



YPF LUZ

Supplemental Lenders Information Package (SLIP)

Cañadon Leon Windfarm

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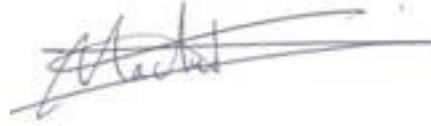
27 June 2019

Supplemental Lenders Information Package (SLIP)

Cañadon Leon Windfarm



Luisa Perez Gorospe
Project Manager



Camille Maclet
Partner in Charge

ERM Argentina S.A.
#2677 Cabildo Ave.
C1428AAI, Buenos Aires City
Argentina

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ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AWEA	American Wind Energy Association
CIA	Cumulative Impact Analysis
CIDT-UNPA	Research, Development and Transference Center of the Austral Patagonia National University
EIA/ESIA/ ETIA	Environmental Impact Assessment / Environmental and Social Impact Assessment
GDP	Gross Domestic Product
GHG	Greenhouse gas emissions
IAEA	International Atomic Energy Agency
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFC PS	IFC Performance Standards
IFI	International Finance Institutions
INDEC	National Institute of Statistics and Censuses
PBP	Provincial Gross Product
RN	National Road
RP	Provincial Road
SADI	Argentinian Interconnection System
SLIP	Supplemental Lender Information Package
VEC	'Valued' environmental and social component
YPF	Yacimientos Petrolíferos Fiscales

EXECUTIVE SUMMARY

The Project

YPF Luz, a subsidiary of YPF S.A., the leading Argentinian power company, proposes developing, building and operating a new windfarm in the vicinity of the village of Cañadon Seco, in the province of Santa Cruz, in southern Argentina.

This Project, named Cañadon Leon, will consist in 29 wind turbines, each with a power rating of 4.2 megawatt (MW), for a total installed power capacity of approximately 122 MW. The Project also includes a power substation within the project footprint and a 3.2 km transmission line connecting the Project to the existing power grid. In addition, but out of the scope of this work, YPF is proposing some upgrades to an existing power substation at the town of Pico Truncado, located approximately 45 km south-west of the project area.

The windfarm will be developed within the boundaries of an existing conventional oil field. It will extend over a total surface area of 18.7 km² (footprint of the boundary of the windfarm), although the actual footprint of the wind turbines and associated facility will be much more limited. An estimated 0.3455 km² will actually be used cumulatively for the 29 wind turbines, substation, access roads, representing 0.85% of the total project area, with 0.18 km² of this footprint being already developed as access roads by the existing oilfield operations. The wider project area has been operated as oil field for several decades, property of and under operation by YPF S.A. All of the windfarms, and the new substation, will be built within the existing oil field.

Construction started in May 2019 with site preparation (topsoil removal and storage) and excavation of foundations for certain wind turbines. The windfarm is expected to be built and ready for commissioning in June 2020.

This document

The Overseas Private Investment Corporation (OPIC) is considering participating to the financing of the Project. OPIC's investment policy requires that, as a condition to financing of projects that OPIC lists as "Category A" projects (i.e. those with potential significant environmental or social risks and impacts), the project be developed in line with the International Finance Corporation (IFC) Environmental and Social (E&S) Performance Standards. This requirement includes demonstrating, through suitable documentation, that the project developer has undertaken an appropriate level of assessment of potential E&S risks and impacts associated with the project, and that suitable mitigation measures are being proposed to avoid, reduce or offset those risks and impacts.

For the Cañadon Leon project, YPF Luz commissioned an environmental and social impact assessment (ESIA) in 2016. This was finalized and permitted in 2017, in line with regulatory requirements of the province of Santa Cruz and Argentina.

As part of the financing process, OPIC undertook a review of the 2017 ESIA documentation and raised a request for further clarification or additional studies on certain aspects. This Supplemental Lender Environmental and Social Information Package (SLIP) was specifically developed to provide responses to OPIC (and their advisors, WOOD) on those aspects.

This SLIP was prepared with support from ERM, in a very short timeframe (end May to mid June 2019). It is based on a review of available information, the consultation of publically available data sources, ERM's in-house review and analysis of E&S aspects related to the Project, as well as a one-day visit to the project area.

Key findings and summary of E&S aspects addressed in this document

Following ERM's visit to the site and desktop review and analysis of potential E&S risks and impacts, it is ERM's opinion that the Cañadon Leon project will have very limited significant negative E&S impacts.

This is thanks to the fact that:

- The Project is being developed within the boundaries of an existing oil field, away from inhabited areas. The two nearest proposed wind turbines will be located at a distance of 1.2 km from the edge of the Cañadon Seco village, in a hilly area, meaning that the Project will be essentially shielded by relief from Cañadon Seco. Other sensitive receptors consist in a small number of nearby residents, located at a minimum of 1.2 km from the nearest wind turbine, and already coexisting with the oil field operation. This means that project-related nuisances or impacts are highly unlikely to directly affect third parties.
- There are virtually no risks or issues associated with land tenure or land use by third party – the Project is being developed wholly on land pertaining to, and already being developed by, YPF. There are no third party claims to the land used by the Project.
- The existing oil field in the project area is already operated by YPF S.A, the parent company of YPF Luz. YPF Luz is actively coordinating and communicating with YPF S.A., thereby providing auspicious conditions for management of risks related to on-site social, environmental, health and safety for workers and communities.

Certain potential risks and impacts were nonetheless identified and are reported in this SLIP. Further detail is provided in the following table, which summarizes the main conclusions presented in this SLIP, as well as in the main document. For all identified potential impacts, YPF Luz proposes implemented specific prevention, control and mitigation measures, summarized in an Environmental and Social Management Plan (ESMP) at the end of this document.

Table 0.1 Summary table of most relevant elements

Element	Description
Project description update	The SLIP provides an updated project description, highlighting change from the description provided in the 2017 ESIA report. This essentially consists in a reduction of the number of wind turbines from 30 to 29, the change of turbine type for a GE turbine with higher power capacity (from 3.8 MW to 4.2 MW), and optimization of the route of the transmission line connecting the field power substation to the existing national grid (3.2 km).
Alternatives analysis	The SLIP provides a discussion of key alternatives for the Project and a justification for the chosen scenario. Note that the fact that the Project is being developed within an operating oil field property of YPF S.A. means that the area is already developed for industrial activities and under EHS management by YPF S.A.
Cumulative effects	A discussion of existing or proposed nearby industrial activities or infrastructure developments is included in the SLIP. The cumulative impact analysis focuses on the superimposition of the Project with existing oil field activities (leading to limited cumulative impacts but to opportunities for impact reduction / mitigation given the existing EHS management of the oilfield), as well as other windfarm developments, all at a distance of more than 30 km from the Project.

Element	Description
Social baseline and stakeholder mapping	<p>The SLIP provides a discussion of the socio-economic baseline of the project area, including a mapping of stakeholders that may have an interest in and/or influence on the Project, or be impacted by the Project.</p> <p>During execution of the study, ERM identified three stakeholder locations that were not reported in the original ESIA; these include two houses along Provincial Road 12 (approximately 1,200 m north of the nearest wind turbine); one farm (“estancia”) specializing in feedlot cattle farming (2,500 m east of the nearest wind turbines) and a rehabilitation center for socially vulnerable youths (2,000 m south-west of the nearest wind turbine).</p>
Stakeholder engagement plan and grievance procedure	<p>This SLIP includes a high-level Stakeholder Engagement Plan, which will include specific commitments for the disclosure of Project-related information to stakeholders, period consultation to collect stakeholder feedback on expectations and potential concerns regarding the Project. The SEP also includes a Grievance Procedure that will allow for the collection, tracking, resolution and monitoring of potential grievance from workers or third parties related to the Project.</p>
Biodiversity / critical habitats	<p>The project area is not deemed to qualify as critical habitat from a habitat assemblage standpoint; however YPF Luz will continue the birds monitoring effort started in December 2018, to provide a one-year birds monitoring dataset, and extend into construction and operation-phase birds / birds mortality monitoring (considerations regarding the monitorings’ methodology are included in Annex C). This will be used to clarify potential sensitivities and impacts related to migrating birds. Should a critical habitat trigger related to migrating birds, and impacts from the Project be identified, YPF will develop a biodiversity action plan with focus on reducing risks of causing impacts to birds from collision during the migratory season. Impacts on avifauna will be assessed and monitored throughout operation through periodic monitoring (eg carcass search, etc.).</p>
Ecosystem services	<p>There are no specific ecosystem services of note potentially impacted by the Project.</p>
Traffic impacts	<p>Potential traffic impacts could be associated with heavy goods transportation in the construction phase (windfarm components, etc.). The project construction services provider (GE) is currently reviewing alternatives for transportation from Caleta Olivia or Comodoro Rivadavia ports, along the coast. There will be no heavy traffic through the residential area of the Cañadon Seco village (the provincial road, Provincial Road 12, avoids this area). The Project will use a traffic management plan that will allow for planning, coordinating, and managing project-induced traffic in such a way as to limit road safety risks and impacts on road infrastructure. This will include due coordination with local / provincial authorities for the definition of preferred routes, timing for crossing urban areas, etc.).</p>
Noise and flicker effect	<p>Noise: The nearest receptors are the edge of the village of Cañadon Seco, located 1.200 m to the east of the project area, and two houses located outside the project area, approximately 1.200 m to the north. Given this distance, it appears very unlikely that receptors will be affected by high-than-ambient noise levels caused by the wind turbines. YPF will confirm this</p>

Element	Description
	<p>through numeric modelling. In addition, in operation, potential impacts related to noise will be assessed and monitored through periodic monitoring and the project's grievance procedure.</p> <p>Shadow flickering: According to IFC guidelines, the predicted duration of shadow flicker should be less than 30 hours per year and be less than 30 minutes per day at all sensitive locations.</p> <p>Based on modelling results, the closest and only residential receptor will have 10-30 minutes of shadow flickering per day (in compliance with the IFC limit), in the worst case scenario. Considering these aspects, the impact is rated as minor.</p>
Climate change risks	<p>A dedicated, high-level climate change risk assessment was conducted as part of developing this SLIP. This assessment concludes that the main potential risk to the Project by 2050 could be bush fires, exacerbated by more frequent occurrence of droughts, and affecting the low-lying, Patagonian steppe vegetation cover of the project area. This is unlikely to create a significant risk to project structures, but may pose a safety risk to workforce. This risk will be duly considered in the development of project emergency planning and fire & life safety plans.</p>
Overall assessment of impacts and proposed mitigation plan	<p>The SLIP includes a review and update of the assessment of potential environmental and social impacts, covering the topics mentioned above, as well as a range of related potential environmental or social impacts. For each impact, specific prevention, control and mitigation measures have been proposed, and are reflected in the ESIA and the Environmental and Social Management Plan (ESMP) included at the end of this document.</p>

1. INTRODUCTION

YPF Luz, a subsidiary of YPF S.A., the leading Argentinian power company, is pursuing financing from International Lenders for the Cañadon Leon wind farm project (which will operate under the legal entity Luz del León S.A.) in Santa Cruz Province, Argentina. The Project has already carried out an Environmental and Social Impact Assessment (ESIA) in line with applicable Argentinian and provincial regulations, and submitted the ESIA report to the relevant government authorities for regulatory permitting, obtaining the Environmental License (DIA N° 2683).

YPF Luz submitted the existing ESIA report to a prospective lender as part of the financing process. The lenders appointed independent consultant made a number of recommendations to complement the ESIA report, with a view to complying with the International Finance Corporation's (IFC) Environmental and Social Performance Standards (IFC PS) and the Equator Principles.

ERM Argentina S.A. (ERM) was mandated by YPF Luz to prepare a Supplemental Lender Information Package (SLIP) for the Cañadon Leon windfarm project. The purpose of the SLIP is to assist lenders in their decision-making processes by providing them documentation beyond that which YPF Luz has already produced for local regulatory compliance to demonstrate Project alignment with applicable lender standards, namely:

- *International Finance Corporation Performance Standards on Environmental and Social Sustainability (IFC PS);*
- *World Bank Group's (WBG) Environmental, Health and Safety (EHS) Guidelines, and specifically the EHS General Guidelines (2007);*
- *IFC Industry Sector Guidelines, specifically for Wind Energy (2015); and*
- *Overseas Private Investment Corporation's (OPIC) Environmental and Social Policy Statement.*

This SLIP document is based on a review of available information, consultation of publically available data sources, as well as a one-day visit to the project area. This included a consultation with the head of administration of the Cañadón Seco village (Jefe de la Comisión de Fomento), a walkover of the village to visit obtain first-hand information on the area and potential nearby receptors; and obtain impressions on the Cañadon Seco infrastructure and interview the local authorities. The visit also included a visit to the project area, including a walkover of turbine locations 15 and 17, and a visit to Estancia La Rosa and the Valdocco Foundation rehabilitation center. The site visit was completed on 31 May 2019, and observations and information obtained were used to feed the different sections of this report.

1.1 Purpose of the SLIP

The purpose of this document is to provide a consolidated report with the various supplementary reviews and assessments relating to the Project, provided by ERM on a series of topics that were identified as having significant gaps in the original EIA studies, including: project description update, social and health, biodiversity/habitat features, description of physical/biological/socio-economical impacts; cumulative impacts, alternatives analysis and climate change. These supplementary studies are either integrated into this document or appropriately referenced; the different "workstreams" undertaken by ERM are listed in Table 1-1.

Table 1-1 Scope of work of the SLIP and relevant sections where key gaps have been addressed

N°	Workstream (as per communication from YPF/OPIC)	Relevant SLIP section
1	Update project layout and provide clarity on project-related land take, number of wind turbines, associated facilities (grid connection, access roads etc.)	Section 2
2	Include Alternatives Analysis (on environmental and social grounds)	Section 3
3	Include Cumulative Effects Analysis (environmental and social focused)	Section 4
4	Include traffic/transport baseline and impact analysis	Annex A
5	Include Climate Change Analysis (what are anticipated impacts from climate change in the region of the Project and how climate change could affect the Project)	Annex B
6	Include map showing route of the 4.5 km transmission line that will connect to the larger transmission line and discuss environmental and social impacts of that transmission line (if within the project's area of influence, suggest being very clear about that)	Section 2
7	Strengthen the "Impact Assessment" section to include more discussion of each potential impact	Section 6
8	Include habitat assessment	Annex C
9	Include information regarding shadow flicker	Annex D
10	Include information regarding other potential community health and safety impacts (worker influx, impacts from worker accommodations, traffic, water use, etc.)	Section 6
11	Information regarding socio-economic baseline survey, social study (stakeholder mapping), information regarding past and current stakeholder engagement activities, and information regarding project information disclosure activities.	Section 5

1.2 SLIP Report Structure

This document is composed of the following sections:

- *Section 1* Introduction
- *Section 2* Project Description Update
- *Section 3* Alternatives Analysis
- *Section 4* Cumulative Effects Analysis
- *Section 5* Social Baseline and Stakeholder Mapping
- *Section 6* Impact Assessment
- *Annexes:*
 - Annex A Heavy Traffic Assessment
 - Annex B Climate Change Analysis
 - Annex C Critical Habitat Assessment
 - Annex D Shadow Flicker Assessment

1.3 ERM Team

This document was prepared by the following ERM specialists:

Name	Role / Area of Expertise	Relevant SLIP section
Camille Maclet	Partner in Charge/ ESIA specialist with Project Finance experience	All – oversight and quality review
Luisa Pérez Gorospe	Senior Project Manager	All – oversight, integration and quality review
Giulio Marin	Biodiversity specialist	Biodiversity, Critical Habitat, Impact Assessment
Javier Odriozola	Technical Director QA/QC	Biodiversity, Critical Habitat, Impact Assessment
Esmeralda Francisco	Technical Review/Social specialist	Social Baseline, Impact Assessment and SEP
Iulia Luta	Social Specialist	Social impacts
Elisabet Torà	Social specialist	Social Baseline, Impact Assessment and SEP
Ben Sussman	Principal Consultant, traffic impacts	Heavy Traffic Assessment
Quentin Chapelier	Climate Change Consultant	Climate Change Analysis
Simone Poli	Senior Environmental Consultant	Shadow Flicker Assessment

2. PROJECT DESCRIPTION UPDATE

2.1 Introduction

2.1.1 Overview of the Project Description Update

This chapter provides a technical description of the updates carried out to the Environmental Impact Assessment (EIA) for the Cañadón León Wind Farm, which is located in Santa Cruz Province, in the Deseado Department. It has been prepared based on information provided by YPF Luz and presents the main characteristics of the Project at a level of sufficient detail to evaluate the latest project design.

2.1.2 Project Area

The Cañadon Leon project site has a total surface area of 40 km² and it is located approximately 1.2km away from the locality of Cañadón Seco. The wider project area is a conventional oil field, under production for several decades (since June 1944), property of and under operation by YPF. The oil field is not fenced off.

The project aims to install 29 wind turbines with a total 122 MW capacity, within the existing oil field, connecting them via a 33 Kv medium voltage electricity line to a centralized substation (to be constructed within the oil field boundaries), which will then ramp up the voltage to 132 Kv. The project substation will then connect to an existing high voltage transmission line that goes along Provincial Road 12 (the Argentine Interconnected System – SADI) via a 3.2 km high-tension line¹.

In addition, YPF proposes upgrading the existing electrical substation located in Pico Truncado, to accommodate the additional power output from the Project (this substation being outside the scope of the current report and the Project that is seeking OPIC financing).

The project site selection criteria included:

- The wind energy production potential found in the region (see “Analysis of Alternatives” section). In addition, the geography and overall topography leads to high-speed winds that increase the capacity of energy production from wind turbines. Furthermore, the orientation and terrain favors energy production by reducing the aerodynamic interference between generators.
- The fact that the entire project footprint can be enclosed in the existing oilfield owned and operated by YPF, which effectively eliminates potential issues related to third party land ownership or land use.

Another advantage is the accessibility, the Provincial Road 43 (RP 43), joining with the locality of Pico Truncado facilitates the transport of heavy machinery in the area.

2.1.3 Project Schedule

Construction started in May 2019 with site preparation (topsoil removal and storage) and excavation of foundations for certain wind turbines. The field is expected to be built and ready for commissioning in June 2020.

¹ This high-tension line will be installed almost entirely inside YPF owned land; only the last 600 meters will run on land that belongs to a private owner. YPF has currently a right of way for the construction of another high-voltage line (that is not related to this Project) at this same land and will therefore amend the existing right of way to include these 600 meters of this high voltage line by the end of 2019, as scheduled.

2.1.4 Workforce

A local subcontractor with regional headquarters will be used to build the turbine pads, power lines and substation. They will predominantly use a local workforce, which at its peak is expected to reach approximately a work force of around 200 employees. The installation of the wind turbines is expected to employ another 50 employees, from the subcontractor from which the turbines are purchased.

Construction workers will mostly come from the nearby towns of Pico Truncado, Las Heras, Caleta Olivia and, very few, Cañadon Seco. These workers will stay at their own homes and commute on a daily basis to the site with transportation means provided by the contractor. A small proportion of them is expected to originate from Puerto Deseado and will stay at hotels and temporary rental apartments in Caleta Olivia. In addition, around 30-40 people that also will come from abroad (non-Argentinian residents) for the erection phase will stay at Caleta Olivia in rental apartments.

Although out of the scope of this Project, it is worth mentioning that for the expansion of the Substation of Santa Cruz Norte in Pico Truncado, a maximum requirement of 50 people is estimated. Personnel working for this expansion will be accommodated in Pico Truncado.

2.2 Description of Project Components

2.2.1 Wind Turbines

The generators to be used for this project are General Electric's Wind Turbine Generator Systems 4.2-117-50Hz with a variable rating of between 3.8 MW to 4.2 MW. This model is a three-bladed, upwind, horizontal-axis wind turbine with a rotor diameter of 117 meters, mounted in a tubular steel tower with a hub height of 85 m. The platform employs active yaw control to steer the wind turbine with respect to the wind direction, as well as active blade pitch control (regulating rotor speed) and a variable speed generator with a power electronic converter system; additional wind turbine features are shown in Table 2-1 and specific description of selected wind turbine components in the following subsections.

Table 2-1 Technical data of the wind turbine

Turbine	4.2-117
Rated output [MW]	4.2
Rotor diameter [m]	117
Number of blades	3
Swept area [m ²]	10751
Rotational direction (viewed from an upwind location)	Clockwise
Maximum speed of the blade tips [m/s]	82.1
Orientation	Upwind
Speed regulation	Pitch control
Aerodynamic brake	Full feathering

Source: GE Renewable Energy, 2018

2.2.1.1 Turbine Rotor

The rotor speed is regulated by a combination of blade pitch angle adjustment and generator/converter torque control. The rotor spins in a clockwise direction under normal operating conditions when viewed from an upwind location.

Full blade pitch angle range is approximately 90 degrees, with the zero degree position being with the blade flat to the prevailing wind. Pitching the blades to a full feather pitch angle of approximately 90 degrees accomplishes aerodynamic braking of the rotor, thus reduces the rotor speed.

2.2.1.2 Turbine Blades

Three rotor blades used on the 4.2-117 wind turbine. The airfoils transition along the blade span and with the thicker airfoils being located inboard towards the blade root (hub) and gradually tapering to thinner cross sections out towards the blade tip. The blades are 4 m long and equipped with low-noise-trailing-edges at the pressure side of the blade's rear edge. These are thin and jagged plastic strips that reduce noise emissions.

2.2.1.3 Blade Pitch Control System

The active pitch controller enables the wind turbine rotor to regulate speed, when above rated wind speed, by allowing the blade to "spill" excess aerodynamic lift. Energy from wind gusts below rated wind speed is captured by allowing the rotor to speed up.

2.2.1.4 Hub

The hub is used to connect the three rotor blades to the turbine main shaft. The hub also houses the blade pitch system and is mounted directly to the main shaft. To carry out maintenance work, the hub can be entered through one of three hatches at the area close to the nacelle roof.

2.2.1.5 Gearbox

The gearbox in the wind turbine is designed to transmit torsional power between the low-rpm turbine rotor and high-rpm electric generator. The gearbox is a multi-stage planetary/helical design. The gearbox is mounted to the wind turbine bedplate. The gearbox mounting is designed to reduce vibration and noise transfer to the bedplate. The gearbox is lubricated by a forced, cooled lubrication system and a filter assists to maintain oil cleanliness.

2.2.1.6 Bearings

The blade pitch bearing is designed to allow the blade to pitch about a span-wise pitch axis. The inner race of the blade pitch bearing is outfitted with a blade drive gear that enables the blade to be driven in pitch. The main shaft bearing is a two-bearing system, designed to provide bearing and alignment of the internal gearing shafts and accommodate radial and axial loads.

2.2.1.7 Brake System

The blade pitch system acts as the main braking system for the wind turbine. Braking under normal operating conditions is accomplished by feathering the blades out of the wind. Only two feathered rotor blades are required to decelerate the rotor safely into idling mode, and each rotor blade has its own backup to drive the blade in the event of a grid line loss.

2.2.1.8 Generator

The generator is a doubly fed induction generator. It is mounted to the bedplate with a mounting so designed as to reduce vibration and noise transfer to the bedplate.

2.2.1.9 Gearbox/Generator Coupling

To protect the drive train from excessive torque loads, a special coupling including a torque-limiting device is provided between the generator and gearbox output shaft.

2.2.1.10 Yaw System

A bearing positioned between the nacelle and tower facilitates yaw motion. Yaw drives mesh with the gear of the yaw bearing and steer the wind turbine to track the wind in yaw. The yaw drive system contains an automatic yaw brake. This brake engages when the yaw drive is not operating and prevents the yaw drives from being loaded due to turbulent wind conditions.

The controller activates the yaw drives to align the nacelle to the wind direction based on the wind vane sensor mounted on the top of the nacelle. The wind turbine records nacelle yaw position following excessive rotation in one direction, the controller automatically brings the rotor to a complete stop, untwists the internal cables, and restarts the wind turbine.

