rapid development, as reflected in the improvement of the power that can be generated, the final details of the wind farm have not yet been determined. Before final implementation of the project, details will be provided on the definite technology to be implemented and the final power to be delivered to the Wholesale Electricity Market (MEM). In order to enable project evaluation, it is estimated that the Wind Farm will deliver approximately **100 MW rated power**. The length of the projected 132-kV high voltage line between the Wind Farm and the connection to the 132-kV line linking the Santa Cruz Norte SET to Caleta Olivia, is approximately 4.5 km.

During the Construction Phase, the project will increase local and regional demand of: (i) services: accommodation for construction personnel, food, earthworks, transportation of personnel, vehicle rental, vehicle repair, water supply, among others; (ii) supplies: construction materials, electrical materials, fuel and oil, among others; (iii) labor: specialized personnel (welders, electricians, engineers, mechanics, etc.) and technical personnel for mounting fixed installations.

Once the Operations Phase begins, and given the sustainable character of the project, the region will have a power resource that will enable consolidation of its energy mix by diversifying generation sources. It should be highlighted that once wind projects are operative, they are compatible with current land use in the project area (extensive livestock raising and grain growing). Finally, it is important to note that this kind of project does not limit, modify or affect the population's microeconomy, but revalues the land use by using the wind resource, which is generally underused.

The construction of this Wind Farm, along with the increase in projects on a regional scale, will enable the development of wind farm maintenance service-providing companies, thereby creating new jobs and specialties.

Given the type of project, after completing the Closure Phase, the risk of creating any Environmental Liabilities that could affect the health of future generations is minimal.

Auditing tasks in the field

On May 12, environmental and social monitoring tasks were conducted in the project area to:

- Establish a biota baseline
- Obtain a soil sample.

On the environmental assessment using weighted impact assessment matrix

The methodology for impact assessment was based on Conesa Fernández Vitora (*Guía metodológica para la evaluación del impacto ambiental*, 1997), using a double entry matrix, called cause-and-effect matrix, where columns are environmental factors and rows are impacting actions. **Impact Importance** is a qualitative assessment which results from the degree of incidence or intensity of the alteration and the characterization of the effect. It involves a series of qualitative attributes such as extent, type of effect, time to manifestation of impact, persistence, reversibility, recoverability, synergy, accumulation and periodicity. These are individually assessed according to experience and project features evaluated in the field and compared to the literature and information provided by the Project Company.

In order to determine the **relative importance** of each subfactor in relation to the other subfactors analyzed, a basis of **1000 importance units (UIP)** is considered for total subfactors. This 1000 UIP basis is used to weight each subfactor.

Conclusions

A Project of these characteristics can be seen to have positive potential for economic development and improvement in quality of life of the population due to the use of a renewable energy source. Moreover, given the dimensions of the Wind Farm project, it will consolidate the diversification of sources in the current energy mix in Santa Cruz Province with wind power, enabling sustainable development in the region. It should be highlighted that proper implementation of prevention, mitigation and/or compensation actions will enable the reduction of observed risks to critical factors such as birds.

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