2.2.1.11 Tower

The wind turbine is mounted on top of a tubular steel tower (85 m hub height). Access to the turbine is through a door at the base of the tower. Internal service platforms and interior lighting is included. A ladder provides access to the nacelle and also supports a fall arrest safety system.

2.2.1.12 Nacelle

The nacelle houses the main components of the wind turbine generator. Access from the tower into the nacelle is through the bottom of the nacelle. The nacelle is ventilated, and illuminated by electric lights. A hatch provides access to the blades and hub.

2.2.1.13 Wind Sensor and Lightning Rod

An ultrasonic wind sensor and lightning rod are mounted on top of the nacelle housing. Access is accomplished through the hatch in the nacelle.

2.2.1.14 Lightning Protection (according to IEC 61400-24 Level I)

The rotor blades are equipped with lightning receptors mounted in the blade. The turbine is grounded and shielded to protect against lightning; however, lightning is an unpredictable force of nature and it is possible that a lightning strike could damage various components notwithstanding the lightning protection employed in the wind turbine.

2.2.1.15 Wind Turbine Control System

The wind turbine can be controlled locally. Control signals can also be sent from a remote computer via a Supervisory Control and Data Acquisition System (SCADA), with local lockout capability provided at the turbine controller.

Service switches at the tower top prevent service personnel at the bottom of the tower from operating certain systems of the turbine while service personnel are in the nacelle. To override any wind turbine operation, emergency-stop buttons located in the tower base and in the nacelle can be activated to stop the turbine in the event of an emergency.

2.2.1.16 Power Converter

The wind turbine uses a power converter system that consists of a converter on the rotor side, a DC intermediate circuit, and a power inverter on the grid side.

The converter system consists of a power module and the associated electrical equipment.

2.2.1.17 Medium Voltage Transformer and Switch Gear

To connect each turbine to the collector system, a medium voltage transformer and medium-voltage switchgear are required. These devices may be either installed in the tower (GE scope) or external to the tower as part of a pad mount transformer (customer scope).

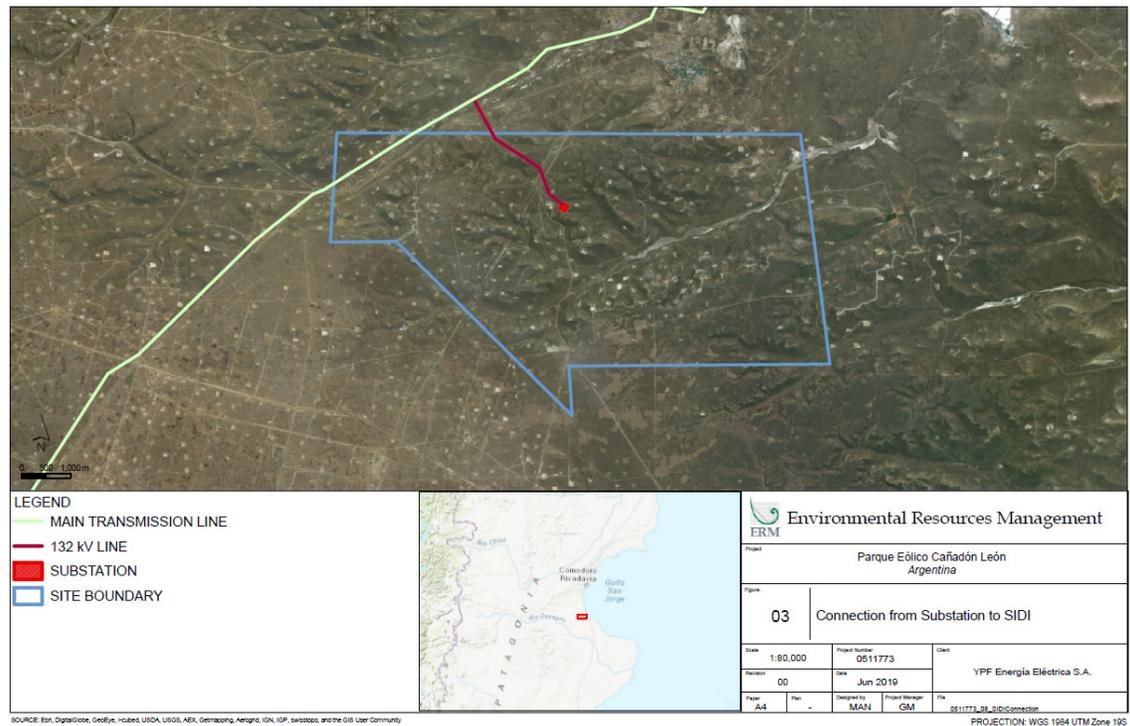
2.2.1.18 Ice Detection system

Wind turbines shall include an ice detection system through a rotor imbalance detection system; such system will be complemented by an operational procedure that shall be put in place by YPF Luz in order to identify any hazards related to ice and snow. Such procedure shall take the relevant safety measures suggested by the equipment manufacturer. The system consists of a set of acceleration sensors mounted in the blades, which analyze Eigen frequencies of these and communicates to the turbine controller. The turbine manufacturer shall implement a parameter in the control system in order to control rotor speed and lower ice throw risk without having to shut down the machine.

2.2.2 Power Evacuation

The Project's wind turbines will be connected to a substation that is within the project area via medium tension 32 Kv lines. This substation will then increase the voltage to 132 Kv from which a high-tension cable will go to a connection point in the Argentine Interconnection system (SADI; Figure 2.1). The power lines will be aerial; the medium tension power lines will connect to each other where possible and feed into the substation. YPF is also considering the upgrade of an existing substation in Pico Truncado.

Figure 2.1 Location of the 132 Kv high-tension line



Source: ERM, 2019.

2.2.2.1 Substation

The substation building will provide protection from harsh weather to all the delicate equipment required for the proper operation of the Wind Farm, such as the Scada system, communications systems, the remote terminal unit, the automatic controls for the converter, batteries and their chargers, and the switches for high, medium and low tension.

The layout will have an exit on the switchboard for the 33 kV medium tensions line as a reserve for future upstream developments. There will also be space for a 33kV / 35kV transformer and space for two outdoor line exits, considering the space required in the substation to equip the control elements

of said fields. There are two transformers expected to be used at the wind farm of 33kV/132kV and 75 MVA.

2.2.3 Additional Project Infrastructure

Associated facilities and utilities such as the following are required as part of the larger wind farm site planning include:

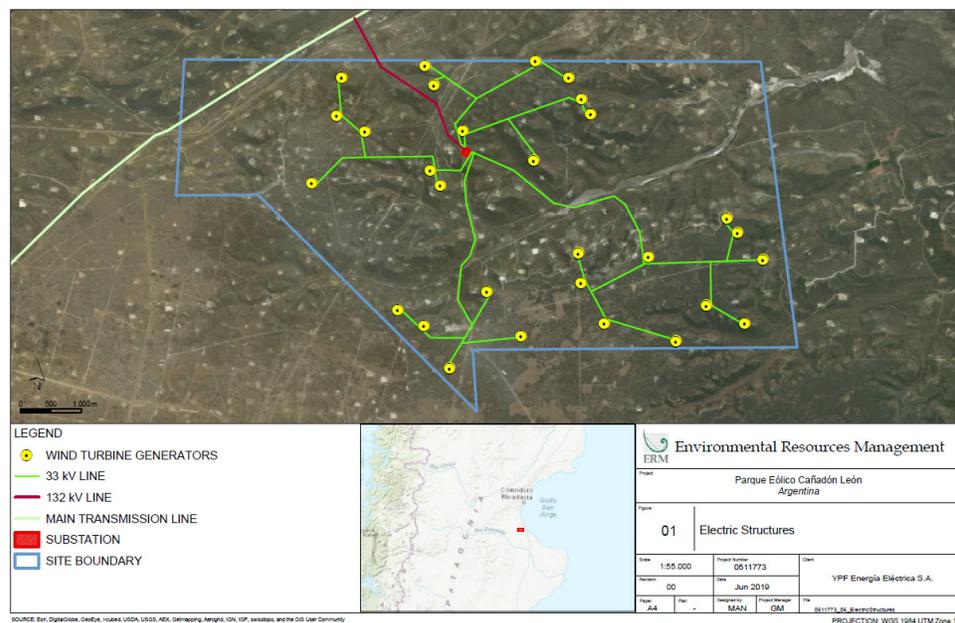
- Cement Batching Plant
- Meteorological Stations;
- Quarry;
- Medium Tension Lines and Associated Pylons
- Material storage yards and stores; and
- Central monitoring station building and facilities.

Some of these structures are temporal during the duration of the project while others will have to be there until decommissioning. The cement batching plant will only be necessary during the construction phase and will be removed afterwards. The storage yards will be outside the project area in the nearby town and will only be necessary during the construction phase of the project. The quarry, even though only active during construction phase, is an open mine already present prior to the project's commencement. Even though it will only be used during the construction phase, its footprint will still be present after the construction phase.

2.2.3.1 Medium Tension Lines

The cables coming from the wind turbines will be buried until they reach the closest pylon; this is estimated to be a distance of between 60 to 80 m (Figure 2.2). This way the cables will not affect or disturb the equipment used for wind turbine set up. The cables will be located on the pylon in such a way that the minimum distance between the top of the crosspieces of the pylons and the element with charge has a minimum distance of 1.50 m. There will be a minimum of 7 m from the electric cabling down to the ground.

Figure 2.2 Layout of medium and high tension cabling



Source: ERM, 2019.

2.2.3.2 Meteorological Stations

There are in the project area a total of three wind-measuring stations placed on masts with an approximate altitude of 85 m. They consist in a metallic structure with an articulated base foundation. The central bodies have a triangular section with "z" faces and will have day and night markings. The weather station are be equipped with wind meters, environmental sensors and registration equipment. Each mast is be equipped with a lightning rod and will be grounded. The wind meter will be placed at the same altitude as the wind turbines' central axis.

Data gathered from these meteorological stations will be integrated into the Supervisory Control and Data Acquisition (SCADA) systems of the Wind Farm. Data considered will include but not be limited to the following:

- Anemometers (ultrasonic and cup type);
- Thermometers;
- Atmospheric pressure sensors;
- Relative humidity sensors;
- Weather vanes for wind direction measurement; and
- Other sensors required for the operation of the Park or measurement of the power curve.

2.2.3.3 Control Building

The building will be designed in such a way that three main and well-differentiated areas are distinguished: an area where the 132Kv protection and control equipment of the energy transport company will be located, in which the design guidelines of the project will be respected. Another area for the operation and maintenance personnel of YPF and a third area for the Contractor's personnel that will be in charge of park maintenance.

2.3 Project Layout

2.3.1 Wind Turbines

The positioning of the wind turbines has been arranged taking into consideration the predominant source of wind, the environmental impact, the interference between turbines and the topographic land obstacles, with the purpose was to maximize energy production. The minimum distance between wind turbines has been maintained at 500 m in the direction of the wind and 300 m transversely to the wind. This separation is sufficient to guarantee high efficiency returns from the wind farm.

Table 2-2 Coordinates of the wind turbines

Name	X Coordinate	Y Coordinate
2	603944.7400	4840076.1901
3	608283.6511	4838634.6000
4	605846.2421	4838059.8910
5	606045.9250	4840350.1340
6	607950.0000	4837200.0000
7	608461.0644	4838399.1320
8	606996.6700	4837997.9500
9	602336.2867	4840058.7980
10	603728.1284	4836169.0300

Name	X Coordinate	Y Coordinate
11	605142.0278	4841221.1690
12	605894.3414	4840601.2610
13	608877.6775	4837953.8650
15	604342.5959	4837426.1870
16	605886.2057	4837571.3210
17	603324.9137	4841147.2740
18	603410.7341	4839424.3770
20	602873.9193	4837124.7580
21	606270.6663	4836904.6690
22	601464.6461	4839219.0290
23	607447.8704	4836614.6730
24	603574.8577	4839177.3320
25	601870.6610	4840326.7180
26	605110.3200	4839586.7899
28	603470.9411	4840823.7350
29	604900.0000	4836700.0000
GE 1 Alternative	601956.0000	4840948.0001
GE 19 Alternative	608577.0000	4836910.0000
GE 14 Alternative	605688.0000	4840951.0001
GE 27 Alternative	603304.0000	4836862.0001

Source: YPF modified by ERM, 2019.

2.3.2 Access Roads

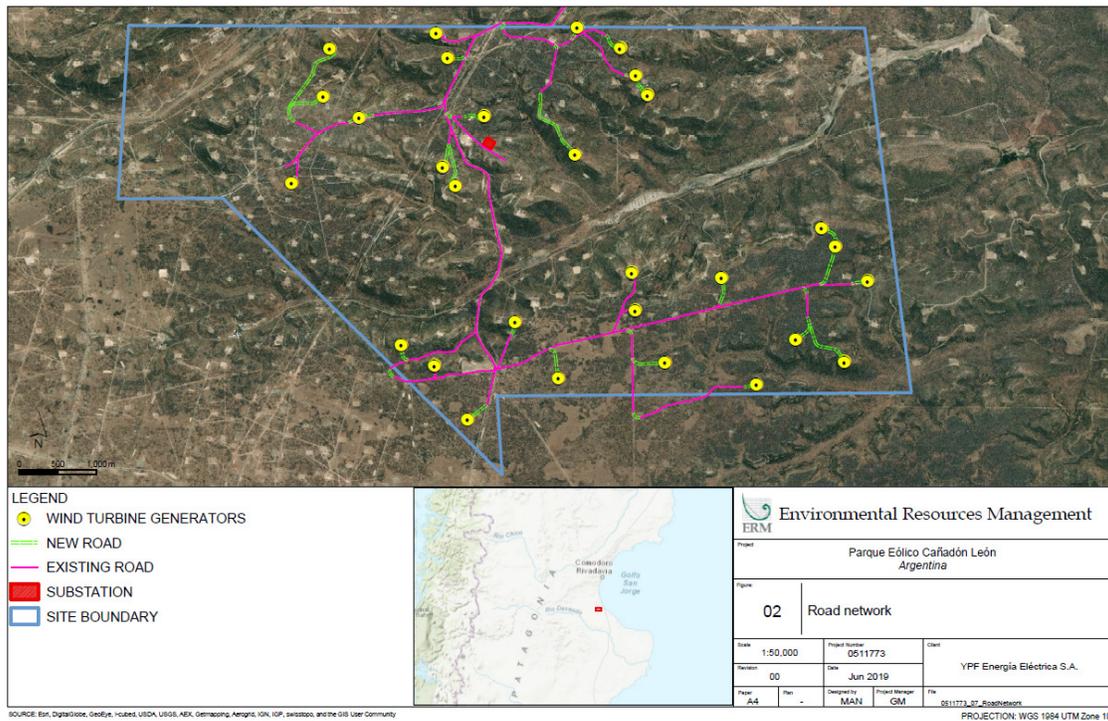
The position of the wind turbines dictates de necessary internal roads. Another important aspect is determined by trying to minimize the number of constructed paths. Furthermore, it must be taken into consideration that each path must be wide enough for circulation of large trucks and cranes, capable of installing the wind turbines. As a consequence there is a limit in the maximum gradient of these roads as well as the turn radius must be large enough to accommodate for the type of vehicles. The design will respect the existing flora and try to minimize their removal when possible.

The roads are to have the following requirements:

- 5 m width on straight sections;
- 11.5 m width in turns; and
- The turn radius must be of at least 35 m.

Maximum gradients should not be over 10%, in some very specific cases, these may go up to 12%, and the camber must also not surpass 3%.

Figure 2.3 Road layout



Source: ERM, 2019.

2.3.2.1 Access to Project Site from National Roads

The wind farm will be just off the road RP12 in the province of Santa Cruz, which will give it easy access off the main road.

The wind turbines will be shipped unassembled to at least two seaports:

- Port of Buenos Aires would require a 1,866 km drive to Caleta Olivia on RN3 national road and then another 25 km on the RP12 provincial road to reach the wind farm. Only the windfarm Anchor cages are expected to be transported with this route.
- Port of Puerto Deseado Port, which would require taking the RN281 for 129 km, to the RN 3 for 16 km, followed by 58 km on the RP43, and lastly 30 km on the RP3, all for a total of 233 km. All remaining wind turbine components shall transported from this port.

Major part of the traffic derived from transporting the equipment will be from Puerto Deseado, it is a likely route to be taken given the low traffic and absence of populated area along the way, as indicated in the Road Survey carried out by GE and ALE Heavylift (see Appendix A in Annex A). The road from Buenos Aires to Caleta Olivia crosses relatively densely populated urban centers.

Table 2-3 Site accessibility

Nearest Access	Detail	Aerial distance and Direction
City	Caleta Olivia	17 km Northeast
Road	RP 12	0 km Crosses the Project Area in the North
Main Ports in the area	Caleta Olivia Port	18 km Northeast
	Comodoro Rivadavia	84 km North-Northeast
	Puerto Deseado	187 km Southeast
Airport	Comodoro Rivadavia	95 km North-Northeast

Source: ERM, 2019

2.4 Land Take from Project Footprint

The overall area of the roject is of 40.67 km²; however, most of this will not be occupied by any of the Project's infrastructure and will simply be left empty. The project area is located within an existing conventional oil field, owned and operated by YPF since June 1944, which is not fenced off².

A total of 29 turbines will be built, which will also require space for the roads, substation and associated facilities. In as many cases as possible, there will be no new land take since already existing roads previously used for the oil fields will be used.

This means that in total an area of 0.3455 km² will actually be used for the Project, representing 0.85% of the total project area. Of the 0.3455 km², 0.18 km² will be from already existing roads.

Of the land area used, 0.016 km² will be utilized during construction only and not during operation.

There are no third party land uses, including agricultural activities or informal land uses, within the project area. All land is owned and operated as oil field by YPF, with the exception of the last 600 meters of the 132 Kv line that fall under third party land (please refer to Section 2.1.2 and Figure 2.1) and one of the roads south of the project area that is not YPF owned. YPF will obtain the right of way with the land owner, which also owns the Estancia Las Rosas where YPF oil wells are located.

2.4.1 Access Roads

The site of the Cañadón León wind farm is over an old oil field and consequently a lot of the land take has already happened. This means that a few new roads will have to be built for this specific project, but existing roads will be used as much as possible. Overall, a total of 41.54 km of roads will be used, however, 31.21 km do not require new land take as they were already in place prior to the project's commencement. Consequently, 11.33 km of new roads will be built.

The overall land take in square kilometers, assuming that each road has is average 6 meters wide, is of 0.25 km². Of which, 0.18 km² had already been converted into roads prior to the beginning of this project. To link all the necessary locations of wind turbines another 0.07 km² of roads will be built.

2.4.2 Cabling

The cables will be buried under ground until they reach the closest medium tension pylon. Afterwards there will be aerial cables connecting to the substation. It is expected that there will be a total of 29.5 km of medium tension cables overall. The high-tension cable from the substation to the connection point (SADI) will have a total length of 2.93 km. Both high and medium tensions cables are expected

² Although not fenced off, YPH has implemented an internal access system (SRC) to allow contractors to access the oil field and has third-party security patrols that inspects the internal oilfield roads to check that every vehicle and people circulating within YPF roads has the corresponding authorization to access the oilfield.

to require a small amount of land take for the pylons, however, this had not been calculated when the update was written.

2.4.3 Wind Turbines

Each turbine will take up around 450 m². A total of 2,055 m² will be used, including the space required to set up the wind turbine, which will require a large enough space for two cranes to be set up and install the equipment, as well as a enough space to store the wind turbine before it is set up. Furthermore, once the cranes have been set up there must still be sufficient space for trucks to manoeuvre. However, it is worth noting that the space used to store the wind turbine prior to its construction will only be used during the project's construction (574 m²).

This means that in total for the 29 turbines a total of 60,000 m² will be used (0.06 km²), of which 16,500 m² (0.0165km²) will only be used during the construction phase. Consequently, during the operation phase the total land take will be of 43,300 m² (0.043 km²).

2.4.4 Building, Facilities and Substation

The total land take from all the building facilities surrounding the substation will be 35,500 m² (0.035 km²). This will be from the substation, which will take up around 13,000 m², and the associated building facilities, which take up another 22,500 m². All of this land will be used throughout the whole Projects' operations.

3. ALTERNATIVES ANALYSIS

3.1 Introduction

This section provides an analysis of alternatives in relation to the Project, particularly in regard with the project conception and planning phase. This includes the following:

- No project scenario;
- Alternative site location and design during micro-siting of individual turbines and associated facilities; and
- Alternative methods of power generation.

3.2 No Project Scenario

The no project scenario is that the wind farm is not built. In the event that the wind farm is not developed, there will be no negative impacts in terms of those that might be typical of windfarms (e.g. noise, visual impact, shadow flicker etc.). From a national perspective, there will be a negative impact in that there will be more reliance on fossil/thermal power generation to meet increasing energy demand and Argentina would not be further developing renewable energy sources potential. Without the Project, 122MW of electricity for the SADI electric grid has to be obtained from another source, which most likely source would create significant carbon emissions.

3.2.1 Renewables Power Scenario in Argentina

Argentina is the third largest power market in Latin America. The Argentinian power landscape is still dominated by fossil fuels, which represent 87 per cent of the total energy mix. Until 2010 Argentina was a power exporting country, however, increased consumption combined with a steady decline in developing new power projects and the decline in the extraction of natural gas forced Argentina to import power (and natural gas for thermal power plants) from neighboring countries. Argentina is facing a significant power deficit, which has triggered various ambitious government initiatives to install additional capacity (Norton Rose Fulbright, 2016).

Amongst the various initiatives to increase power generation, the Argentinian government launched the RenovAr Programme to develop Argentina's renewable energy sector. RenovAr started its first round with an auction to add 1,000MW of renewable energy to the grid (600MW of wind, 300MW of solar, 65MW of biomass, 20MW from small dams and 15MW from biogas). So far, the program has completed three bidding rounds, awarding 147 projects with a combined capacity of 4,466 MW (Yaneva et al., 2018).

Argentina has exceptional resources in relation to wind energy. Global experience indicates that with average winds of 5m/s or higher it is feasible to deliver good returns in wind power generation. About 70 per cent of Argentina's territory enjoys winds with an average speed of 6m/s or more, while in areas of Patagonia they can exceed 9m/s (Norton Rose Fulbright, 2016).

At the end of 2017, Argentina had only 228 MW of installed wind power capacity, after adding 24 MW in that year. The country is lagging significantly behind Latin America's wind leaders Brazil (12.8 GW), Chile (1.54 GW) and Uruguay (1.5 GW). Total installed capacity is expected to ramp up to 6.1 GW once the projects secured in the RenovAr tenders and renewable energy term market are fully realized. In 2017, wind farms in Argentina produced a total of 615.8 GWh; and according to market estimates, Argentina could have 5 to 6 GW of wind power capacity at the end of the year 2025 (Yaneva et al., 2018).

Demand for electricity in Argentina is expected to increase to 170 TWh in 2025 from 135 TWh in 2015. (Ministry of Energy and Mining, June 2017). Renewables will play a major role in meeting the additional demand with 10 GW of new capacity planned to be put online in the period. Thermal power, large hydro and nuclear power are to add 6 GW, 3 GW and 1 GW respectively. (Yaneva et al., 2018).

3.2.2 Status of Wind Power in the Santa Cruz Province

From the three rounds of renewable energy developments celebrated so far by RenovAr, the projects currently present in Santa Cruz Province are:

- Bicentenario (constructed and operational)
 - 28 turbines: Vestas
 - Total nominal power: 100,800 kW
 - Under construction
 - Onshore wind farm
 - Developer: ABO-Wind
 - Owner: Petroquímica Comodoro Rivadavia
- Los Hercules (under construction)
 - 27 turbines: Senvion 3.6M114 NES (power 3 600 kW, diameter 114 m)
 - Total nominal power: 97,200 kW
 - Operational
 - Onshore wind farm
 - Developer: ABO-Wind
 - Owners: Eren Groupe/Mitsui

An additional windfarm that was included in one of the RenovAr bids is the Kolule Kayke Windfarm (25 MW); but, based on information available in the public domain, this does not appear to not have been developed yet. One existing Project outside of the RenovAr Program is that of Parque Jorge Romanotti in Pico Truncado with four turbines), operated by the local municipality.

Another project outside the RenovAr is the “La Deseada” Windfarm Project, which initially was conceived as a 450 turbine windfarm in the southeast Pico Truncado area; though latest information (e.g. *Energía Estratégica*, 2019) states that it may only be effectively a 100 MW park should it be constructed.

3.2.3 YPF Luz & Manantiales Behr Windfarm

YPF Luz is a subsidiary of YPF (Yacimientos Petrolíferos Fiscales), the national state-owned oil & gas company; which was founded in 2013 to support the company’s transition to lead in the generation of sustainable energy. YPF Luz is dedicated to the production of electrical energy, being the 5th generator of electrical energy in Argentina (1.8 GW) through nine heat production facilities and one windfarm (Manantiales Behr). Additional 634 MW capacity is currently under construction and will be operating by the end of 2020 as part of an investment plan of 1.4 million US dollars.

YPF Luz planned the construction and operation of three windfarms, Manantiales Behr, Los Teros and Cañadón León. Of these three, Manantiales Behr is the first one to be finished and put in operation (July 2018).

It was the first windfarm to be built on a gas and oil field in production, covering an area of 2,000 hectares with 30 wind turbines. The park is going to be enhanced with the addition of a thermal power plant of 58 MW to allow for the creation of the first hybrid generation system in the country.

The Manantiales Behr windfarm was financed by the Investment Development Bank via “IDB Invest” and operates under international finance standards (e.g. IFC Performance Standards and Equator Principles). The park is subject to periodical environmental and social monitoring through IDB Invest and ERM.

3.3 Alternative Site Location

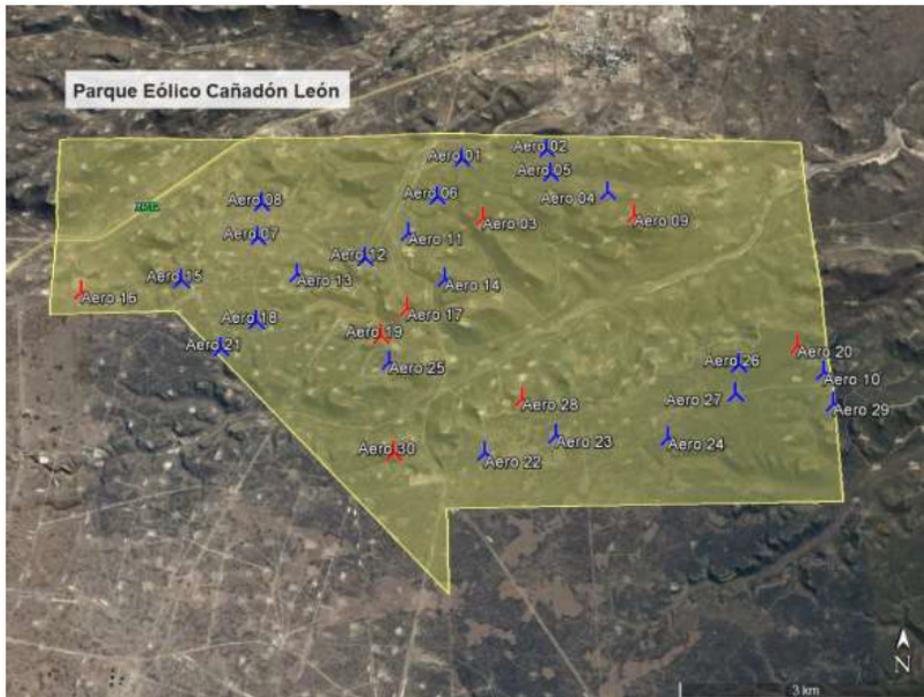
Wind energy projects are non-polluting energy generation projects, which are site specific and dependent on the availability of wind resource. Wind resource mapping and power potential assessment for the Project was done by EAPC Sur. This included an assessment of the wind power generation potential in the Cañadon Leon area through the analysis of 4 years of data provided by a meteorological mast that was located within the Project Area (see report 18-332-018 rev. 2 Certificación de Producción Anual de Energía PE Cañadón León).

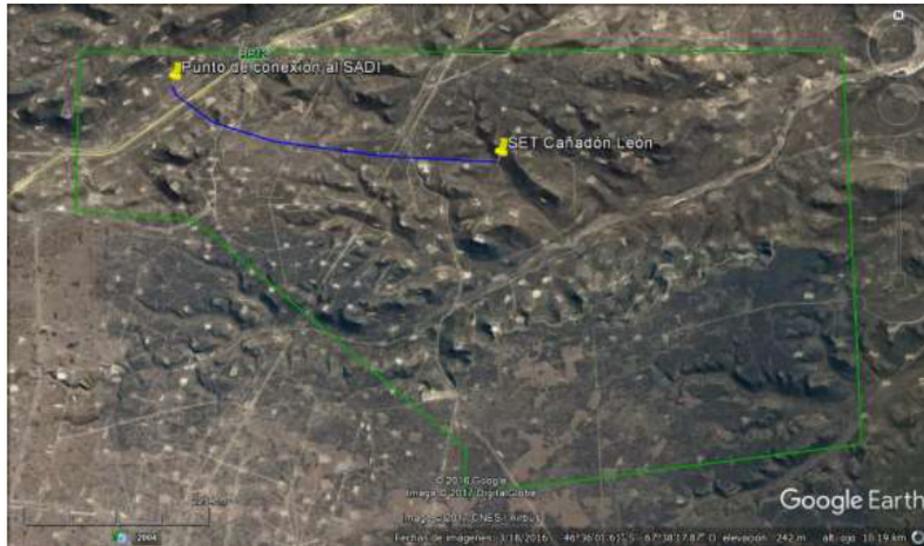
The project site is located within an oil field, in operation for several decades and property of YPF S.A. The windfarm will be developed within the boundaries of the active oil field. As a result, no land was required to be purchased for the Project. The Project can therefore be seen as a diversification of the actual land use in the area, and the inclusion of a renewable energy production facility over an area so far dedicated to production of hydrocarbons.

3.3.1 Alternative Locations and Design for Wind Turbines and Associated Facilities

The original layout of the Cañadon Leon windfarm (as stated in the original Estudio Tecnico de Evaluación de Impact Ambiental – ETIA) consisted of 30 Vestas V112-3.3 MW turbines, connected to an electrical substation that was connected to the Argentinian Interconnection System (SADI) by a 4.5 km 132 kV transmission line (Figure 2.1).

Figure 3.1 Original layout of Cañadon Leon windfarm turbines (top) and transmission line (bottom)

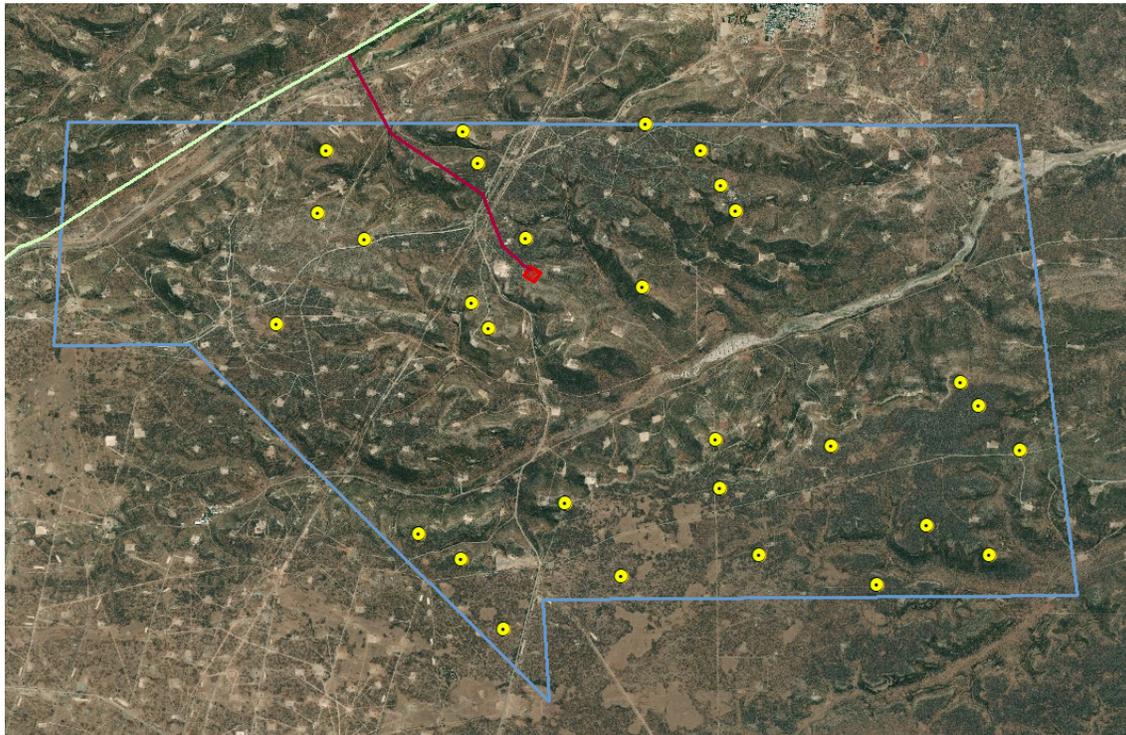




Source: Scudelati & Asociados, 2017.

Further refinement of the Project led to employ a new wind turbine model (General Electric 4.2-117; with a variable rating between 3.8 and 4.2 MW), which is comparatively more efficient, and thus the new layout includes 29 turbines and an optimized redesign of the transmission line that is now 3.2 km long (Figure 3.2). Both types of turbines share the same basic 3-bladed design and dimensions, e.g. Vestas/GE: Hub height 84/85 m; rotor diameter: 112/117 m.

Figure 3.2 Updated layout of Cañadón León windfarm



Source: YPF-ERM, 2019.

The proposed wind power project site has the following location advantages:

- The Project is anticipated to be constructed entirely on YPF owned land;
- The Project does not have any major ecological concerns including environmentally sensitive areas and rare, endangered or threatened species;
- The Project does not have any major social sensitivities in regards to nearby populations/settlements and paleontological/cultural heritage sites (a paleontological and archeological survey was completed in 2017 as part of the EIA); and
- All identified dwellings that could be affected by noise or flicker effect from the wind turbine are located at a distance of at least 1.2 km away from the nearest wind turbine; with no identified stray residential buildings located within this distance.

3.4 Alternative Method of Power Generation

Harnessing wind-energy is an eco-friendly process, with an inexhaustible wind resource and minimal environmental footprint. There are minimal fuel and water requirements for operational activities. Wind energy has a short development timeframe compared to most other forms of energy production. Only a relatively brief lead-time is required to design, install and start-up the construction of a wind plant (an estimated five months after micro-siting and approvals). Table 3-1 elaborates upon the environmental advantages and disadvantages of various power generation systems

Table 3-1 Advantages and disadvantages of power generation systems

System	Advantage	Disadvantage
Thermal Power	<ul style="list-style-type: none"> ■ Large-scale production potential; ■ Moderate gestation period; ■ Near-instant flexibility to adapt to surges or reductions of power demand; ■ Wider distribution potential. 	<ul style="list-style-type: none"> ■ High fossil fuel requirements; ■ Large quantities of water required for cooling; ■ High volume emissions from operation; ■ Accumulation of fly ash (in case of coal powered installations); ■ Upstream impact from mining and oil exploration; ■ GHG emissions estimated as 228bCeq/kWh.
Hydropower	<ul style="list-style-type: none"> ■ GHG emission estimated as low as 1.1g Ceq/kWh (for run of the river projects); ■ Do not create any waste by-products during conversion process; ■ Some hydropower facilities can quickly go from zero power to maximum output; ■ Because hydropower plants can generate power to the grid immediately, they provide essential back-up power during major electricity outages or disruptions. 	<ul style="list-style-type: none"> ■ Site-specific, dependent on reservoir/river etc.; ■ Long gestation period; ■ Alteration of river flow regime; ■ Adverse social; and ■ Ecological impacts due to inundation and downstream effects.
Nuclear Power	<ul style="list-style-type: none"> ■ GHG emissions are as low as 2.5gCeq/kWh; ■ Low fuel cost; 	<ul style="list-style-type: none"> ■ Availability of fuel source; ■ Hazards associated with radioactive material;

System	Advantage	Disadvantage
	<ul style="list-style-type: none"> The production of electric energy is continuous. A nuclear power plant generates electricity for almost 90% of annual time. It reduces the price volatility compared to other fuels; Do not emit smoke particles or gases 	<ul style="list-style-type: none"> Disposal of waste is expensive, as wastes are radioactive in nature; High cost of project; Long gestation period; Risk of fallout and meltdown scenarios and its impacts on the local populace and environment;
Solar Power	<ul style="list-style-type: none"> Pollution levels are insignificant; Inexpensive power generation; Inexhaustible solar resource. GHG emissions are as low as 8.2gCeq/Kwh for the production chain. 	<ul style="list-style-type: none"> Large land requirement; Site-specific, dependent on solar insolation; Expensive installation.
Wind Power	<ul style="list-style-type: none"> Pollution levels are insignificant; Inexpensive power generation; Inexhaustible wind resource; GHG emissions as low as 2.5gCeq/kWh for the production chain. 	<ul style="list-style-type: none"> Large land requirement; Site-specific, dependent on wind pattern; and Expensive installation.

Source: International Atomic Energy Agency (IAEA).

3.4.1 Greenhouse Gas Emissions

As per the estimations of the International Atomic Energy Agency (IAEA), carbon emission (including CO₂, CH₄, N₂O, etc.) per Gigawatt hour of electricity (CO₂e/GWh) for wind energy projects is low (with emissions being essentially associated with construction) and scores favorably when compared with other forms of conventional and non-conventional sources of energy. Table 3-2 provides the greenhouse gas emissions (GHG) associated with each technology.

Table 3-2 GHG emissions from different electricity production chains

Technology	Mean tonnes (CO ₂ e/GWh)	Low tonnes (CO ₂ e/GWh)	High tonnes (CO ₂ e/GWh)
Lignite	1,054	790	1,372
Coal	888	756	1,310
Oil	733	547	935
Natural Gas	499	362	891
Solar PV	85	13	731
Biomass	45	10	101
Nuclear	29	2	130
Hydroelectric	26	2	237
Wind	26	26	124

Source: World Nuclear Association (WNA), 2010.

Considering various factors such as wind resources in potential project areas; favorable environmental and social settings; low GHG emissions across the project life cycle; land use and availability; governmental assistance; and local community's acceptance of wind energy projects over the last decade in the region, wind energy based power generation is the most appropriate in the Santa Cruz Province.

3.4.2 Water Consumption

Wind power projects use almost insignificant water quantities in comparison to nuclear and coal based power projects. Wind farms require small amounts of water to clean the wind turbine rotor blades in arid climates (where rainfall does not keep the blades clean).

According to the American Wind Energy Association (AWEA), wind power uses less than 1/600 as much water per unit of electricity produced compared to nuclear power, and approximated 1/500 as much as a coal power plant³.

3.4.3 Carbon Offsetting

Hydropower, solar and wind energy projects help in offsetting CO₂ emissions from conventional power generation. According to National Renewable Energy Laboratory, 1 MW of wind energy results in 2,600 tons of CO₂ offsetting⁴. In the case of YPF Luz Cañadon Leon Project, 122MW can offset approximately 317,200 tons CO₂.

3.5 References

Energia Estrategica. 2019. <http://www.energiaestrategica.com/2019-con-gran-actividad-argentina-inauguraria-en-promedio-un-parque-eolico-cada-15-dias-su-mayor-record-historico/>

Norton Rose Fulbright, 2016. Renewable energy in Latin America.

Scudelati & Asociados. 2017. Estudio Técnico de Evaluación de Impacto Ambiental Parque Eólico Cañadón León. ETIA PECL 001/17

World Nuclear Association, 2010 Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources

Yaneva, M; Tisheca, P and T. Tsanova. 2018. 2018 ARGENTINA RENEWABLE ENERGY REPORT.

³ American Wind Energy Association estimate based on data obtained in personal communication with Brian Roach, Fluidyne Corp., December 13, 1996. Assumes 250 kW turbine operating at 0.25 capacity factor with blades washed four times annually.

⁴ http://apps2.eere.energy.gov/wind/windexchange/pdfs/economic_development/2009/ma_wind_benefits_factsheet.pdf

4. CUMULATIVE EFFECTS ANALYSIS

4.1 Introduction

This Cumulative Impact Analysis (CIA) was developed in line with the International Finance Corporation (“IFC”) *Good Practice Handbook. Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. August 2013.*

The main challenges of any CIA are securing relevant, up-to-date information on the status of activities and projects being considered (including their scale, prospective timing of completion, likely impacts, etc.), without excessive reliance on speculative assumptions.

This CIA is based upon information on the Cañadon Leon wind project and Cañadon Seco area available in the public domain, and information provided directly by YPF Luz.

Similarly, the CIA should be risk based and assess the impact on ‘valued’ environmental and social components (hereinafter ‘VECs’). It is assumed that similar projects assessed within this CIA in the area will have to manage impacts on similar VECs.

As a consequence of the limited availability of data on existing and prospective Projects, this CIA was developed as a “Rapid CIA” provided by the IFC – a basic six-step process including:

- Scoping phase I – Identify the VECs, spatial and temporal boundaries;
- Scoping phase II – Identify other activities and environmental drivers;
- Establish information on baseline status of VECs;
- Assess cumulative impacts on VECs;
- Assess significance of predicted cumulative impacts; and
- Management of cumulative impacts – design and implementation.

4.1.1 Main findings of the Cañadon Leon ETIA and Supplementary Information

The main VECs for the Cañadon Leon project, as reported in the EIA report, include:

- Avifauna. The avifauna monitoring study conducted as part of the baseline survey on behalf of YPF identified five migrating species of birds in the area, as well as three raptor species. Recent bird monitoring undertaken on a monthly basis since December 2018 identified five additional raptor species. Overall results of the December 18 to April 19 monitoring surveys (five monthly surveys to date) indicate that no IUCN species of conservation concern were present, no bat species were observed and no bird nests were identified. The risk of collision for most species was found to be low, with a few species considered to be at high-moderate risk.
- Landscape and visual. Wind projects can have a significant effect on the visual landscape, as the turbines are tall and are visible from a distance. The EIA concluded the impact on the visual landscape would be moderate, taking into consideration: visibility, context and intensity features of the proposed windfarm. This is largely related to the scarcity of residents nearby the project area, and the fact that relief will shield the project from view from the nearest village of Cañadon Seco.
- Employment and community revenues. YPF expects that up to approximately 250 people will be employed during the construction of the windfarm. The numbers employed during the 20 years operational life of the plant will be low, however, the Project should contribute positively to local (Santa Cruz Province) and national tax revenues.
- Transportation of turbines and construction materials to the site. Major part of the turbine components and construction materials will be delivered to Puerto Deseado port at a distance of

approx. 232.8 km⁵) and then transferred to site on trucks. Each turbine will require up to ten oversize trucks or a total of 290 trucks for Cañadon Leon Project. In addition, large amounts of sand and stone will be needed for construction. This could interfere with normal traffic and also increase the possibility of accidents.

4.2 Scope of the CIA

The Santa Cruz Province is sparsely populated area dominated by large steppes (Patagonian steppe terrestrial ecoregion). The north of the Province, including at the project site, has been known for oil production since the early Twentieth Century – the nearby village of Cañadon Seco was initially developed as an oil workers' camp before being retrocessed by YPF to the Argentinian State. The Project is effectively being superimposed to an existing oilfield, operated by YPF.

The project area is generally flat and it has wind conditions that are favorable to the development of wind energy power plants. Consequently, a number of developers are considering the construction of windfarms in the area. These projects vary in size but each will have similar environmental and social impacts (both negative and positive). Therefore, and given that no other big developments have been identified for the area, this CIA is confined to the consideration of other windfarms and assesses the impact on the VECs described above.

Having considered these environmental and social characteristics for the CIA, the geographic and temporal boundaries of the assessment have been set as:

- A radius of 60 km from Cañadon Leon site; this area thus includes prospective and existing windfarms.
- The time horizon has been set at 5 years, as it is not possible to consider construction or development activities beyond this period.

4.3 Existing and Potential Windfarm Developments

To date (May 2019), up to six windfarm developments constructed/ to be constructed are present in the Santa Cruz Province (including the Cañadon Leon Project; Table 4-1); three of them are built and the other three are under development. Four of these developments are located within a within a 60 km radius of the Cañadon Leon windfarm (Figure 4.1).

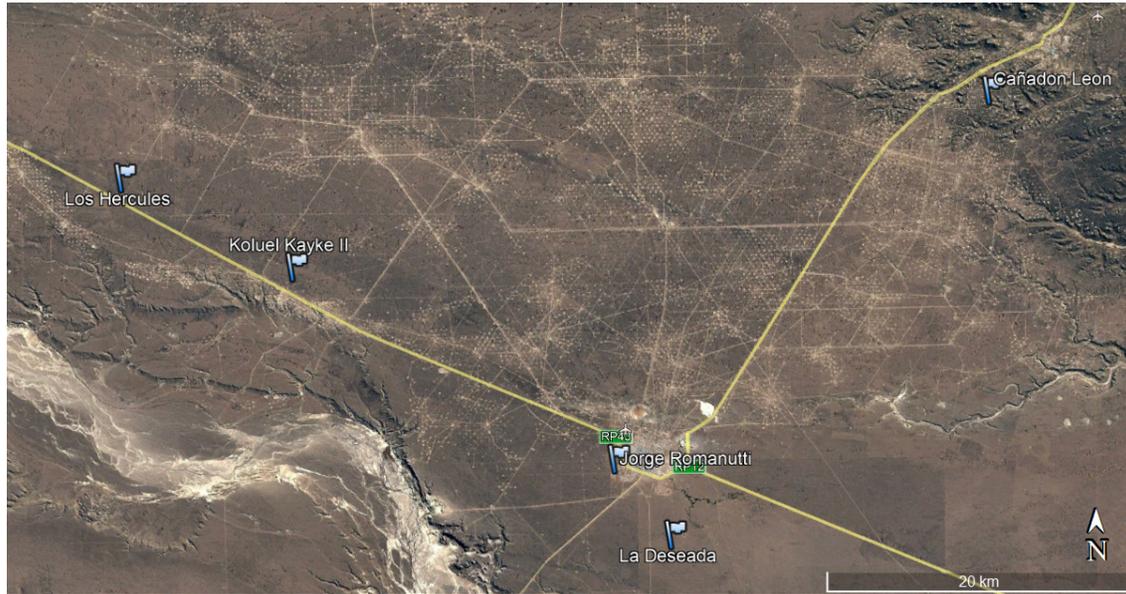
Table 4-1 Status of windfarm developments in Santa Cruz and distance to project site

RenovAr round	Locality	Name	Strategic partner	Capacity (MW)	Constructed (Y/N)	Distance to Cañadon real Windfarm
1	Las Heras	P.E. Vientos Los Hércules	EREN	97,2	Yes	51 Km
1,5	Puerto Deseado	P.E. Del Bicentenario	Petroquímica Comodoro Rivadavia S.A.	100,0	Yes	90 Km
2-F1	Cañadon Seco (this Project)	P.E. Cañadon Leon	YPF Energía NERGÍA Eléctrica S.A.	99,0	Started in May 2019	0 Km
202	Puerto Deseado	P.E. Koluel Kayke II	Eólica Koluel Kayke S.A.	25,0	No	44 km
n.a.	Pico Truncado	P.E. La Deseada	Eolica Pico Truncado S.A.	100,0	No	35 Km
n.a.	Pico Truncado	P.E. Jorge Romanutti (currently offline)	Municipalidad de Pico Truncado	2,4	Yes	33 Km

Source: *Energia Estrategica*, 2019.

⁵ Only turbine anchor cages are expected to be delivered to Buenos Aires to later be transported by ground to the project site.

Figure 4.1 Present/prospective windfarm developments within 60 km of Cañadon Leon site



Source: ERM, 2019.

4.4 Other Windfarm Developments

Information sources used for this assessment included the websites of:

- Published EIAs available in the public domain (e.g. from Multilateral Investment Guarantee Agency (MIGA), Santa Cruz government website); and
- Specialized Energy websites (e.g. Energia Estrategica; Windpower.net, etc.).

Of the identified windfarm developments, there are three EIA reports available in the public domain; these being i) Los Hercules, ii) La Deseada and iii) Bicentenario Projects. Apart from the Cañadon Leon ETIA documentation which includes bird/bat survey reports (with basic bird flight height observations), other windfarm documents only include basic information of bird survey findings and none of the EIA's provide data on bird collision risk assessments. The Bicentenario project though distant from Cañadon Real its EIA provided useful information considering that it is located within the same biogeographic province (and terrestrial ecoregion).

It should be noted that absence of any relevant documentation in the public domain for the Kolule Kayke II/Jorge Romanutti windfarms is considered a limitation in this cumulative assessment. The windfarm layout of the first is not publicly available; whilst the Jorge Romanutti is considered a minor limitation since it consists to date of only four turbines. For the purpose of this Rapid CIA, it has been assumed that condition of 'valued environmental components' in both of these sites is similar to those of Cañadon Leon (given the proximity of the sites).

As there is uncertainty as to whether the prospective windfarms not yet constructed will be developed, only a qualitative assessment of the potential cumulative impacts is discussed.

4.5 Potential Impacts on VECs

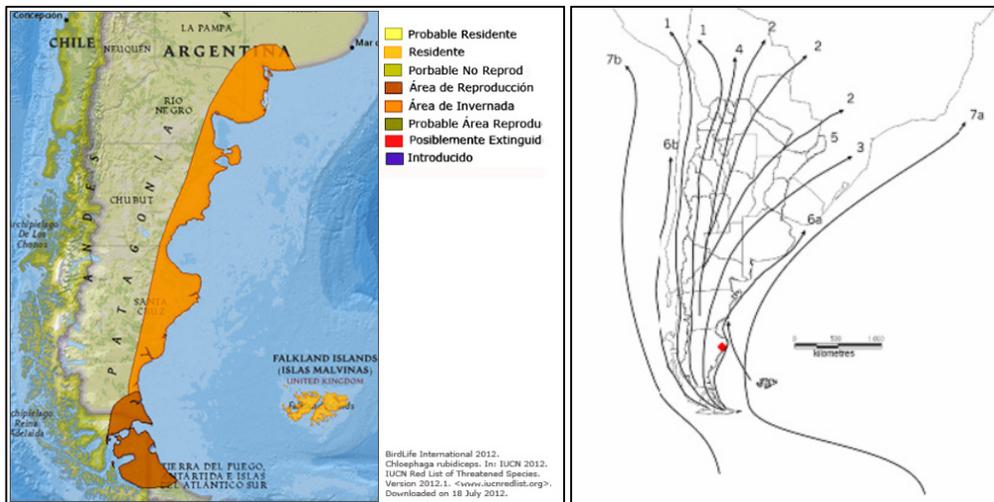
4.5.1 Birds

To properly estimate the cumulative impact on birds, the ornithological data provided in windfarm EIA reports should be comparable, i.e. based on a similar (internationally recognized) methodologies. Of all the available EIAs and their related documentation, only the Cañadon Leon bird monitoring surveys are aligned to a structured survey methodology that may be comparable among sites/seasons. The base EIA documents in general only provided basic observation from walking/vehicle line transects.

The cumulative effects of windfarms on birds are usually described as a set of the following impact types:

- Creating a barrier to bird migration and/or movements:
 - Neither the Cañadon Leon ETIA nor the recent bird survey reports suggest that a distinct migratory corridor is present in the specific Cañadon Leon project area; nonetheless, migrating bird species have been identified. The Los Hercules, Pico Truncado and Bicentenario EIAs mention the potential presence of broad bird migration corridors. Of these broad migration corridors, the relevant to this CIA would correspond primarily to the Eastern Argentina corridor (Id 3); followed to a lesser extent by the Falklands current (Id 7a) and Atlantic Coast (Id 6a) corridors (Figure 4.2 right). Furthermore, the Cauquen Colorado (*Chloephaga rubidiceps*) presence in the area is probable, considering its range and known migration from/to breeding areas in southern Argentina (Figure 4.2 left). Pedrana et al. (2018a) confirmed from the satellite tracking of six adults that they effectively used the Atlantic coast migration route.

Figure 4.2 Broad bird migration patterns (right) and “Cauquen Colorado” (*Chloephaga rubidiceps*) range (left)



Source: ArgentAvis, 2012; Birdlife, 2012.

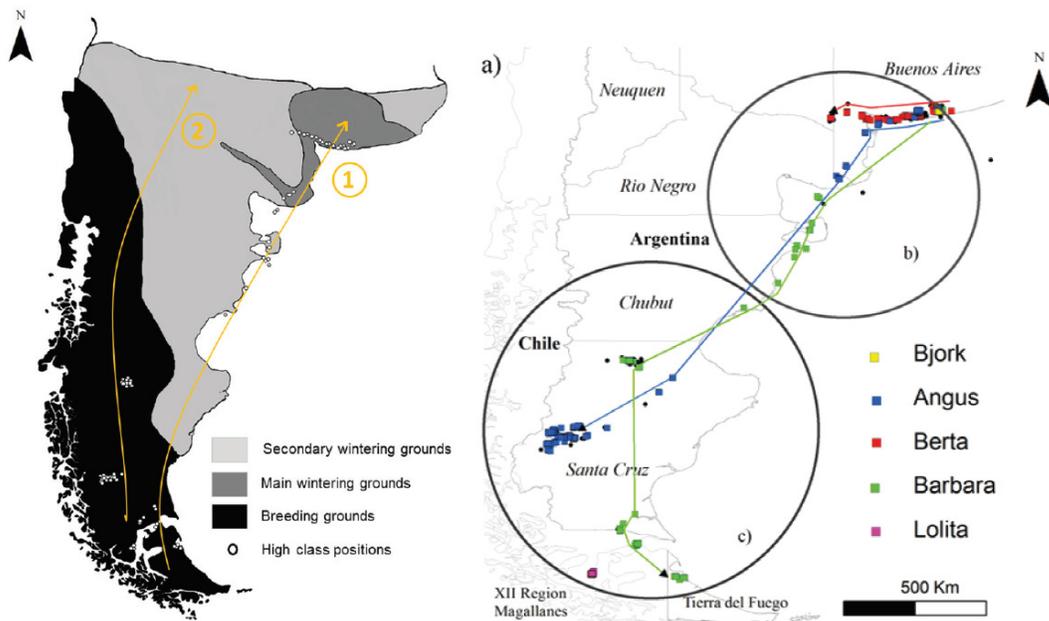
- Stopover⁶ sites for the Cauquen Colorado or other migratory bird species are largely unknown, though these may probably use existing wetland areas that may be found in the wider environment (e.g. Pico Truncado / Caleta Olivia wetlands). Pedrana et al. (2018b), used satellite tracking information on five individuals of *Chloephaga picta* deployed five

⁶ Stopover areas: These are sites along the migration routes where birds stop to feed and refill their energy stores, which is often essential for their survival during migration (Newton, 2008).

miniaturized satellite transmitters on adult Upland Geese *Chloephaga picta* to gather data about breeding, wintering and stopover sites all along their migratory routes (Figure 4.3). Though their results are conditioned by the low number of samples, important findings where:

- In Santa Cruz Province, presumed breeding grounds are potentially two core areas, one located in the north of the province with an area of 550 km², and another located to the south covering an area of 660 km². (see Figure 4.3; blue and green markings).
- Two individuals (blue and green) were in accordance with the proposed eastern route as they migrated in August to September, through the southern Buenos Aires Province along the Atlantic Coast, to reach their first potential breeding grounds in southern Patagonia (Santa Cruz Province).

Figure 4.3 Migration routes of the Upland Goose (*Chloephaga picta*) in South America (left) and spring migration routes of Upland Geese (*Chloephaga picta*) from their wintering to their breeding sites, satellite tracked during 2014–2016 (left)



Source: Pedrana et al (2018)

- There are a variety of bibliographical sources that cite prospective flight heights, mostly for *Chloephaga picta* or *Chloephaga* spp. (undetermined species), but with major differences among these, and thus no quantitative evidence on Cauquen flight height at migration or of daily movements. According to Blanco et al. (2001) Cauquen migration towards the North (from Tierra del Fuego to Buenos Aires) takes place in March-April; whilst the backwards southward migration in September-November. Nonetheless the same source indicates that about the prospective migration route: i) does not present high density of individuals; ii) migration routes tend to concentrate close to the coast (e.g. along the coastline); iii) diurnal migration has an estimated flight height of 300 to 1000 m, with no data on nocturnal migration, which may seemingly be higher and iv) localized movements have a flight height estimated between 30 to 200 m and are thus more dangerous to aerial navigation. Though it may be unlikely that Cauquen Colorado groups stay in the area, it cannot be completely discarded that they may be subject to interactions with wind turbines.
- Additionally, up to eight raptor species have been identified (none listed as critically endangered / endangered by IUCN) in the wider area where the windfarms are located. The Cañadon Leon ETIA provided basic information on their flying range which covered

hundreds of meters (and thus distance between several wind turbines). The recent bird monitoring surveys conducted at Cañadon Leon also described flight height of encountered bird species, the general conclusion being that for most species there is a low risk of collision. Nonetheless, there are a few species considered to be at moderate-high risk (practically all raptors and a few small passerine species; that fly beyond 15 m height; Table 4-2). The Cañadon Leon is different from other windfarm areas in that it is not flat but rather has significant relief, which may influence bird flight behavior.

Table 4-2 Flight height of bird species during monitoring surveys at Cañadon Leon site

Medium risk (15 to 30 m height)	High risk (30 m to 150 m height)
<i>Pygochelidon cyanoleuca</i>	<i>Pygochelidon cyanoleuca</i>
<i>Circus cinereus (VC)</i>	<i>Circus cinereus (VC)</i>
<i>Geranoaetus polyosoma (VC)</i>	<i>Geranoaetus polyosoma (VC)</i>
<i>Zenaida auriculata</i>	<i>Geranoaetus melanoleucus</i>
<i>Milvago chimango</i>	<i>Theristicus melanopis (>200m)</i>
<i>Progne elegans</i>	<i>Larus dominicanus (>200m)</i>
<i>Falco sparverius</i>	

Source: Scudelati & Asociados Bird monitoring surveys. Dec 2018 to Mar 2019. VC: very common.

■ Habitat loss and habitat fragmentation:

- Habitat loss or fragmentation will be both temporary during the construction and decommissioning phases and permanent during the operational phase of windfarms. The area has been heavily subject to O&G activities, and thus will use the existing network of access roads, with a proportionally low area of additional land clearance. The scale of habitat loss is estimated only in the Cañadon Leon Project site at approximately 0.4% of the total windfarm site (estimated to be approximately 4067 hectares) that will be permanently lost and a further 0.04% being temporarily lost during construction. This information can be used to extrapolate the habitat loss for other windfarms – estimating that no more than 1-2% of each windfarm site will be lost to new land take (dependent on landtake / project area ratio).
- Total habitat loss in the study area is expected to be small in comparison to remaining suitable habitat. Given that the habitat within the region represents a uniform steppe habitat, the effects of habitat loss for birds at one windfarm site are not considered significant, as they will have the use of abundant alternative habitat in the wider area.

■ Displacement and disturbance:

- The scale of disturbance caused by windfarms varies greatly. The variation depends, among other factors, on seasonal pattern use, presence of important habitats and availability of alternative habitats. Temporary disturbance and displacement during the construction of windfarms is likely due to increased noise levels, vibration and human presence. Disturbance during the operational phase is considered to be similar to that of the existing disturbance levels as result of on-going oil & gas practices.
- Spatial arrangement of potential windfarms in the area is such that they are distanced from any recognized protected areas. The whole region comprises a large expanse of Patagonian steppe with limited wetland areas.

4.5.2 Landscape and Visual

Wind projects can have a significant effect on the visual landscape, as the turbines are tall and are visible from a distance. Some people find the turbines to be pleasing additions to the visual landscape, whilst others may find them distracting and negative.

The introduction of the Cañadon Leon windfarm on its own has been assessed to have a moderate adverse effect on the landscape character; due to the moderate visual effect on residential properties at the western edge (industrial area) of Cañadon Seco as well as 2 properties along Provincial Road 12.

The turbines are likely to become a dominant feature and a key characteristic of the landscape within the local area. Whereas other EIAs such as of Los Hercules and La Deseada characterize this impact as neutral or low respectively.

If all prospective developments were to be constructed, wind turbines would become a characteristic feature of landscape in the Pico Truncado area. This would be a significant cumulative change to the character of landscape (which is uniform and ordinary). Given the low population density of the area and the absence of cultural heritage or touristic interest sites, nonetheless, the number of residents or visitors for whom the visual impact of the projects would be perceptible is likely to be very limited.

4.5.3 Transportation and Construction

Development of windfarm projects in the Santa Cruz Province started in recent years ago and has progressed in parallel with the local legal framework development. Not all windfarm schemes that had started the permitting procedure received the construction permits; this is the case of La Deseada that has been on hold for almost a decade.

Information available in to May 2019 about the expected dynamics of construction is provided in Table 4-3. It should be noted that information about the start of construction of La Deseada and Koluel Kayke II windfarms should be taken with caution.

Table 4-3 Available information about construction of the windfarms

Locality	Name	Expected start of Construction	Expected duration of works	Number of turbines	Truck movements per turbine	Total truck movements	Location concrete batch plant
Las Heras	P.E. Vientos Los Hércules	Under construction	97,2	60	11	660	Within site
Cañadon Seco (this Project)	P.E. Cañadon Leon	Earthworks started Q2 2019	99,0	29	10	290	Within site
Puerto Deseado	P.E. Koluel Kayke II	No information	25,0	12	Assumed 10	120	Unknown
Pico Truncado	P.E. La Deseada	No information	100,0	Assumed 50	Assumed 10	500	Within site

Source: ERM, 2019

For the purpose of this cumulative assessment, it is assumed that construction of these windfarms will start simultaneously (or with a few months in between). All windfarms are deemed to use the port of Puerto Deseado for the supply of components. The main transport route will be:

- National Road 281 (RN281) - Provincial Road 43 (RP43) - Provincial Road 12 (RP12) for materials coming from Puerto Deseado port.

Transport route for the Cañadon Leon Windfarm is shown in Figure 4.4. It is expected that other developments considered under this EIA will also use these.

Figure 4.4 Transport route from the Puerto Deseado Port to Cañadon Leon site



Source: ALE, 2018.

In terms of direct site access, the Cañadon Leon is the only one expected to use RP12, whilst for the other windfarms they will use RP43 through Pico Truncado settlement. The Cañadon Seco settlement is relatively small and local existing traffic volume is low but cumulative effect is likely to arise as the prospective construction of two or more windfarms overlaps with current materials transport from Comodoro Rivadavia. It will be necessary that transport arrangements avoid peak commuting hours and that appropriate transport management measures are implemented (in cooperation with local authorities and windfarm developers). Note that the main provincial road providing access to Cañadon Seco does not cross the residential part of the village, but bends west into the industrial zone of the village.

Cumulative short-term impact on traffic is unlikely to affect the urban area from Puerto Deseado considering that the port exit road avoids completely the city of Puerto Deseado.

None of the EIA assigned a significant impact to receptors derived from project related vehicle transit (e.g. Low in Los Hercules and La Deseada ETIAs).

The average annual daily traffic on the RN281 is of 201-1000 vehicles/day (with a larger volume between the localities of Fitz Roy and Pico Truncado which may rise to 1001-4000 vehicles), which is shown in Figure 4.5. No information is currently available for RP12 traffic volumes.

Figure 4.5 Annual Average Daily Traffic (AADT) of main transport route to Cañadon Leon site



Source: Argentina Official Portal, 2019.

Given the expected number of heavy truck movements for the windfarms, considering that construction periods may span between two to three months, it is estimated conservatively that heavy traffic may be up to 10 heavy vehicles a day for each windfarm. It is thus likely that the number of heavy trucks using the /RN281 will see a minor increase in traffic volume. These roads are large and safe enough for cars to easily overtake trucks and have the capacity to support the likely short-term increase in the number of trucks using the roads.

Another possible short-term cumulative effect could affect the ports where components will be received. The port has appropriate facilities in place to manage the unloading of large-scale wind turbine components from barges and appropriate laydown/ storage areas to hold wind turbine components, prior to transfer to road going vehicles. However, in case that components for two or

more windfarms are supplied to either port during the same time period – appropriate management of the port activities is likely to be necessary to prevent the disruption of normal activities in the port.

Reviewed EIAs indicate that concrete mixing areas are to be located within the limits of their respective sites, but no definition on their exact location. Considering the distance between sites, no cumulative effect of dust emission to nearby communities is expected.

4.5.4 Socioeconomic Impacts

The province of Santa Cruz is one of the least populated jurisdictions of the Argentine Republic, representing only 0.5% of the total population. The main settlements associated to windfarm developments such as Cañadon Leon, Pico Truncado, Las Heras and Kolule Kayke first originated in association to the construction of transport infrastructure and of cattle herding activity, but it was until the discovery of hydrocarbon resources in the zone what potentiated and finally structured the current economic activities of the area. The development of these urban centers has been limited in the recent decades to meet the demands of O&G activities, specifically to concentrate labor and meet the basic conditions for their development. These populated centers close to the Projects are subject to an “enclave” economy, where the links between the O&G productive activity and the existing services necessary to maintain the workers and their families are very close.

The fact that a diversified economic structure has not developed in the localities means that unemployed workers are unable to reintegrate within the labor market; leading to cycles of high unemployment rates.

Municipal budgets may likely be increased as a result of potential agreements between the windfarm operators and local municipalities (e.g. profit sharing agreements or similar) and social investment programs. Although no information is currently available about specific arrangements between the municipalities and related windfarm developers, in case that all proposed windfarms become operational, the beneficial cumulative effect on revenues and social investment programs is likely to be significant. Additional income may also be provided to single landowners for the leasing of their land if it where the case.

The construction of windfarms is expected to create both direct and indirect employment opportunities. Up to 200-300 workers may be required at the height of the construction phase for a windfarm of 29 turbines. Candidates for open positions in the construction phase will be selected in coordination with the Construction Worker’s Union, UOCRA (Unión Obrera de la Constucción de la República Argentina), at the beginning of the construction phase and are relocated to other projects in the area at the end (wind-down phase). In addition, materials needed for civil works and infrastructure improvements may be procured in the local municipalities creating opportunities for local contractors. Construction of windfarms will require the upgrading and widening of access roads, which will have a beneficial impact on infrastructure in the area. At the operational phase, presence of two or more windfarms are expected to support the growth of local industry for service and maintenance.

Each windfarm project will also result in some development of the local area, in particular in terms of improving access between local communities and improving access to adjacent land through improvement of roads, as well as providing some local employment and other economic opportunities.

4.6 CIA Conclusions

The Rapid CIA indicates that:

- **Birds.** The overall impact of the windfarms within the study area on migratory birds is a matter of concern, considering the known migratory corridor through the eastern Argentinian coast and the presence of migratory species identified from different surveys along the wider project area, though in low numbers as suggested by recent monitoring data at the Cañadon Leon site. The likelihood of bird collisions for non-migratory species such as raptor species that inhabit the area and make daily movements across and within prospective windfarm sites is also a concern. Though the EIAs qualify these impacts as ranging between minor to moderate; it will be important

that bird monitoring be undertaken regularly (e.g. a full migratory cycle, or one full year) in order to define the presence and flight characteristics of migrating birds in the project site, and that a robust monitoring of bird strikes/carcass search be implemented in order to identify if any turbines within a given windfarm are located in an area that favors strikes and take measures to micro-site the specific turbine(s).

- **Landscape.** The introduction of the Cañadon Leon windfarm on its own has been assessed to have a moderate visual effect. Assuming the remaining windfarms are constructed a significant cumulative visual effect may be expected considering their relative distance to each other.
- **Transportation.** There are no publicly available Traffic Management Plans for any of the developments. All assessed windfarms basically rely on the same road networks for heavy traffic movement associated to transportation of equipment; light traffic on the other hand is not expected to accumulate between developments due to their relative distance from each other. The road safety implications of the increased movement of heavy vehicles from the main highways (RN#) to the local road systems (RP#) must be carefully considered. The levels of nuisance in certain areas could be high and firm controls will need to be established in the Traffic Management Plans.
- **Employment.** The construction of windfarms is expected to create both direct and indirect employment opportunities and to improve revenues to local communities. The scale of benefits cannot be calculated at present.

The windfarm projects in the area will play an important role in Argentina's strategy to **reduce** its **greenhouse gas emissions** in energy production. The potential involvement of International Finance Institutions (IFI) in the development of some of the proposed windfarms is considered positive; considering they illustrate how "Good International Practice" can be applied successfully, to the benefit of the environment and the local communities.

The Environmental and Social Action Plan ("ESAP") agreed between each of the Lenders and respective Developers provides clear guidance on the establishment of a windfarm. However, it is not the responsibility of each developer to assess and manage the impacts of another's windfarm. This is the responsibility of the government, both local and national. It is therefore recommended that the IFIs use their influence with the authorities to enhance the quality of spatial plans and the practical application of Cumulative Impact Assessments.

In addition, the Lenders, through the delivery of their ESAPs, can help ensure that the windfarm developers in the wider project area work together in order to:

- Prepare integrated traffic management plans for the construction periods. The construction dates for the majority of the windfarms are not in the public domain and the scale of issue cannot yet be determined;
- Share information from bird monitoring activities. This will help refine the understanding migratory movements; and
- Build technical skills within the local workforce to improve their re-insertion to the labor market.

4.7 References

ALE Heavylift. Road Transport Survey 2018. Cañadon Seco windfarm

Argentina Official Portal. 2019 <https://www.argentina.gob.ar/vialidad-nacional/sig-vial>

ArgentAvis, 2012. http://argentavis.org/2012/sitio/especie_co.php?id=967

Blanco et al. 2001. Comando de Regiones Aereas. Direccion de Transito Arereo. ENR 5.6 "Vuelos migratorios de aves, zonas con fauna sensible y control de peligro aviario".

Energia Estrategica, 2019. <http://www.energiaestrategica.com/2019-con-gran-actividad-argentina-inauguraria-en-promedio-un-parque-eolico-cada-15-dias-su-mayor-record-historico>

Pedrana, Julieta & Bernad, Lucia & Pütz, Klemens & Gorosábel, Antonella & D. Muñoz, Sebastián. (2018a). El seguimiento satelital en Sud América: conociendo las rutas migratorias del cauquén colorado (*Chloephaga rubidiceps*). Poster presentation.

Pedrana, Julieta & Pütz, Klemens & Bernad, Lucia & Seco Pon, Juan Pablo & Gorosábel, Antonella & D Muñoz, Sebastián & Isacch, Juan & Matus, Ricardo & Blank, Olivia & Lüthi, Benno & Lunardelli, Melina & Rojas, Pablo. (2018b). Migration routes and stopover sites of Upland Geese *Chloephaga picta* in South America. *Avian biology research*. 11. 80-88. 10.3184/175815618x1517918048851

5. SOCIAL BASELINE AND STAKEHOLDER MAPPING

5.1 Socioeconomic Baseline

5.1.1 Introduction

5.1.1.1 Overview

This chapter provides an overview of socio-economic conditions in the settlement of the project study area within the context of the Deseado Department in the province of Santa Cruz of Argentina. Information is presented in this section at a settlement and department level, with reference to other levels (i.e. provincial and national) where relevant.

The data presented at project area level has been gathered from publicly available secondary sources, mainly: the World Bank Open Data (2017), the Government of Santa Cruz Province webpage, and others.

ERM undertook a site visit on 31 May 2019 to understand the site setting and the social and environmental sensitivities within the socio-economic study area. The site visit included meeting with local authorities from the Cañadón Seco Promotion Commission (*Comisión de Fomento*) and a walkover of the site. As part of the site visit, primary data was collected from sensitive areas and other key receptors inside the socio-economic study area. The following subsections provide an understanding of the same.

5.1.1.2 Study Area used for Socio-economic Baseline

An area of up to 2.5 km radius⁷ from the project boundary (wind farm area) has been demarcated as socio-economic study area for the Project by considering the extent of project impact in terms of water resources, human settlement, location of labor sites, location of the access roads, shadow flicker etc. The land on which it will be developed has a total area of approximately 40 km². Figure 5.1 shows the site and the socio-economic study area perimeter.

The socio-economic study area includes one single village: Cañadón Seco, which is located approximately 1.2 km away from the site perimeter (nearest turbine location), two farms (*estancias*) of which only one is active, and a former farm now reconverted as a rehabilitation center for youths suffering from addictions (Valdocco Foundation, Patagonia House).

The term *estancia* refers to a large rural establishment especially for the extensive rearing of cattle or sheep and is usually characterized by the existence of at least one "hull", i.e. a building center that includes housing, silos, stables, stables or haras, cellars and other related buildings.

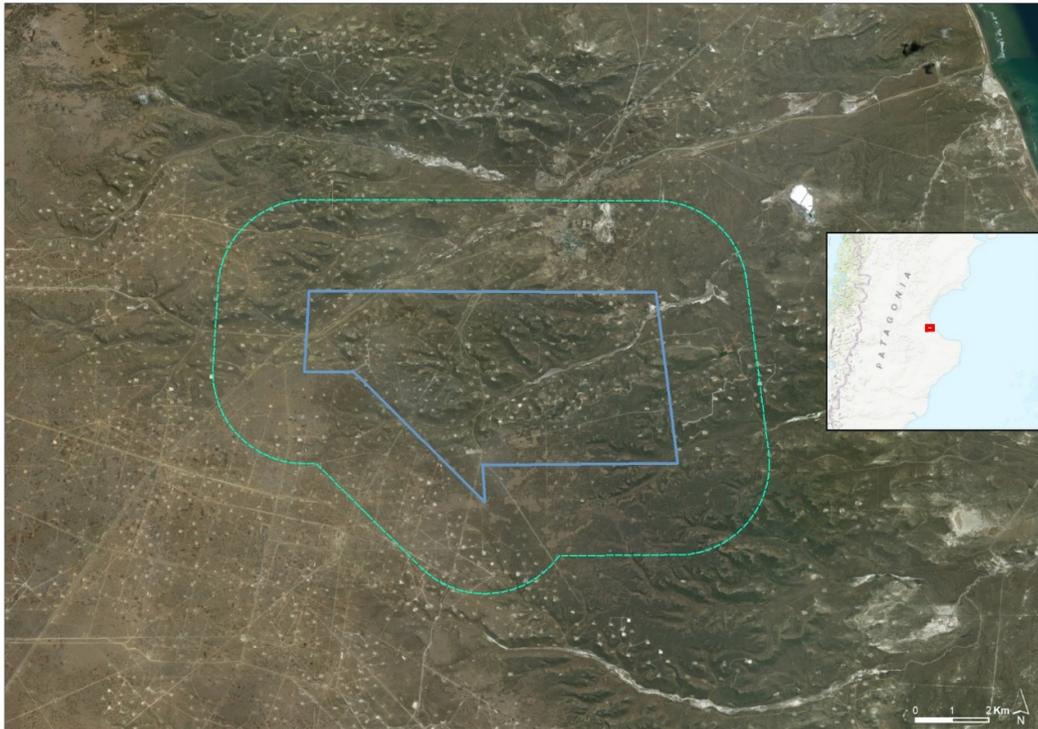
The wind farm will be located close to two rural farms (*estancias*):

- Estancia Las Rosas: located 2.5 km away from the nearest turbine. This farm is over (1000) one hundred years old and is owned by the Hermoso family. A total of (4) four employees work and live there carrying out cow farming in a fenced yard (feedlot) (see Figure 5.5); and
- Estancia Luján (not active anymore): located 1.2 km away from the site. This property does not carry out agricultural activities. It is occupied by a family of four people who rent the house and take care of it; and another single person who lives alone in another house.

Valdocco Patagonia House is located in the former Estancia Los Claveles, 2 km away from the nearest turbine (see 5.1.13.4 for further information).

⁷ The study area for a Wind farm is defined by connecting all the WTGs and associated components and connecting them to form a polygon.

Figure 5.1 Site perimeter and socio-economic study area delineation



* Note: the blue line identifies the perimeter of the site / the green line identify the perimeter of the socio-economic study area

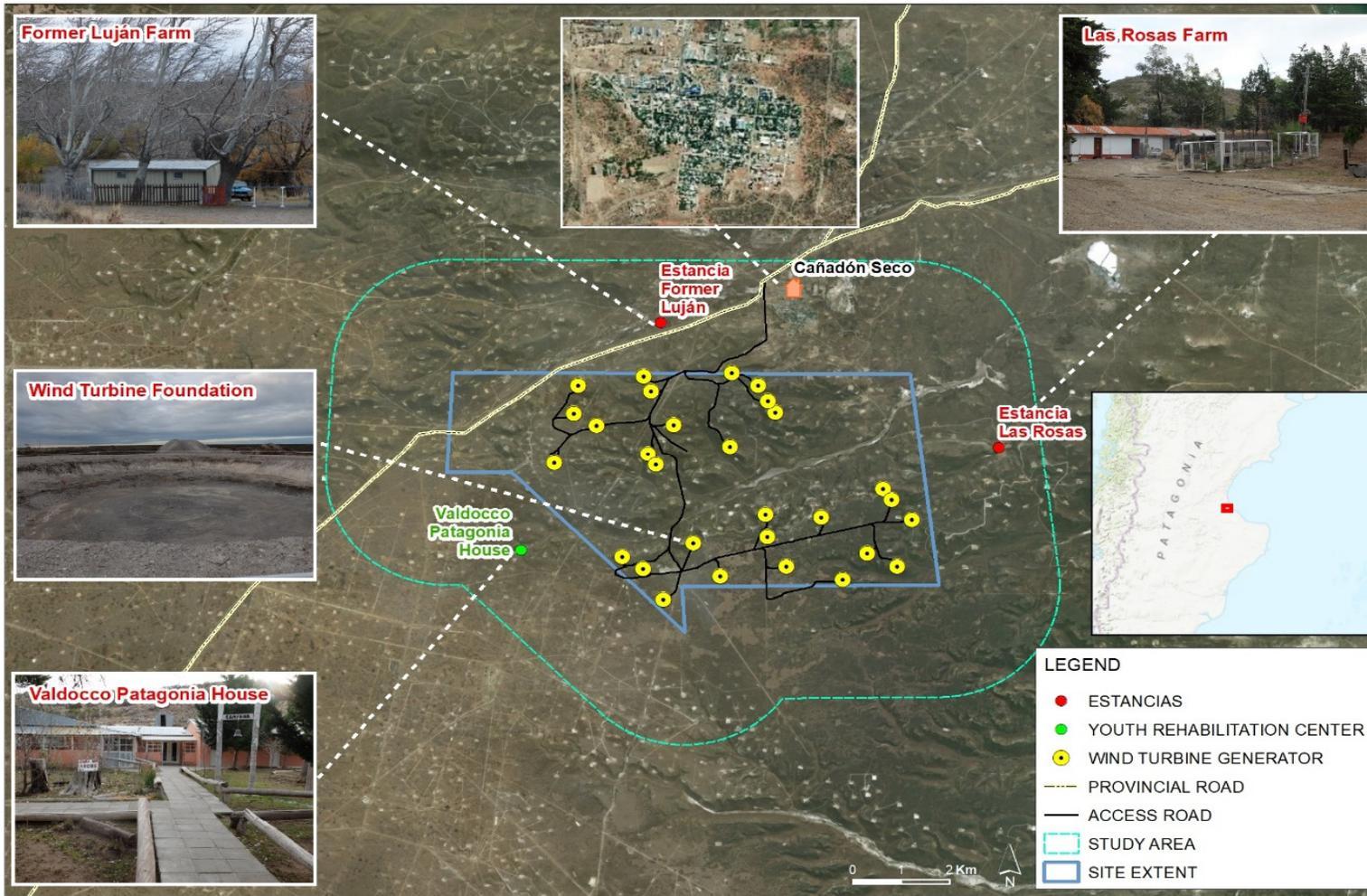
5.1.2 Governance and Administration

5.1.2.1 Administrative Structure and Settlement in the Project Area

Argentina is divided into 23 Provinces and the Autonomous City of Buenos Aires. Each province has its own constitution and internal laws although it has to comply with the national constitution and legislation. Each province, except from Buenos Aires, is divided into Departments, which are merely administrative divisions with no *de facto* power. The Departments are in turn broken into municipalities (cities, towns or villages).

The socio-economic study area is located in the Department of Deseado, north of the province of Santa Cruz (Patagonian Region). It includes the 25 km² rural village of Cañadón Seco, located 1.2 km from the Wind Farm site. Localities neighboring the study area include urban cities such as Olivia Caleta (approx. 25 km from the site) and Pico Truncado (approx. 33 km from the site) and rural villages such as Fitz Roy and Koluei Kaike. Figure 5.2 shows the overview of the socio-economic study area.

Figure 5.2 Overview of the socio-economic study area



Source: ERM based on field visit, 2019.

5.1.2.2 Local Decision-Making

The Province of Santa Cruz entrusts the administration of the local population interests' to municipalities (*municipio*) and promotion commissions (*comisiones de fomento*). See Table 5-1 for the complete list of municipalities and promotion commissions in Santa Cruz Province.

Table 5-1 Municipalities and promotion commissions - Santa Cruz Province

Municipalities	Promotion Commissions
Caleta Olivia	Cañadón Seco
Los Antiguos	Jaramillo
Río Gallegos	Koluel Kayke
Pico Truncado	Julia Dufour
El Calafate	Tres Lagos
Las Heras	Lago Posadas
Puerto Deseado	Fitz Roy
Puerto San Julián	Tellier
Gobernador Gregores	Hipólito Yrigoyen
Ventiocho de Noviembre	
Yacimientos Río Turbio	
Comandante Luis Piedra Buena	
Perito Moreno	
Puerto Santa Cruz	
El Chaltén	

* Note: In bold the municipalities / promotion commissions inside or close to the socio-economic study area

Source: Ministerio de Economía y Finanzas Públicas.

<http://www2.mecon.gov.ar/hacienda/dncfp/municipal/caracterizacion/exportar2.php?provincia=z>

Municipalities are established in those places with more than (1,000) thousand inhabitants. The creation of promotion commissions is carried out in locations with an insufficient number of inhabitants to constitute a municipality⁸. In the Santa Cruz Province, the promotion commissions (*Comisiones de Fomento*) depend directly on the provincial executive power. Therefore, the presidents of the promotion commissions are directly elected by the Governor and not through general elections. The promotion commissions are executive bodies, without legislative nor judiciary powers⁹.

⁸ Leoni, Maria (2004). Los Municipios y la Política en los Territorios Nacionales. <http://www.redalyc.org/html/638/63810303/>

⁹ Field Survey, ERM, 2019. Interview with local authorities.

5.1.3 Demographics

5.1.3.1 National

In 2017, Argentina's population numbered 44 million inhabitants¹⁰, mainly concentrated in urban areas (92%). Argentina has a young population, with 25% of the population being aged under 14 in 2017, and an average annual population growth rate of 0.9%. Argentina's population continues to grow but at a slower rate because of its steadily declining birth rate¹¹.

5.1.3.2 Provincial

The Santa Cruz Province occupies a vast area of 243,000 km² and is composed of seven departments, among which is Deseado. Population density is low but there is an upward trend in population concentration in urban areas. The history of the population living in this department is recent and coincides with the founding of coastal towns in times prior to the formation of provincial states, due to state interest in the exploitation of energy resources, extensive livestock and sovereignty of peripheral territories.

According to the latest 2010 census conducted by the National Institute of Statistics and Censuses of the Argentine Republic (hereinafter INDEC), the province of Santa Cruz has the lowest population per unit/area, being a total population of 273,964 inhabitants, of which 49% are women and 51% are men.

5.1.3.3 Departmental

The Deseado Department is the second most important department in the province, representing 39% of the total provincial population. It is a department rich in natural resources, including oil and gas, gold, silver, and fisheries, bordered on the west by the Lake Buenos Aires Department and south by the Magallanes Department. In the eastern part, it has an extensive coast on the Atlantic Ocean and the province of Chubut borders the north. Its name comes from the Deseado River, which crosses it from west to east. Together with the Escalante Department (Chubut Province), they form the San Jorge Gulf Basin, a place of more than 340 000 inhabitants.

5.1.3.4 Municipalities

The village of Cañadón Seco, the only settlement in the socio-economic study area, is located in the northern part of the province of Santa Cruz. It has an area of 25 km² and is inhabited by a relatively young population of 879 people, of which 46% are women and 54% are men (2010 INDEC census). According to local authorities, no population growth is expected and there are limitations to territorial expansion due to industrial use (the majority of the municipal territory is dedicated to O&G industry) and geographical features.

Cañadón Seco was born as a result of the discovery of oil in the surrounding area in 1944. At first, it was a camp for YPF, S.A. In 2000, it became an administrative entity in its own right as YPF transferred its property rights to the Province of Santa Cruz. As the Cañadón Seco inhabitants did not number more than 1000 (one) thousand, a Promotion Commission was created. As stated in Section 385.1.3.4, the Promotion Commission is an executive body. No legislative nor judiciary power are present in Cañadón Seco.

Today, hydrocarbon activity is still the main source of livelihood for the city, as is the case of cities in the area. According to local authorities, approximately 2 600 workers travel to Cañadón Seco on a daily basis, mainly from Caleta Olivia and other nearby towns.

The city of Caleta Olivia is the closest urban hub to Cañadón Seco. In 2010, the population numbered 51 733 inhabitants, of which 49% are women and 51% are men (2010 INDEC census).

¹⁰ World Bank Open Data (2017). World Bank Group. <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=AR>

¹¹ IndexMundi Argentina. https://www.indexmundi.com/argentina/demographics_profile.html

5.1.4 Migration and Population Change

According to the 2010 INDEC census, there was a significant increase in the population of the province of Santa Cruz in the period 2000-2010. This population increase is due to an industrial development policy that favors the process of migration to the province.

Specifically, Department of Deseado, which falls within the socio-economic study area, experiences an increase in population density. This is fundamentally due to a new flow of labor opportunities associated with hydrocarbon activity, as is the case of Caleta Olivia, Pico Truncado, Las Heras and Puerto Deseado.

In Cañadón Seco, there has been a change in the composition of the local population in the last ten (10) and twenty (20) years, as YPF has increasingly reduced its control over the village and reduced the hiring of labor during the acquisition of Repsol. As YPF reduced the number of employees, housing became more accessible: most of the buildings formerly owned by YPF and transferred to workers were sold. People who came from other provinces, such as San Juan and Salta, in search of work, occupied these empty houses.

5.1.5 Ethnicity, Language and Religion

Argentina is a multicultural country with a considerable geographic variety and the combination of many ethnic identities. The main language is Spanish, spoken by almost the entire population. Various indigenous languages are still present nowadays: Guaraní in the northeast of the country (especially in the interior of the province of Corrientes); Quechua in the province of Santiago de Estero and in areas of the province of Jujuy; and Mapudungun in the provinces of Patagonia¹².

According to data from RENACI (National Registry of Indigenous Communities) and the Government of the Province of Santa Cruz, Indigenous Mapuche communities are present in the Pico Truncado Municipality (Deseado Department). These communities are mixed with the local population in the following localities:

- "Willi Mapu" and "Newen Mapu" Mapuches: these communities are located in the city of Caleta Olivia in approximately 18 km from the Project Area since 2011. The "Newen Mapu" community is made up of (8) eight families.
- Mapuches - Tehuelches "Nehuen Mullfüñ": this community is located in the town of Pico Truncado in approximately 30 km from the Project Area since the end of 2011. This community is made up of (17) seventeen families.

The Tehuelche, Aoniken Indigenous Group (Mapudungun-speaking) is also present in the Province of Santa Cruz, concretely in the Department of Deseado, further south of the socio-economic study area (specifically 17 km). This group numbers 31,000 people¹³. However, this group does not come from this land, but from migratory movements. Consequently, they have no ancestral lands in the area.

None of those indigenous communities are physically present (as per the National Registry of Indigenous Communities), or have claims related to, the land within or in the vicinity of the project boundaries.

Additionally, there is no identified cultural heritage or historic building or monument in the project area, and the construction phase will include a chance find procedure to report on and manage any potential archaeological find.

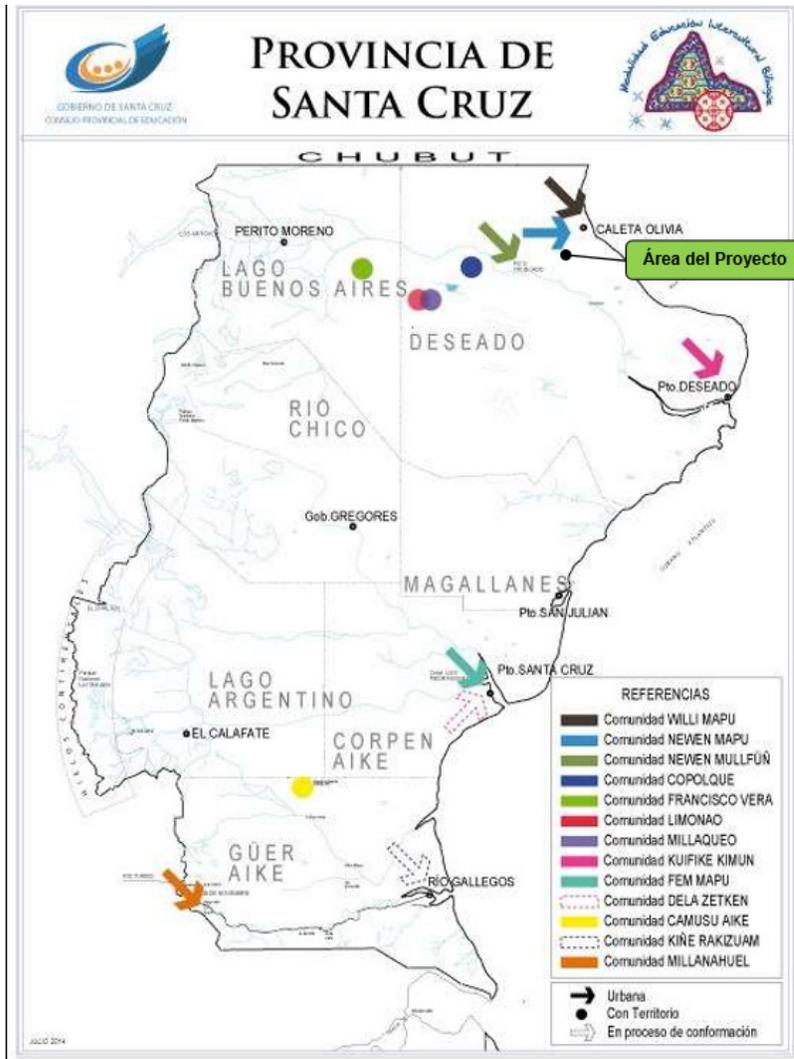
Christianity is the largest religion (93.1%)¹⁴.

¹² Idioma de Argentina. <https://queidioma.com/hablan-en-argentina/>

¹³ Tehuelche, Aoniken, Argentina. https://joshuaproject.net/people_groups/15319/AR

¹⁴ Argentina religion. <https://joshuaproject.net/countries/AR>

Figure 5.3 Location of native indigenous peoples in the Santa Cruz Province



Source: Gobierno de la Provincia de Santa Cruz as presented in YPF Luz Local EIA (2017).

5.1.6 Gender and Gender Rights

The situation of women in Argentina has improved in recent years in terms of their political participation, education and sexual and reproductive health, placing the country among the top countries in the continent in terms of gender equality. However, the growing integration of women in the labor market has not been counterbalanced by a greater commitment of men to family and domestic roles¹⁵.

In September 2018, the province of Santa Cruz passed a Law making gender equity mandatory in the composition of candidates lists for provincial and local political elections, from 2019 onwards.

¹⁵ Información para la igualdad. <http://www.amecpress.net/spip.php?article7810>

5.1.7 Community Networks

Cañadón Seco has less than 1,000 inhabitants. However, approximately 2,900 people coming from nearby communities travel to the area on a daily basis to work on industrial activities, mainly in the oil and gas field. According to the representatives of the local government of Cañadón Seco, this phenomenon does not represent a substantial change since Cañadón Seco was born as an oil workers' camp and are therefore used to regular daily influx of people.

5.1.8 Land Use and Ownership

5.1.8.1 Land tenure

As stated in the IFAD Report¹⁶, the Patagonian Region (where the Santa Cruz Province is located) presents a very particular situation in comparison to the national context, with many farms less than 100 hectares in size that are closely link to fruit growing activities or large-scale extensive livestock operations¹⁷.

In the socio-economic study area (which includes but is not limited to the project area as defined in Section 5.1.1), most the land is practically owned by YPF S.A., which previously carried out oil-related activities. As previously stated, the village of Cañadón Seco, a former YPF camp, has acquired its own administrative autonomy linked to the provincial government. Within the boundaries of the proposed windfarm and the footprint of the electrical transmission line spur, the entirety of the land is property of YPF S.A.

The socio-economic study area presents a very dry terrain historically dedicated to the exploitation of fossil resources such as oil and gas. According to local authorities, Cañadón Seco's existence is essentially linked to operation of the nearby oil and gas fields. No agriculture activities are carried out in the study area.

As it is shown in Figure 5.4, the vegetation found in the area is the Patagonian steppe, widely distributed along the region and characterized by the presence of herbaceous and low shrub species and a lack of trees.

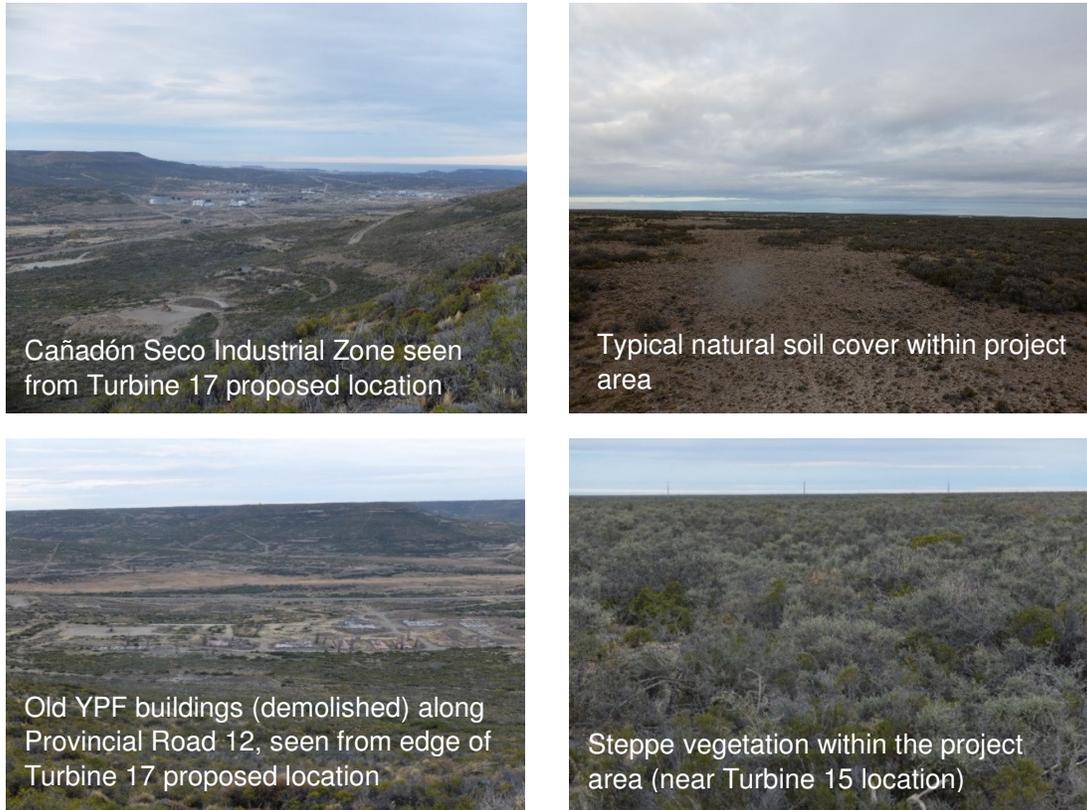
¹⁶ IFAD (2011). The issue of land in Argentina.

https://www.ifad.org/documents/38714170/39150184/The+issue+of+land+in+Argentina_e.pdf/3e84fef1-04d6-4524-8df7-fbabb57c782c

¹⁷ IFAD (2011). The issue of land in Argentina.

https://www.ifad.org/documents/38714170/39150184/The+issue+of+land+in+Argentina_e.pdf/3e84fef1-04d6-4524-8df7-fbabb57c782c

Figure 5.4 Land use in the socio-economic study area



Source: ERM, 2019

5.1.9 Economy and Employment

Argentina is one of the largest economies in Latin America, with a Gross Domestic Product (GDP) of more than US \$500 billion. However, the historical volatility of economic growth and the accumulation of institutional obstacles have impeded the country's development¹⁸.

Argentina has vast expanses of fertile agricultural lands and an enormous potential in renewable energies. It is a leading country in food production, with large-scale industries in the agriculture and cattle sectors. Argentina also has great opportunities in manufacturing sub-sectors and in the high-tech innovative services sector¹⁹.

The extraction of oil and gas is Santa Cruz's most important economic activity. At present, Santa Cruz is the first coal-producing province in the country and the second O&G producing province, after the province of Neuquén. The hydrocarbons production is intended both for processing within the country (mainly outside the province) and for export in crude oil. The main oil buyers are Chile (where most of the production is destined), the United States, China and Brazil. In Santa Cruz, the hydrocarbon exploitation corresponds to 1/3 of the Provincial Gross Product (PBP).

Santa Cruz is the Argentine province that exports more production in relation to its product, at levels markedly higher than the national average. This export orientation based on the exploitation of natural resources - hydrocarbons, sea products, wool - implies that both export volumes and values present significant price fluctuations in the international market.

The socio-economic study area follows the province's tendency to exploit natural resources, notably oil and gas. There is a potential economic opportunity in the field of wind energy, due to the climatic

¹⁸ World Bank Group- Argentina. <https://www.worldbank.org/en/country/argentina/overview>

¹⁹ World Bank Group- Argentina. <https://www.worldbank.org/en/country/argentina/overview>

characteristics of the area. In the area of Pico Truncado, 40km from the study area, the Wind Farm “Jorge Romanutti” is already in function.

5.1.10 Livelihoods and Income

Livelihoods in the socio-economic study area are constrained by the current land use and presence of oil and gas operations. The main livelihood activities are public employment and industrial activities (mainly oil and gas) as well as small trading and services.

5.1.10.1 Public Employment

In Cañadón Seco, an important part of the population earn a living with paid employment, mainly administrative public employees, teachers and others. It was reported that over 60% of the people in working age are public servants.

5.1.10.2 Oil & Gas and Mining

As stated in Section 5.1.9, the extraction of oil and gas is Santa Cruz's most important economic activity. At present, Santa Cruz is the first coal-producing province in the country and the second oil & gas producing province, after the province of Neuquén.

The activities developed in the area of study are mainly related to the oil & gas activity, which carries out the exploitation of non-renewable resources such as crude oil and natural gas, being the Departments Deseado and Lago Buenos Aires where most of the extraction wells are concentrated. The oil and gas industry is one of the major employers in the area.

5.1.10.3 Agriculture

The Deseado Department has approximately 500 agricultural establishments, all of them together with an approximate load of 400 thousand animals. This region, unlike those of the center and south, specializes in the production of fine wool. In relation to other Argentine Provinces, the agricultural sector of Santa Cruz is not significant. However, Santa Cruz is the province with greater slaughter of sheep and the second producer of wool of the country²⁰. The ovine cattle ranch is a common type of livelihood, which by its double purpose, commercialization of its wool and consumption of the meat, extends by the entire Province.

However, the socio-economic study area is mainly dedicated oil and gas activities. The few farms (*estancias*) present in the study area do not make use of the full extension of their lands, since many were given as easements for oil and gas activities.

As indicated in Section 5.1.1.2, the Estancia las Rosas is the only one that keeps active its feedlot activity of fattening cattle. At this estancia, the animals are kept in fenced plots and do not graze freely on the land.

²⁰ Industrias agropecuarias. Sociedad Rural de Puerto Deseado: “El presente y futuro de la ganadería en el Departamento Deseado desde la perspectiva de los productores”

<http://www.observadorcentral.com.ar/especializadas/industria/agropecuario/sociedad-rural-de-puerto-deseado-el-presente-y-futuro-de-la-ganaderia-en-el-departamento-deseado-desde-la-perspectiva-de-los-productores/>

Figure 5.5 Estancia Las Rosas



Source: ERM Field Survey, 2019

5.1.11 Education

Argentinian law 26.206²¹ states that the structure of the education system in Argentina is divided in (4) four levels:

- Early education (*educación inicial*);
- Primary education (*educación primaria*);
- Secondary education (*educación secundaria*);
- Higher education (*educación superior*);
- Vocational training (*formación profesional*).

²¹ Argentina Education Law 26.206

http://www.sipi.siteal.iipe.unesco.org/sites/default/files/sipi_normativa/argentina_ley_nro_26206_2006.pdf

According to data from the INDEC 2010 Census, out of 85,851 people in the education system, 98.75% of the inhabitants of Deseado Department are literate, with only 1.25% illiteracy.

In Caleta Olivia, the literacy rate is 79 % of the total population aged 10 years and over. Table 5-2 shows the level of completion of each education level per % of population in Olivia Caleta.

Table 5-2 Population per maximum level of education attained – Olivia Caleta

Level of completion	% of population
Early education	5%
Primary education	41%
Secondary education	32%
Higher education	13%
Vocational training	1%

Source: INDEC Census, 2010

5.1.12 Public Health

The Argentinean health system is characterized by excessive fragmentation. There are three major sub-sectors:

- Public;
- Social security;
- Private.

The public subsector is in turn fragmented into levels subject to regulations emanating from the different jurisdictions²².

- National;
- Provincial;
- Municipal.

In the socio-economic study area, the responsible public sector is the Ministry of Health of the Santa Cruz Province.

5.1.13 Infrastructure and Public Services

5.1.13.1 Access to Water Resources

The town of Cañadon Seco depends on the use of groundwater resources to meet its basic water needs, both for human and industrial use. The project implementation zone is located on the hydrogeological reserve Meseta Espinosa-El Cordón area. This basin covers an area that allows water supply to some localities such as Caleta Olivia, Cañado Seco and Pico Truncado. Cañadón Seco is supplied with water via groundwater wells and a system of water tanks.

The Project will require access to water for staff personal consumption and cooking. Bottled water (bottles/dispenser) will be provided from the nearest location for such purposes.

²² Ministerio de Salud. Presidencia de la nación. Módulo 5 Políticas de Salud.

http://www.msal.gob.ar/images/stories/bes/graficos/0000001030cnt-modulo_5_politicas-salud.pdf

5.1.13.2 Solid Waste Management

The Cañadon Seco Promotion Commission has implemented a third-party service for the collection of solid urban waste and disposal at the Caleta Olivia municipal landfill/dumpsite. Hazardous and industrial wastes are managed by the companies that generate these via third-party contractors authorized by the provincial environmental authority.

The company will implement a waste management program for all project stages and personnel and third parties will be trained in waste management procedures.

Waste generation is limited to solid or liquid waste remaining from any process during the construction stage and maintenance waste during the operation stage. Contractor companies will be responsible for the proper management of their waste. YPF will audit that management and require the relevant documentation.

5.1.13.3 Education Facilities

With regard to schooling infrastructure, the Deseado Department has educational establishments at all levels of the education system, especially at the primary, initial and secondary levels.

Education facilities in the Deseado Department are described in Table 5-3.

Table 5-3 Education facilities in the Deseado Department

Level	Number
Early education	26
Primary education	41
Secondary education	19
Higher education	2
Vocational training	5

Source: EIA Los Hercules based on <http://educacionsantacruz.gov.ar/index.php/institucional/establecimientos-educativos>

At Cañadón Seco village, the field survey has reported the existence of a school, a student residence, a public library and a Research, Development and Transference Center of the Austral Patagonia National University (CIDT-UNPA).

According to local authorities, there are close cooperative relationships between Cañadón Seco and Olivia Caleta and Comodoro Rivadavia (Chubut Province) in terms of educational services.

Figure 5.6 School in Cañadón Seco



Source: ERM Field Survey, 2019.

5.1.13.4 Access to Healthcare

Access to healthcare in the Deseado Department counts on hospitals and health centers in the most populated cities and even in smaller localities, as in Cañadón Seco.

Health centers in the Deseado Department close to the socio-economic study area are shown in Table 5-4.

Table 5-4 Health centers close to the socio-economic study area

Health center	Address	Village/Town/City
Puesto Sanitario Virgen del Valle	Damevin w/n	Caleta Olivia
Cic. Gobernador Gregores	Barrio Gob. Gregores	Caleta Olivia
Cic. San Cayetano	Barrio San Cayetano	Caleta Olivia
Cic. Centenario	Ombú & Las Lilas w/n	Caleta Olivia
Puesto Sanitario Rotary	Bº Rotary 23 Sta Fe St.	Caleta Olivia
Puesto Sanitario 2 de Abril	Street w/n	Caleta Olivia
Puesto Sanitario 17 de Octubre	Barrio 17 de Octubre	Caleta Olivia
Hospital Zonal Caleta Olivia	Lavalle w/n	Caleta Olivia
Puesto Sanitario Jaramillo	Janes Font & National Road 281	Cañadón Seco
Puesto Sanitario Fitz Roy	Nacional Road 3, km 85 (from Caleta Olivia)	Fitz Roy
Puesto Sanitario Koluel Kaike	Mariano Moreno 864	Koluel Kaike
Hospital Las Heras	28 de Noviembre w/n	Las Heras

Health center	Address	Village/Town/City
Cic. B° Perón – Pico Truncado	Tucumán & Vélez Sarsfield	Pico Truncado
Cic. B° 400 – Pico Truncado	España & Pje. Colón	Pico Truncado
Cic. Huemul – Pico Truncado	San Martín Esq. 13 de Diciembre	Pico Truncado
Cic. Mosconi – Pico Truncado	Barrio Mosconi	Pico Truncado
Hospital Pico Truncado	Sarmiento & Vélez Sarsfield	Pico Truncado
Hospital Puerto Deseado	España 990	Puerto Deseado

Source: Santa Cruz. Gobierno de Provincia. Hospitales y Centros de Salud.
<http://saludsantacruz.gob.ar/portal/institucional/hospitales-y-centros-de-salud/>

In Cañadon Seco there is one health center (See Figure 5.7 below). In the absence of more health care centers, the Ministry of Health of the Santa Cruz Province launched the mobile clinic program (*programa de consultorio móvil*) for prevention and primary care in Cañadón Seco, as well as in other small localities²³.

According to local authorities, there are close cooperative relationships between Cañadón Seco and Olivia Caleta and Comodoro Rivadavia (Chubut Province) in terms of health services.

Figure 5.7 Cañadón Seco Health Center



Source: ERM Field Survey, 2019.

²³ Tiempo sur. <https://www.tiemposur.com.ar/nota/172694-jornadas-de-salud-en-canadon-seco>

The Valdocco therapeutic and educational center for young people between 15 and 28 years old with addiction problems is also located in the socio-economic study area, concretely 2 km away from the nearest proposed wind turbine. Approximately 55 to 60 people live in the foundation, where activities such as carpentry, bakery, plant nursing etc. are done in a daily basis. The center was installed 15 years ago in a former farm, “Estancia Los Claveles”, owned by YPF. The access to the site is via roads maintained by YPF.

Valdocco is a national foundation; this center is part of a network of other centers in Argentina. Funding is mainly channeled through national and provincial subsidies and donations.

Figure 5.8 Valdocco Rehabilitation Center



Source: ERM Field Survey, 2019.

5.1.13.5 Roads and Transportation Means

The main road connecting the socio-economic study area and the community of Cañadon Seco is the Provincial Road 12. No traffic volume data was available for RP12. The Google Maps traffic visualization tool suggests that traffic along RP 12 and some segments of other roads is generally free-flowing or has limited delays in more developed areas near Fitz Roy and Pico Truncado, essentially at peak hours (morning and evening) (Google 2019).

Receptors for transportation impacts include other users of the public roads. These users are likely to be unaccustomed to frequent heavy-truck traffic or substantial congestion; however, as residents of a rural part of Argentina, these users likely have experience dealing with unexpected road conditions.

Potential transportation impacts are discussed in Annex A of this report.

It should be noted that the site is located within a conventional oil exploitation area, so there are facilities in for operation for extraction, buried pipelines for hydrocarbon transport, power lines for equipment, etc. It is expected that these facilities will continue to operate both during the construction stage and during the production stage of the park.

5.1.13.6 Airports and Ports

The relevant infrastructures for the Project are the following:

- The port that will be used for the Project is that of Puerto Deseado, located 230 km away from the site.
- The airport in Pico Truncado (30km away from the site).

5.1.13.7 Housing

Figure 5.9 provides an overview of the typical housing present in the Cañadón Seco village.

Figure 5.9 Typical housing in Cañadón Seco



Source: Prepared by ERM based on Field Survey information, 2019.

5.2 Stakeholder Mapping

The following information needs to be complemented with the Stakeholder Engagement Plan provided as stand-alone document.

5.2.1 Background

The stakeholders for this Project differ in terms of the degree of impact, interest, and influence over the project. The preliminary stakeholder mapping and its analysis was conducted with the objective of identifying each stakeholder group; studying their profile, characteristics and the nature of their stakes; gauging their influence on the project; and understanding the specific issues, concerns as well as expectations of each group from the Project.

On October 4, 2017, a public hearing was held in Caleta Olivia in which YPF presented the Cañadón Seco Wind Farm project to the local authorities of the province as well as other various stakeholders. This public hearing described the characteristics of the project and its location, as well as the results of the environmental impact assessment. The public hearing was attended by 30 members (women and men) of the community including private citizens, representatives of private entities, schoolteachers etc. The consultation process was an opportunity to assess awareness levels about the project in the community as well as to identify issues, concerns and expectations. The consultations dealt with the duration of the construction stage of the park, the election of the porth, and meetings at universities.

The Institutional Relations Management Department of YPF Luz manages Stakeholder relations at YPF Luz. This team participates in meetings with stakeholders and provides advice at all times to the various areas of the company and provides a coordinated response in case of issues or concerns are raised by stakeholders. The possibility of making any complaint or suggestion that may help improve the company's environmental, social, or health and safety performance through the consultation and grievance system is available to the public.

YPF Luz has enacted a communication plan with the following main stakeholders:

- **Authorities:** In order to communicate to the authorities about the different instances of the project and to obtain the respective permits, notes are sent and meetings are held with authorities from the province of Santa Cruz and the municipalities in the northern part of the province. At the same time, meetings and presentations are made to CAMMESA, ENRE and Secretaría de Energía Eléctrica de Nación in order to request access to the transportation system and agent of the Wholesale Electricity Market.
- **Media:** YPF Luz has a proactive communication strategy. The company regularly invites media to visit its sites, holds meetings with specialized media, responds to every media request received and sends media press releases when appropriate. The company has trained each of its regional managers to be effective spokespersons and communicators. In addition, YPF Luz has a news monitoring agency that reports on the different repercussions related to the company and the operations of each site. In addition, the Brandwatch site is used to monitor the news.
- **Employees and Trade Unions:** The relationship between YPF Luz and these stakeholders is described with detail in the "Plan de Relacionamiento Parque Eólico Cañadón León, 2019". YPF Luz envisages two main grievance mechanisms:
 - Workers' Grievance mechanism: Ethical line; maligning and Customer Service
 - Community Grievance mechanism: Official Web page, LinkedIn and Meetings
- **Local community:** YPF Luz has developed a plan of social investment activities for 2019 in the area. More detail is provided in the Plan de Relacionamiento Parque Eólico Cañadón León, 2019.

YPF Luz has enacted a Social Investment Plan for 2019 with the goal to evolve from isolated social investment actions, to a company-wide strategy that can be replicated in every company site, adapting to local needs and considering input from local stakeholders in ongoing consultations with the community (see Stakeholder Engagement Plan for further detail). The 2019 YPF Luz's social investment program will concretely aim to:

- Improve the quality of life and infrastructure of the communities where they operate.
- Contribute to improve the quality of education.
- Encourage the development and dissemination of knowledge to benefit society, with particular focus on the efficient use of energy and renewable energies.
- Collaborate with professional, business and community associations, whose efforts can complement the operations of YPF LUZ and allow to improve the service to the public.

The social investment strategy is aligned with the following SDGs 4, 7, 11 and 17: SDG 4 regarding Quality Education; SDG 7 regarding Affordable and Clean Energy; SDG 11 regarding Sustainable Cities and Communities and; SDG regarding Partnerships for the Goals.

The initiatives that will be undertaken include:

- **Employee Volunteering Program.** This program will be set in place for as many social investment activities as possible. In 2019, employees will be invited to participate in social investment activities and to coordinate them. The objective is to set up a volunteering committee to select employee proposals for volunteering in 2020. In 2019, the program will be launched, with at least one volunteering opportunity in every company site.
- **Meetings with Local Communities.** "Encounters with the community" in the form of meetings opened to the public will be held on a quarterly basis, to better monitor social investment actions and improve dialogue with stakeholders. The plan includes at least two meetings per site, not only in sites in operation, but also in sites under construction. Meetings will be coordinated community relationship local referents, who will be trained in communications and community relations during 2019.
- **Planting Activities.** Planting activities will be organized jointly with local communities. Trees will be donated by the company. The activity will count with the participation of neighbouring families and social organizations and will be coordinated by YPF Luz Volunteers.
- **Guided visits to company sites.** Regular guided tours for the community will be offered at each YPF Luz site once the wind farm is constructed, with the collaboration of volunteers. In the meantime, the company has invited several members of the community, including members of the Cañadón Seco Commission, and participants of the renewables training to visit the Manantiales Behr Windfarm. These visits are planned for the spring of 2019. During the site visits YPF Luz will present what the company does, the importance of electric power, renewable energies, as well as energy efficiency, and describe in detail the activities at the site being visited.

The above-mentioned measures will be complemented with YPF Foundation activities will also undertake several initiatives such as the following:

- **Sustainable Cities Plan for Cañadón Seco.** YPF Foundation is carrying out a sustainable cities report to promote private public partnerships in local development. The elaboration of the report will begin in June 2019 with a survey to the local community on environmental, urban, educational, government and local development sustainability.
- **Renewable energy training courses in Cañadón Seco.** This course is carried out by YPF Foundation, with the participation of YPF Luz volunteers. It consists in training to technicians on installation of residential renewable energy solutions. Two courses will be dictated in Cañadón Seco, with approximately 10 participants each, and last 4 months each. The first course began in April 2019 and the second one is scheduled to begin in August.

5.2.2 Project Stakeholder

5.2.2.1 Stakeholder Identification

Stakeholders are organisations and individuals who may be directly or indirectly (positively or negatively) affected by the Project or who may have an effect on how the Project is implemented. Stakeholder can be categorized as follows:

- **Primary Stakeholders:** Those directly affected by the Project such as individuals with rights of ownership or use of land required by the Project and nearby neighbours to the parcel of land.
- **Secondary Stakeholders:** Those indirectly affected by the Project but who will influence the project implementation. These include the responsible agencies, government ministries, municipal authorities.

Stakeholder identification began at project inception and planning, and has continued through the various stages of the project development. Stakeholders identified to date are listed in the table below. Stakeholder identification is an ongoing activity that will need to be continued as the Project progresses.

Stakeholder identification was completed using a series of YPF Luz documents including the “Plan de Relacionamento Parque Eólico Cañadón León, 2019” and the “Minuta Audiencia Pública, 2017”.

Table 5-5 Stakeholders list

Category	Stakeholder	Priority
Public Administration : National level	Secretary of the Electric Energy (Secretario de Energia Eléctrica) Alejandro Sruoga	Secondary
	ENRE; National Electricity Regulatory Body (<i>Ente Nacional Regulador de la Electricidad</i>)	
Public Administration : Provincial level	Governor of Santa Cruz (Alicia Kirchner)	Secondary
	Ministry of Labour of the Santa Cruz Province (Teodoro Camino)	
	Ministry of Health of Santa Cruz Province (María Rocío García)	
	Secretary of State for the Environment of the Santa Cruz Province) (Mariano Bertinat)	
	Development Commission of Cañadón Seco – Province of Santa Cruz	
Public Administration : Municipal level	Cañadon Seco Commissioner (Jorge Soloaga)	Secondary
	Cañadón Seco Directorate of Natural Resources and Health (Estela Llama)	
	Cañadón Seco Institutional Relations (Juan Quiroga)	
	Cañadón Seco General Secretary (Javier Carrizo)	
	Mayor of Caleta Olivia (Facundo Prades)	
	Mayor of Pico Truncado (Omar Fernández)	
Community-based services	Library Cañadon Seco	Secondary
	Vecinos Patagónicos	Secondary
	School N° 33 Cañadón Seco	Secondary
	Federación de Centros Juveniles Valdocco (Director Valeria Gómez)	Primary
	Police Cañadón Seco	Primary
	EM San Jorge	Secondary
	Health Center (Puesto Sanitario)	Secondary
	Firemen Cañadón Seco	Primary
NGOs	Asociación de Mujeres del Arte Popular (Director Juana Almeyra)	Secondary
Estancias	Estancia Las Rosas	Primary
	Estancia Luján	
Indigenous Peoples	Tehuelche, Aoniken Indigenous Group	Secondary
Local Press	Elcaletense.net	Secondary
	Diario Prensa	
	El Patagónico	

Category	Stakeholder	Priority
Local Press	Tiempo Sur	Secondary
	El Mediador	
	La Prensa de Santa Cruz	
National Press	TELAM	Secondary
	DYN	
Private Sector entities	Grupo Dragón	Secondary
	CAMMESA (<i>client</i>)	
	General Electric (<i>supplier</i>)	
Trade Unions	APUAYE; Association of University Professionals of Water and Electric Energy (<i>Asociación de Profesionales Universitarios del Agua y la Energía Eléctrica</i>),	Secondary
	APJAE; Association of Water and Electric Power Hierarchical Personnel (<i>Asociación del Personal Jerárquico del Agua y la Energía Eléctrica</i>);	
	Argentine Federation of Workers of Light and Power (<i>Federación Argentina de Trabajadores de Luz y Fuerza</i>).	
Employees	YPF Luz	Secondary

Source: ERM and YPF Luz, 2019.

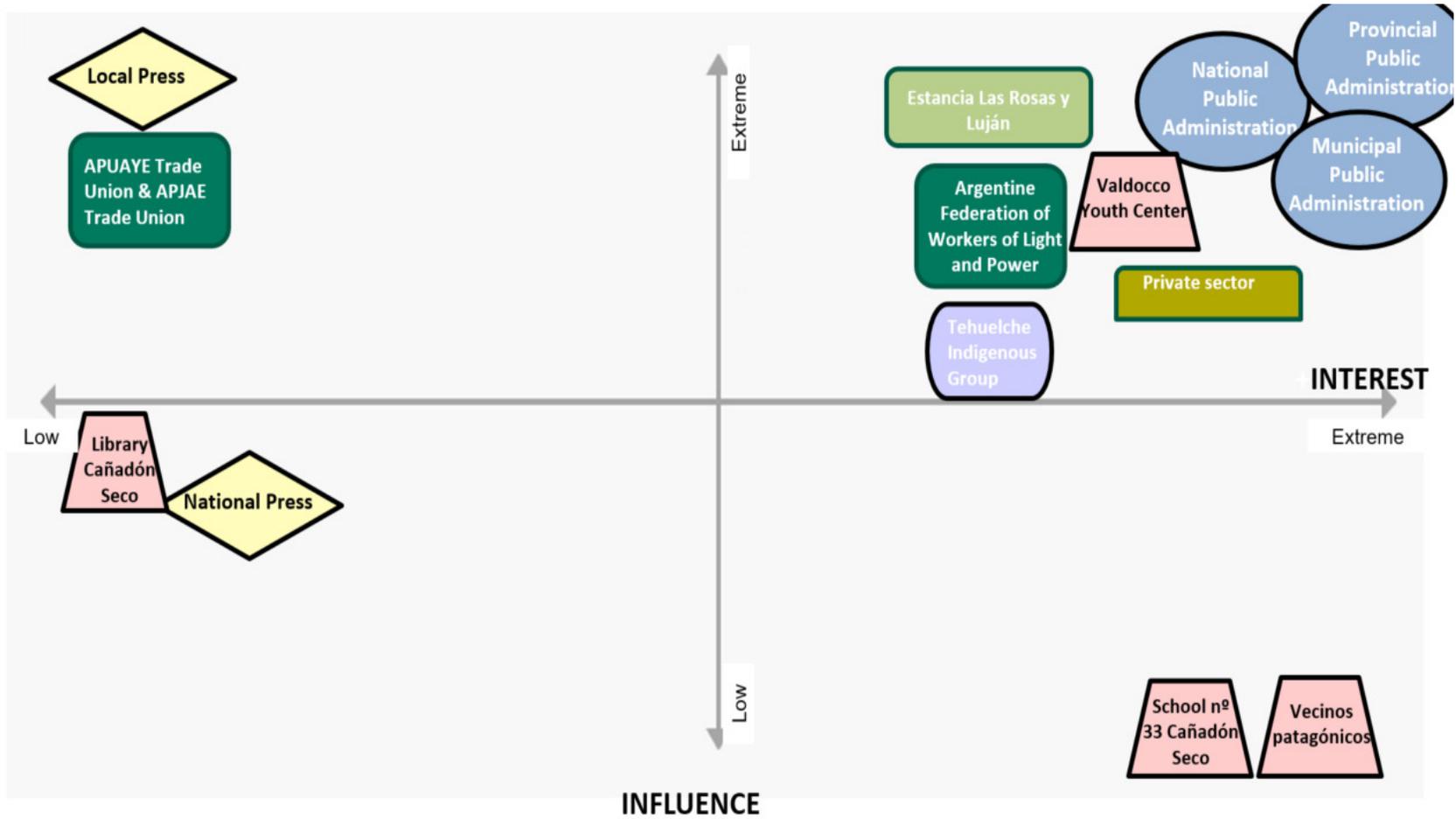
5.2.2.2 Stakeholder Analysis

It is helpful to map stakeholders in order to develop tailored and effective means of engagement that meet their interest in the project and their likely key issues. To support the analysis of stakeholders have been mapped to indicate the following:

- **Influence on the Project:** Influence refers to the power that the stakeholders have in relation to decisions either taken by, or affecting the Project. This power may be in the form of stakeholders that have formal control over the decision-making process or it can be informal in the sense of protesting against, blocking or allowing project operations to continue.
- **Interest:** Interests refers to the connection between the stakeholders and the Project, for example they may or have something to either gain or lose because of project implementation. Understanding stakeholder level of interest can help clarify the motivations of different stakeholders and the ways in which they might be able to influence the Project.

Figure 5.10 shows the current stakeholder map. It is noted that the positions of stakeholders may change over time as the Project progresses and that the stakeholder map should be reviewed and updated as appropriate. The figure details the position of the relevant actors according to the interest and influence they can exert on the project. In addition, any new stakeholders identified should be added into the map.

Figure 5.10 Stakeholder Mapping



Source: ERM, 2019

5.3 Summary of Stakeholder Engagement Plan

The stakeholder engagement plan (provided as a separate, stand-alone document) is designed to cover the pre-construction and construction phases of the Project. Specific planning and engagement activities will be necessary at each Project phase; however, some activities will be ongoing throughout the entire Project cycle and therefore common to the different phases. Common activities include the following:

- Regular update of the Project's Background Information Document (BID) as the Project moves forward and activities, schedules and milestones evolve.
- Regular update and revision of the stakeholder register including stakeholder analysis and re-evaluation as necessary throughout the different project phases.
- Addressing comments, questions, and grievances regularly and through appropriate channels, and issuing information to stakeholders. This includes regular refreshers to stakeholders about the grievance mechanism and related processes.
- Regular reporting to the different stakeholders as appropriate
- Regular Project Monitoring reports (in particular during the construction phase).

More detailed information about the Stakeholder Engagement Plan is provided in Table 5.6 hereafter. The table details actions to be managed by YPF Luz for engaging stakeholders during pre-construction and construction phase in order to meet the project objectives, address their issues and concerns, as well as implement mitigation and enhancement measures across the Project's management systems, including the Social Investment Programme detailed by YPF to be implemented in 2019.

Table 5.6 Stakeholder Engagement Program for pre-construction and construction phases

Activity	Stakeholders	Purpose	Timeframe	Responsible
<i>Pre-construction</i>				
ESIA disclosure to national and local authorities	Key ministries, national regulatory bodies, government agencies and institutes, provincial and municipal authorities.	<ul style="list-style-type: none"> Present ESIA results. Consult stakeholders on their views on the key impacts and mitigation/enhancement measures (social investment plan). 	During the pre-construction period (COMPLETED)	YPF Luz Manager ; Community Liaison Manager
ESIA disclosure to local communities (Cañadon Seco)	Local community members	<ul style="list-style-type: none"> Provide information on the Project to the whole community of Cañadon Seco. Consult stakeholders on their views on key impacts and mitigation/enhancement measures. Socialise the grievance mechanism. Present the YPF Luz social investment plan and associated timeline. 	During the pre-construction period (COMPLETED)	YPF Luz Manager ; Community Liaison Manager
Engagement with the Promotion Commission of Cañadón Seco	Municipal representatives Local community members	<ul style="list-style-type: none"> Identify potential community development projects to be targeted by the Social Investment Plan. Present the content, purpose and activities related to the YPF Luz Social Investment Plan. 	During the pre-construction period (before August 2019)	YPF Luz Manager ; Community Liaison Manager
Social Investment Plan follow up meetings	Promotion Commission of Cañadon Seco and representatives Local community	<ul style="list-style-type: none"> Hold follow up meetings as required agreeing Social Investment Plan measures particularly: i) employee volunteering program; ii) planting activities; iii) sustainable cities plan for Cañadón Seco; iv) Renewable energy training courses in Cañadón Seco. 	During the pre-construction period	YPF Luz Manager ; Community Liaison Manager
Establishment and management of the Grievance Mechanism	Local community Local community members and	<ul style="list-style-type: none"> Record and manage grievances during pre-construction. 	During the pre-construction period	YPF Luz Manager ;

Activity	Stakeholders	Purpose	Timeframe	Responsible
	estancias affected by the project			Community Liaison Manager
<i>Construction</i>				
Implementation engagement	Municipal representatives Local community members affected	<ul style="list-style-type: none"> Engagement related to monitoring and evaluation of the implementation. Manage grievances. 	Ongoing	YPF Luz Manager
Work site establishment	Local community members and estancias	<ul style="list-style-type: none"> Inform affected communities of the future presence of workforce in the nearby areas, the timeline of planned works, the health and safety risks associated with those works and the mitigation measures planned to control those risks. 	2 weeks prior to work site establishment.	YPF Luz Manager ; Community Liaison Manager and HSES manager
Ongoing information on construction progress	Local community members and estancias	<ul style="list-style-type: none"> Inform stakeholders of construction work progress and schedule. Give feedback on grievances received and associated resolution. 	Monthly	YPF Luz Manager ; Community Liaison Manager and HSES manager
Grievance management	Local community members and estancias	<ul style="list-style-type: none"> Record and manage grievances during construction. 	Ongoing	YPF Luz Manager and Community Liaison Manager
Work site dismantlement	Local community members and estancias	<ul style="list-style-type: none"> Inform local communities of the end of works and work site remediation measures. Inform local staff of retrenchment conditions. 	2 weeks prior to work site dismantlement.	YPF Luz Manager and Community Liaison Manager

Source: ERM, 2019

6. IMPACT ASSESSMENT

6.1 Introduction

This section assesses the manner in which the Project will interact with elements of the physical, ecological or social environment to produce impacts to resources/ receptors. It has been organized as per the various phases of the project life cycle to understand the risks and impacts associated with each phase.

Impacts are assessed considering that mitigation measures that form part of the project design (embedded measures) are implemented prior to the implementation of any additional measures. Residual impacts are assessed following the implementation of additional mitigation measures, considered necessary by this assessment.

6.2 Assessment Methodology

The methodology employed in the environmental, social and health impact assessment was prepared in accordance with the ERM Impact Assessment Standard v1.1 (2012). Box 6.1 presents the ERM Impact Assessment Approach, which is aligned with international best practices

Box 6.1 Impact Assessment Approach

A project can have potential significant impacts on a wide range of environmental, social and health receptors. The importance or significance of these impacts depends upon a number of factors, principally the level of magnitude of the impact and secondly the sensitivity of a receptor to be affected by the impact. It is therefore important to:

- Identify those processes or actions which will lead to an impact (i.e., a change in the environment) and evaluate the magnitude of this change; and,
- Identify any environmental receptors upon which the impacts may act and evaluate their sensitivity.

The significance of the impact is determined by comparing, wherever possible, against accepted company, national or international standards. If no standards are available then it is necessary to develop project-specific limits, based on guidance or experience, as necessary. Such standards or limits are referred to as the significance threshold. Wherever possible the significance thresholds are based on a measurable value and compared with a legal, policy or guideline value. The threshold standards used for the assessments are those stipulated by Algerian regulations. In the absence of Algerian standards, appropriate international standards will be used (refer to Chapter 2 Regulatory Framework for further details on project standards).

If the size and type of the impact is greater than the significance threshold, this is then termed a significant impact, which is further defined as high, moderate or low. A significant impact may be broadly defined as one which should be brought to the attention of those involved in the decision-making process and therefore any significant impacts identified must be reported in the ESIA Addendum Report and, wherever possible, avoided or mitigated to reduce them to an acceptable level.

Source: ERM, 2016

6.3 Identification and Characterization of Impacts

The first step in impact identification is to identify the various activities associated with the Project, as well as the environmental, social and health resources and receptors.

The following exercise serves to screen potential impacts. An ‘impact identification’ matrix identifies and scopes the predicted interactions between project activities, environmental/socio-economic and health resources, and receptors. The identification matrix is presented in Section 6.4.

Once the screening exercise is complete and the potential preliminary impacts have been identified, the next step in the impact assessment is to define the characteristics of each impact. ERM’s impact assessment uses a set of standards that are detailed in Table 6-1.

Table 6-1 Impact definitions

Characteristics	Definition	Designation
Type	A descriptor indicating the relationship of the impact to the project (in terms of cause and effect)	Direct/Indirect/Induced
Extent	The “reach” of the impact (e.g., confined to a small area around the project, or projected for several kilometers)	Local/Regional/International
Duration	The time period over which a resource or receptor will be affected	Temporary/Short-term/ Long-term/Permanent
Frequency	A measure of the constancy or periodicity of the impact	(no fixed designations; intended to be a numerical value)

Source: ERM, 2012.

The following criteria are used in the current assessment in order to assign a consequence/magnitude to potential impacts.

Table 6-2 Criteria for magnitude of impacts

Magnitude	Description of Adverse Consequences	Description of Beneficial Consequences
Large	Loss of resource and/or quality and integrity; severe damage to key characteristics, features or elements.	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Significant impact on the resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Small	Some measurable change in quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements.	Minor benefit to, or addition of, one or more key characteristics, features or elements; some beneficial impact on an attribute or a reduced risk of negative impact occurring.
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements	Very minor benefit to or positive addition of one or more characteristics, features or elements

Source: ERM, 2019.

6.3.1 Receptor Characterization

Sensitive receptors can be defined as:

- Elements of the environment that are of value to the functioning of natural or human systems (i.e., areas or elements of ecological, landscape or heritage value, soil and sediment, air and water bodies); and
- Human receptors, such as people (i.e., users of dwellings, places of recreation or worship, places of employment and community facilities), and human systems (e.g., the employment market).

The environmental value (or sensitivity) of the receptors identified is defined using the criteria in Table 6-3.

Table 6-3 Sensitivity value of receptors

Value / Sensitivity	Description of Value
International/ High Sensitivity	Highly important and rare on an international scale with limited potential for substitution (e.g., international fresh water aquifer).
National/ Medium sensitivity	Highly important and rare on a national scale with limited potential for substitution (e.g., residential receptor).
Local/ Low sensitivity	Low or medium importance and rarity, local scale.

Source: ERM, 2019.

6.3.2 Assessment Criteria for Social Impacts

The impact assessment methodology for social features follows the approach described under Section 6.2 above. However, for the assessment of social impacts, the sensitivity and magnitude criteria outlined in Table 6-4 and Table 6-5 respectively have been used. The social impacts associated with the construction, operations and decommissioning stages have been assessed qualitatively and in some cases quantitatively (subject to availability of data), using professional judgment based on past experience from similar projects.

Table 6-4 Criteria for assessing sensitivity / vulnerability of receptor

Ranking	Definition
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project.
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project.
Low	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

Table 6-5 Criteria for assessing magnitude of impact

Ranking	Extent / Duration / Scale / Frequency
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

6.3.3 Impact Significance Assessment

Once the magnitude of impact and the sensitivity/vulnerability/importance of the resource/receptor have been characterized, significance is assigned for each impact.

The current assessment uses a matrix to determine the significance of an impact, which is presented in Figure 6.1. Significance is therefore a function of the value or sensitivity of the receptor being considered, as defined in in Table 6-3 and the magnitude of impact defined in Table 6-2.

Impact prediction and evaluation have taken into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the project design, regardless of the results of the impact assessment process). This avoids assigning an impact magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Figure 6.1 Impact significance

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Source: ERM, 2019.

6.3.4 Identification of Prevention, Control and Mitigation Measures (Environmental and Social Management Plan)

A key objective of the ESIA and the corresponding Environmental and Social Management Plan (ESMP) is to identify prevention, control and mitigation measures for all significant negative impacts on the environmental, socio-economic, and health resources and receptors, and determine the potential residual impact after their implementation.

Recommended prevention, control and mitigation measures have been identified and follow a mitigation hierarchy as shown in Figure 6.2. Mitigation is clearly described for all significant environmental and social impacts to a level appropriate for the stage of project development.

Figure 6.2 Mitigation hierarchy

- **Avoid at Source; Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site:** add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy:** some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind; Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

Source: ERM, 2019.

6.3.5 Assessing residual impact significance

Reporting the significance of a residual impact in the EIA is based on:

- The predicted magnitude of an impact, taking into consideration all the mitigation measures; and
- The sensitivity/vulnerability/importance of the receptor.

Constraints arising from applicable regulations and standards are taken into account in the evaluation of residual impacts and their acceptability.

6.4 Impact Identification and Scoping

The impact identification matrix identifies the predicted interactions between project activities and environmental/socio-economic and health resources and receptors. The impact identification matrix for project activities is presented in Table 6-6 below.

Each marked cell on the impact matrix represents a potential interaction between a project activity and an environmental or social and health receptor or resource (i.e., potential impact).

Blank cells in the matrix indicate no primary effect or an absence of the resources in the general area.

Table 6-6 Impacts identification matrix

Environmental and Social Resources/ Receptors	Air Quality	Surface and groundwater resources	Ambient Noise Quality	Soils	Topography and Landscape	Flora	Fauna	Occupational Health and Safety	Community Health and Safety	Local Economy and Employment	Infrastructure and Services	Culture and heritage
Project Activity												
<i>Construction Phase</i>												
Construction/strengthening of accesses and roads												
Site clearance												
Construction material transport and storage												
Foundation excavation and construction for wind turbines and transmission lines towers												
Transportation and transient storage of wind turbines components												
Installation of wind turbines and transmission lines												
Construction of permanent facilities												
<i>Operation phase</i>												
Operation of wind turbines, substation and transmission lines												
Inspection, maintenance and operation of transmission lines												
Inspection, maintenance and operation of intra-site pathways/access roads												
Vehicle movements												
<i>Decommissioning phase</i>												
Dismantling of wind turbines and transmission lines												
Demolition of permanent facilities												
Vehicle movements												

Source: ERM, 2019

6.5 Impacts on Construction Phase

6.5.1 Impacts on Air Quality

Impact description

There are several activities leading to local air emissions, throughout project construction activities. However, only a small number of these could effectively impact air quality. These are:

- Dust emissions from construction site clearance, excavation works, cutting and levelling work, stacking of soils, handling of construction materials, transportation of materials, emission due to movement of vehicles on unpaved roads, plying of heavy construction machinery, etc.
- Vehicular exhaust emissions on the site and the approach roads;
- Exhaust emissions from construction machinery and other heavy equipment such as bulldozers, excavators and compactors, as well as diesel generators. It is estimated that 1092 m³ of fuel will be required for the construction phase.

The above presented emissions will result in small direct impacts on local air quality, potentially leading to changes in existing background concentration levels. Emissions will occur on a discontinuous basis during the whole length of the project construction phase.

The biggest source of emissions in the construction phase is the dust emissions related to the earthworks and use of heavy machinery. Usually a large portion of this dust will settle within a few tens to hundreds of meters from the source and will affect a small area of the habitat in the immediate vicinity of the works (depending on wind speed and direction, and type of ground material being handled).

Dust emissions will be released low to the ground and are characterized by a minimum buoyancy and low dispersion; they typically do not reach distances greater than 1km from the emissions sources. Similarly, exhaust emissions from vehicles, machinery and combustion sources, will be likely to disperse in the atmosphere in the distances between the emission sources and the closest populated areas.

The magnitude of the impact is proposed as low given the duration of the construction phase (which started in May 2019 and is aimed to be completed in 13 months, ending June 2020) and the expected amount of emissions, especially those related to dust.

The sensitivity of the receptor is assessed as low, given the absence of nearby receptors, expected natural dispersion due to prevailing wind conditions, and generally sound quality of ambient air in the area.

Mitigation measures

The following prevention measures aimed at ensuring atmospheric emissions are as low as practicable will be implemented:

- Regular maintenance of vehicles and machinery to guarantee emissions in compliance with manufacturer specifications;
- Limitation of vehicles speed on unpaved surfaces (YPF Luz uses satellite tracker systems to monitor vehicle speed and verify adherence to speed limits);
- Apply dust suppression techniques (e.g. watering);
- Optimization of traffic volumes and minimization of vehicles movement; and
- Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities.

<i>Residual impact evaluation</i>	
Air quality residual impacts due to emissions deriving from the use of vehicles and machinery as well as dust generation is considered to be minor due to the nature of the area where the activities are to take place (high dispersion rate of exhaust gases), temporality of the impact (would mostly cease once the construction is finished) as well as the implementation of preventive and mitigation measures that will minimize quantity of emissions produced	
Impact rating for Air Quality on construction phase	Negligible

6.5.2 Impacts on Water Quality and Resources

<i>Impact description</i>	
<p>The Project plans to source water for construction activities from groundwater resources, while for drinking and cooking bottled water will be used. No abstraction from surface water bodies is envisaged (in any case, there are no permanent surface water bodies in the project area). The total consumption of groundwater resources has been estimated to be 7.2 m³ per day for the construction phase, resulting in an impact assessed to be of small magnitude with regards to the consumption of water resources and no impact to the community's groundwater resources is expected.</p> <p>In terms of effluents, the project does not envisage the discharge of effluents as grey and black waters will be generated within chemical bathrooms that will store the water for its subsequent disposal by trucks to a facility for its treatment.</p> <p>The only potential affection to surface or groundwater quality would be related to non-planned events associated to accidental spills of fuel, that in any case and provided the expected limited amounts and nature of stored substances and fuel it would be a small-scale spill and therefore could be cleaned-up before any affection to groundwater occurs. The magnitude of the potential impact of pollution has been assessed therefore as negligible.</p>	
<i>Mitigation measures</i>	
<p>The following prevention measures aimed at ensuring potential impacts on water resources are as low as practicable will be implemented:</p> <ul style="list-style-type: none"> ■ Adequate planning of tracks, roads and drainage to avoid affection to existing drainage channels and temporary water accumulations in the area; ■ Permitting for the groundwater extraction shall be obtained from authorities before beginning of activities; ■ Construction labor deputed onsite should be sensitized about water conservation and encouraged for optimal use of water; and ■ Optimum use of water during sprinkling on roads for dust settlement, washing of vehicles, concrete mixing for wind turbines and electrical lines towers foundations; 	
<i>Residual impact evaluation</i>	
Given the lack of effluents planned for the construction phase, residual impacts on water resources rely only on water consumption. Given that the region is characterized by limited water resources and the dependence of nearby communities on groundwater, the resource has been assessed as of medium sensitivity, resulting in an impact of minor significance.	
Impact rating for Water Resources on construction phase	Negligible

6.5.3 Impacts from Noise Emissions

Impact description

Construction activities with potential to create noise disturbances are those where vehicles/equipment are employed (e.g., site and accesses preparation, excavation, construction of ancillary facilities and erection of wind turbines and transmission towers, transportation of materials and personnel).

Nonetheless, general noise levels derived from the project are not expected to be significantly high and would be limited to the surroundings of the noise generating sources, being concentrated within the location of each wind turbine and permanent facilities as well as throughout the tracks and accesses.

All works will be carried out at a distance of at least 1,2 km from the nearest settlement (Cañadon Seco village, housings on Provincial Road 12 and Valdocco Rehabilitation Center) except for the very limited electrical transmission line spur installation from the project area to the existing electrical transmission line, along Provincial Road 12 (still over 1 km away from the village of Cañadon Seco). The noise generated will therefore be temporary and discontinuous with, except in exceptional circumstances, no impacts at nighttime. Similarly, noise levels at a given receptor will vary over time given the size of the project area and the distance between wind turbines locations.

Noise impact is therefore expected to be limited to the immediate working locations with limited to no effects on the nearby settlement and therefore the impact magnitude has been assessed as **negligible**.

Mitigation measures

- Normal working hours of the contractor to be defined (preferable 8 am to 6pm) and limited to daylight hours. If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise, except under exceptional circumstances ;
- Only well-maintained equipment should be operated on-site;
- If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible;
- Machinery and construction equipment that may be in intermittent use should be shut down or throttled down during non-work periods; and
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.

Residual impact evaluation

Based on the temporary nature of activities, the absence of planned works at nighttime hours the distance to sensitive receptors and the implementation of the above-mentioned mitigation measures the residual impact is expected to be **negligible**.

Impact rating for noise on construction phase	Negligible
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6.5.4 Impacts on Soils

Impact description

Several activities undertaken during the construction phase have the potential to impact soils, including the clearing of vegetation, the construction and strengthening of accesses, the excavations and the storage and transport of materials. The site clearance, excavation and access road construction will largely affect the top layers of the soil. Loss of top soil quality would have an impact on the potential productivity of the land but the effects can be reversed over time.

Impacts on soils are also related to the increase of the erosion rate associated to the site clearance and the compaction and the accumulation in the soil surface of stones as a result of the vehicle movements, excavations and earthworks.

Site clearance for the site is anticipated to be minimal given the existence of several tracks that have already been considered in the design of the windfarm, limiting the creation of new paths and therefore the clearance needs. Vehicles will be encouraged to utilize the established roads and tracks instead of going off-road. The usage of existing roads by vehicles and minimal access road construction will reduce the impact from soil compaction in the area.

As a result vegetation and soil clearance will be mainly limited to the sites of each wind turbine, the electrical substation and the storage areas, given that all electrical transmission lines will be aerial implying no excavations. All these impacts will be, however, temporary and limited in terms of surface occupied.

It has been estimated that the disturbed soil surface will be of approximately less than 1 % (some 20 hectares) from the total of 40 km² area of the property. Similarly, the generation of wastes such as used oils, hydraulic fluids, oil containing rags, construction wastes could lead to a contamination of the soil if not properly managed and stored.

Mitigation measures

- Vehicles will utilize existing roads to access the site. Use of existing tracks within project site will be maximized to minimize the creation of new ones;
- Stripping of top soil will be conducted only when required;
- Topsoil will be stored on site, well maintained and used for restoration purposes either on site for restoration of temporarily affected areas, or off site for restoration of areas operated by YPF S.A. such as abandoned well sites;
- Soil should be ploughed in compacted areas after completion of construction work;
- The stockpiles of top soil should be kept moist to avoid wind erosion of the soil.
- Off-road traffic will be banned;
- Construction and demolition waste should be stored separately and periodically collected and delivered to an authorized treatment and storage facility;
- Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface and with secondary containment;
- All waste should be stored in a shed protected from the elements (rain, winds, etc.) and away from natural drainage channels; and
- Site restoration shall begin immediately after finalization of activities at a given location.

Residual impact evaluation

The Impact Magnitude has been assessed to be **negligible** due to the limited land take requirements thanks to the existence of tracks and the lack of agricultural uses for the existing soils, together with the reversible effects of the potential impacts on the soils. Given the risk of desertification estimated for the region and the lack of developed soils, the sensitivity has been assessed as medium. As a result, the impact on soils from construction activities is assessed as minor.

Impact rating for soils on construction phase

Negligible

6.5.5 Impacts on Topography and Landscape

<p><i>Impact description</i></p> <p>The construction of the windfarm could affect topography by the creation of new accesses and the levelling of the areas where the wind turbines will be erected. The design of the wind farm has taken into account the existent drainage channels that together with the existence of several tracks and the reduced area occupied by the infrastructures required will largely limit the magnitude of the potential impact in the topography.</p> <p>Similarly, during the construction phase the presence of heavy machinery, including large cranes, as well as the installation of the wind turbines will generate visual impacts to local population, especially from Cañadon Seco settlement, and to passers by. The location of the proposed windfarm is in an area considered as of low scenic values, lacking of trees and degraded, that can be visible mainly from the nearby roads given its location above the potential receptors. Based on the above, the sensitivity of the resource has been assessed therefore as low, while the impact magnitude considering the visibility of the project area and the extent of it has been assessed as medium.</p>	
<p><i>Mitigation measures</i></p> <ul style="list-style-type: none"> ■ Store machinery, materials and equipment in areas not directly visible from the village or the nearby roads to the extent possible; ■ Reduce illumination to the extent possible; and ■ Avoid construction activities for wind turbines along existing drainage channels and adequate those channels when crossed by new accesses. 	
<p><i>Residual impact evaluation</i></p> <p>Considering the mitigation measures in place together with the design of the project and the temporary duration of the construction phase, the impacts on the topography and landscape associated to construction phase can be assessed of minor significance.</p>	
<p>Impact rating for Topography and Landscape on construction phase</p>	<p>Minor</p>

6.5.6 Impacts on Flora and Habitats

<p><i>Impact description</i></p> <p>Construction activities will affect flora mainly from vegetation clearance activities, destined to adequate the area for the installation of the different structures and facilities, as well as to prepare the different accesses.</p> <p>These activities will result in the loss of vegetation that can directly affect the floral diversity.</p> <p>Vegetation clearance will affect a limited amount of surface within the project area. In particular, there will be limited impacts due to access tracks, thanks to the existence of many tracks serving the existing oil field, that the Project will use, thereby minimizing the creation of new accesses and that the works will be concentrated on specific points (wind turbines and electrical transmission towers locations and electrical substation site).</p> <p>The habitat found in the area is the Patagonian steppe, widely distributed along the region and characterized by the presence of herbaceous and low shrub species and a lack of trees as shown by the field surveys conducted as part of the initial EIA. This would result in the loss of a small percentage of the habitat that would therefore have a not significant effect in regional terms. In addition, the absence of trees and large and slow-growing species will minimize the impacts as all species encountered can quickly recolonize affected areas once the disturbance has ended, resulting in a temporary impact.</p> <p>In addition, no protected or endangered species have been encountered as a result of the field surveys conducted, being all widespread and common throughout the region.</p>	
<p><i>Mitigation measures</i></p> <ul style="list-style-type: none"> ■ Vegetation clearance should be restricted to the Project activity area(s); ■ Any mature vegetation found should be avoided when planning any site clearance activities; ■ Topsoil should be stored separately for on-site/off-site restoration of habitat after construction; ■ Unnecessary disturbance of vegetation due to off-roading, fuel wood procurement, and destruction of floral resources should be prohibited; and ■ Local grass species can be seeded in disturbed areas once the construction phase has finalized. 	
<p><i>Residual impact evaluation</i></p> <p>Considering that the existing habitat and flora species are common and widespread along the region, the lack of tree or large species that will facilitate a quick restoration of affected areas and the absence of protected species, the sensitivity of the resource has been considered to be low. Similarly, given the surface expected to be cleared the magnitude of the impact has been considered as medium and therefore the residual impact on flora and habitats, after the implementation of the above mentioned mitigation measures, has been assessed to be of minor significance.</p>	
Impact rating for Flora on construction phase	Minor

6.5.7 Impacts on Fauna

Impact description

Project activities with potential impacts on fauna in the project area include vegetation clearance, vehicular movement and transport of workers and materials, earthworks, etc. However, fauna within the Project location is relatively scarce and dominated by highly mobile species that will avoid the area once the works have begun, as shown by the field surveys conducted as part of the initial EIA (i.e. surveys identified various species of birds and one terrestrial mammal). The nature of the impacts on fauna that may occur due to the abovementioned activities include:

- Disturbance and temporary displacement of species due to land occupation, noise and human activity along the project site (short and medium term displacement);
- Direct harm, injury or death to species due to collision with vehicles, clearance activities, unregulated hunting by crew, access to hazardous materials; and
- Secondary effects due to loss of habitat and/or reduction in food availability (due to loss of vegetation or loss of/displacement of prey species).

The impacts associated to construction activities are considered to be temporary and short term, as most of them will disappear once the construction has been completed and will occur only at the precise place where activities take place, as the activities will progressively move across the planned locations for the different project elements. As a result, the most relevant impact on fauna will derive from noise disturbance, vegetation clearance and the associated loss of habitat as well as potential physical harm resulting from the clearance and preparation of the site.

Direct harm or some individuals' loss on the less mobile species, such juveniles and eggs of birds and reptiles could potentially occur. However, any direct impact in terms of direct harm on large and highly mobile species is considered unlikely.

The impact due to habitat loss is considered to be limited thanks to the mitigation measures and the limited clearance expected to be required as well as to the ubiquity of the habitat of the area, located widespread along the region, as shown by the assessment conducted in the previous Impact on Flora and Habitats Section. The fauna considered to be at most risk due to construction activities is the burrow-dwelling fauna, as their burrows may be destroyed or affected as part of the earthworks to be conducted.

The risks derived from any potential hunting or trapping of animals by the workforce are, however, considered minimal given the adoption of a "no hunting, trapping or removal" policy.

Mitigation measures

In addition to the mitigation measures indicated for the minimization of impacts on flora and habitats, the following measures shall apply:

- A 'code of conduct' shall be established for all workers that will prohibit hunting, gathering, chasing or disturbance of any wildlife;
- The adoption of good waste management policies, ensuring waste is stored in appropriate and adapted sites that prevent fauna access and periodic removal of domestic wastes generated;
- Avoid, to the extent possible, any traffic movement at night and dawn times; and
- Construction activities should be conducted in a phased manner to prevent excessive noise, anthropogenic movement and vehicular movement throughout the entire windfarm area at any given time.

Residual impact evaluation

The main residual impact to fauna is associated to the noise generation and noise presence that would lead to displacements, resulting in an impact of small magnitude over a medium sensitive receptor. As a result, impact on fauna during construction activities has been assessed to be of **minor** significance.

Impact rating for Fauna on construction phase

Minor

6.5.8 Impacts on Employment and Economy

The assessment with respect to employment and economy has been done for the following project activities representing sources of impact during the construction phase:

- The project construction phase will extend over 13 months from May 2019 (with commissioning targeted in June 2020). Peak construction workforce is expected to be approximately 200 employees. The installation of the wind turbines is expected to employ another 50 employees, from the subcontractor from which the turbines are purchased. Out of the average workforce during overall construction period, it is assumed that 20% will be skilled, 50% semi-skilled and 30% unskilled personnel. It is assumed that semi-skilled and unskilled workers will mostly be sourced from regional and local level.
- No workers camp during the construction works is envisaged. Construction workers for the civil and electromechanical works will mostly come from the nearby towns of Pico Truncado, Las Heras, Caleta Olivia and, very few, Cañadon Seco. These workers will stay at their own homes and commute to the site with transportation means provided by the EPC contractor and subcontractors. Few of them (around 15) will be from Puerto Deseado and will stay at hotels and, subsequently, temporary rental apartments in Caleta Olivia. Specialized personnel for the enlargement of Santa Cruz Norte Substation (around 10 supervisors and managers from abroad - non argentinian-) will stay at rental apartments in Pico Truncado; and around 30-40 people that also will come from abroad for the erection phase will stay at Caleta Olivia in rental apartments. No details on the amount of apartments are made available by the main contractor and/or subcontractors.
- During the construction, the Project will require goods and services such as construction materials for civil works, construction equipment and machinery, catering, logistics and transportation, etc.

Impacts on employment and economy are assessed separately, in the following tables.

Impact description – Employment

During the construction period, the Project will need to hire workers and purchase goods and services, potentially resulting in positive impacts on the regional and local economy. The receptors of this impact are likely to be the communities in or neighboring the socio-economic study area defined for the Project. Temporary employment during the construction phase includes people directly employed or subcontracted by the Engineering Procurement and Construction (EPC) Contractor for the preparation of temporary storage areas and office facilities (pre-construction) and construction of the access roads and wind farm components (wind turbine generators, Project substation, transmission lines) – direct employment. It also includes jobs supplying the goods and services needed to support the construction process, including food and transport services and support staff in the construction camp – indirect employment. In addition, the increased income of the employees may lead to an increase in general spending on goods and services as well as potentially related job creations – induced employment.

The Project is developed within an existing oil field, which already employs 900 people from Caleta Olivia (25 km away from the project area) and the nearby rural village Cañadón Seco (Caleta Olivia Municipality), 1.2 km away from the nearest wind turbine, travelling daily to the oil field. It has been estimated that approximately 60% of the people in Cañadon Seco work in the service sector in particular in government jobs (administration, education, health etc.). Local authorities confirmed that there is some locally available manpower, albeit limited in number, which could provide for a few unskilled and semi-skilled labor for the construction of the Project. The construction subcontractors are approaching the local Construction Workers' Union (UOCRA) representatives to assess background and skills of local workers to incorporate to the Project via the union's positions advertisement and candidate selection program.

The purchase of goods and services during construction will also generate some local employment, mainly out of the settlements close to the project area (urban hubs: Caleta Olivia, and Pico Truncado and rural villages Cañadón Seco, Koluel Kayke and Fitz Roy). Some of the highly skilled construction workforce will be

accommodated in the nearby towns of Caleta Olivia and Pico Truncado. However, it is estimated that numbers of workers with such accommodation arrangements will be overall low and, therefore, spending would not lead to an increase of demand of services, which could generate new jobs.

In summary, employment benefits during the construction phase are expected to be **positive**. This said, they will be limited by the 13-month construction period and relatively small number of positions open to unskilled workers. At the end of the construction phase, construction workers will be relocated by the local branch of the Construction Workers' Union (UOCRA), in other projects within the Santa Cruz Province, which is the standard practice for construction workers in the province.

Enhancement measures

During construction, it will be important to maximize employment opportunities for local people, as direct employment is the main benefit that the Project can bring to the communities in the region. The following measures will be recommended to enhance local employment:

- The Project Proponent will develop and implement recruitment procedures, based on the principle of equal opportunity and fair competition, including reasonable disclosure of open positions to local authorities and employment agency, so as to foster local employment. These procedures will also aim to provide opportunities for employment of workforce, in priority from within the project area (jobseekers from Cañadon Seco in particular), to the extent possible, considering unskilled, semi-skilled and skilled workforce.
- YPF will ensure that priority to local employment will be given wherever possible by the active subcontractors on the Project. YPF will establish a mechanism to verify that subcontractors respect this requirements, for instance via audits.
- In anticipation of the operations phase, YPF will consider a skills development program to help train local workforce and therefore provide opportunities for locally available manpower to be employed by the Project.
- Retrenchment of the construction workforce following the completion of construction activities will be done in compliance with relevant legal and contractual requirements.
- Continue with the implementation of YPF Luz social investment program to support local community development, in coordination with YPF S.A., which is historically actively involved in community development in Cañadon Seco.

Residual impact evaluation

Measures defined above will enhance *Positive* impacts on employment. The residual impact of the Project will remain **positive**.

Impact Rating for Employment

Positive

Impact description – Economy

Economic impacts during the Project construction will stem from procurement of goods and services by the Project (direct), local employment and induced economic effects of spending by construction workers. The receptor of this impact will be the local and regional economy and, to a certain extent, the national economy.

Detailed information on the procurement needs for the construction phase is not yet available at this stage. In general terms, the types of goods and services required will inter alia include:

- Transport, catering, laundry, food supply, security services for construction camp;
- Supply of construction vehicles and equipment; and
- Provision of construction materials including aggregates/sand, concrete, and building materials.

The Project Proponent will coordinate with the EPC Contractor, and measures will be taken to identify which of the goods and services required for the Project could actually be procured locally within Argentina. The list of materials and services that can be sourced locally is under investigation. Although much of the wind turbine equipment will be procured internationally, there will still be substantial potential for regional/local procurement of construction materials and services. For the purpose of this socio-economic impact assessment, it is assumed that most services (including civil construction, transport, laundry, catering, etc.) will be sourced from Argentinian companies.

It is conservatively estimated that the amount of work that will be captured by national companies will be up to 10% of the contracted construction and procurement contract values. The economic impact is considered *Positive* and will likely primarily occur at a national rather than a local level unless local community procurement is specifically targeted by the Project.

In summary, the economic impact of project workforce spending in the local economy is expected to be *Positive*. Private spending by Project workers is likely to benefit to local shops, restaurants, bars and other existing formal businesses in the service sector.

Enhancement measures

Specific measures to enhance economic impacts will include:

- The Project Proponent will conduct a demand and supply side analysis to identify and quantify local content potential, identify potential suppliers and subcontractors.
- The Project Proponent will adopt policies for employment and purchasing within the project area, establishing tenders for procurement of subcontracted goods and services at a scale that local businesses can respond to, ensuring opportunities are advertised locally, and providing training for people in the socio-economic study area, to allow them to obtain jobs with the Project as much as possible.
- The sourcing of local goods and services, wherever possible, will be made obligatory for the sub-contractors and in all major procurement activities.

Residual Impact evaluation

Measures defined above will enhance *Positive* impacts on economy. The residual impact of the Project will remain **positive**.

Impact Rating for Economy

Positive

6.5.9 Impacts on Land and Livelihoods

The following project activities are relevant for assessing impacts to land and livelihoods during the project construction:

- The overall area of the project is of approximately 40 km², however, most of this will not be occupied by any of the project's infrastructure and will simply be left empty (see Figure 3.2).
- A total of 29 turbines will be built, which will also require space for the roads, substation and associated facilities. In as many cases as possible, there will be no new land take since already existing roads previously used for the oil fields will be used.
- Of the project area, a physical footprint of 0.3455 km² will actually be used for the project, representing 0.85% of the total project area. Of the 0.3455 km², 0.18 km² will be from already existing roads. Of the land area used, 0.016 km² will be utilized during construction only and not during operation.

<p><i>Impact description</i></p> <p>The Project involves 29 wind turbines, all of which are located/ proposed to be located on a brownfield currently operated for oil & gas production, and owned by YPF. The wind farm will be located in two former rural properties in the Department of Deseado: Estancia La Sofia and Estancia Los Claveles (owned by YPF S.A – the Project Proponent). No additional land acquisition will be required for the Project during operation.</p> <p>Considering the industrial use and the ownership of the project site by the Project Proponent, and given that the land is currently not used for cultivation or grazing activities, the Project will not result in any loss of livelihoods and household income.</p> <p>The overall impact significance is considered to be negligible.</p>	
<p><i>Mitigation measures</i></p> <p>No mitigation measures are considered to be needed for land impacts given the context of the Project. However, in order to ensure that the Project pro-actively addresses any livelihood impacts, a grievance mechanism will be established to ensure that individuals who have concerns or complaints about the Project or wish to report that their livelihoods have been impacted by the changes to land use can communicate directly with the Project (refer to the Stakeholder Engagement Plan). Grievances will be received and registered either in writing, by telephone or in person. Grievances must be addressed as a matter of priority to ensure good relations with local residents are maintained.</p>	
<p><i>Residual impact evaluation</i></p> <p>The overall significance will be negligible.</p>	
Impact Rating for Land and Livelihoods	Negligible

6.5.10 Impacts on Infrastructure and Utilities

The assessment with respect to infrastructure and utilities has been done for the following project activities representing sources of impact during the construction phase:

- Rehabilitation of existing roads and construction of new access roads;
- Transport of equipment and goods to the construction camp via national and provincial public roads;
- Establishment of temporary construction camp including associated utility supplies and consumption during the construction period;
- Construction of the wind turbine generators platforms and pylons for the electrical overhead transmission lines;
- Construction of substation and transmission lines and connection to the existing grid.

Impact description - Temporary disruption and damage to road transport and infrastructure

Due to the current stage of project development, there are a number of aspects of the Project yet to be defined that influence the magnitude of the impacts to infrastructure and utilities. These include:

- Any upgrade works that may be required by the local authorities to allow the use of local roads for supply of equipment, goods and services (mainly triggered by the transportation of the main equipment from the Puerto Deseado port, and to be defined once the corresponding transportation permits are applied for by the subcontractors);
- Any upgrade works which may be required to restore local infrastructure (roads) to initial conditions following the completion of the construction phase (also to be defined once the corresponding transportation permits are applied for by the subcontractors);
- Any planned interruptions in energy supply as the new transmission lines are connected to the existing substation at Santa Cruz Norte – Caleta Olivia.

Receptors of these impacts include the settlements along the construction supply route and the local communities in the socio-economic study area as well as users of local roads, such as commuters working in the oil field where the Project is developed.

The wind turbine components will be delivered to Puerto Deseado Port located approximately 230 km south east from the project site. From there they will be transported by via national and provincial routes. It is estimated that 10 trucks (as reported in the 2017 Project EIA) will be required to transport for each wind turbine. The Project Proponent undertook a road survey in 2018 aimed at identifying the best route to be selected for the supply of wind turbine components. The study looked at alternative routes, road conditions and settlements crossed. The selected alternative was based on low traffic, clear conditions through most part of the road and lack of visible attached road improvements costs. The alternative will also require the use of the Provincial Road 12 from the Caleta Olivia to the wind farm, which has some traffic increases due to the proximity of this city but that however avoids going through the settlement of Cañadón Seco. The route survey undertaken indicated areas along this route, which are covered by gravel, partly asphalted or still under construction.

Potential impacts on local infrastructure and utilities, in particular roads, during project construction arise from potential disruption to traffic and damage of local roads due transport of Project equipment/ turbine components, personnel and construction materials.

Disruption to road infrastructure could result in impacts to livelihood or quality of life and if unmanaged could result in health impacts (e.g. inability to pass roads in an emergency etc.). It thus is envisaged that, if unmanaged, disruption to road infrastructure might result in community distrust and resentment towards the Project.

A dedicated assessment of heavy traffic derived from the transportation of the wind turbines is available in Annex A, with relevant impact ratings and specific mitigation measures.

General mitigation measures for traffic

Prior to the construction phase, the Project Proponent will develop a Traffic and Transportation Management Plan (TTMP). This TTMP will include a set of measures to mitigate the impact of Project traffic on local roads. Examples of key measures to be included in the TTMP are:

- YPF Luz and the EPC Contractor will consult with municipal and regional authorities along the supply route in order to identify potential issues in road stability or traffic choke points, and factor this information into route selection;
- The EPC Contractor will identify the program of road restoration measures that may be required post construction if Project-related traffic leads to a deterioration of road infrastructure;
- The EPC Contractor will ensure that the existing road network remains open to the public without disruption due to the Project – transportation of exceptionally heavy loads should be planned in coordination with local authorities to limit impacts on third party users;
- All statutory vehicle limits (width, height, loading, gross weight) and any other statutory requirement will be complied with.
- The settlements along the selected supply route will be informed of the planned times and route for transporting the wind turbine components.

Impact Rating for Transport and Infrastructure

See Annex A

Impact description - Increased pressure on and unplanned disruption of existing utility supply

In addition to transport, workers' influx during the construction phase in the vicinity of a community may strain existing infrastructure, in particular the water and sanitation and electricity systems. Disruption to utilities could result in impacts to livelihood or quality of life and, if unmanaged, could result in health impacts (e.g. water restrictions, inadequate sanitation, electricity cuts, etc.). Receptors of these impacts include the local communities in the socio-economic study area or beyond it, who may be depending on the utilities supplied from the area.

According to the EBRD and IFC *Guideline on Worker Accommodation*²⁴, workers need to have easy access to a source of clean water. An adequate supply of potable water is required in the same buildings where bedrooms or dormitories are provided. Depending on accommodation arrangements (at present, the Project is not planning to accommodate workers at the site), then a typical water demand could fluctuate between 80 and 180 liters per person per day. Considering, conservatively, a peak construction workforce of approximately 200 employees, this means an overall water demand of approximately 16 to 36 m³ per day, which can be supplied by truck, from YPF S.A.'s water supply system at Cañadon Seco. The magnitude of the impact is therefore considered to be small. This said, a press review indicated that Caleta Olivia (25km away from the Project) experienced shortages in water supply in February 2014 as a result of the rupture of the aqueduct Jorge Carstens which left the whole San Jorge Gulf area without water for several days²⁵. The vulnerability of receptors is therefore assessed as major.

With regards to other utilities, the construction of the transmission lines is not anticipated to involve any interruptions in utilities supply. However, following the construction of the transmission lines, interconnecting the new system (transmission lines and substation) to the existing grid may result in a short-term interruption of power supply. It is unknown at this stage whether this interruption could affect the nearby village of Cañadón Seco but it is assumed that the interruption will not be longer than half a day. The impact is therefore rated as having a **moderate** significance.

²⁴ Source: Workers' accommodation: processes and standards, A guidance note by IFC and the EBRD, available at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_workersaccommodation, accessed on 30 May 2019

²⁵ Source: online article *Water supply problems in Caleta Olivia 2014*, available at https://en.wikipedia.org/wiki/Water_supply_problems_in_Caleta_Olivia_2014, accessed on 30 May 2019

<p><i>Mitigation measures</i></p> <p>Measures to mitigate impacts on local infrastructure and utilities will be included in a Community Health, Safety and Security Management Plan (CHSSMP) to be developed and implemented by the Project Proponent and passed on for implementation to the EPC Contractor. Examples of key measures to be included in the CHSSMP are:</p> <ul style="list-style-type: none"> ■ The EPC Contractor will identify activities that will require disruption to infrastructure and services. Any planned disruption of utility distribution services will be communicated to local authorities with at least 72 hours' notice; ■ The Project Proponent and the EPC Contractor will implement a grievance mechanism which will specify required response times in case of complaints; ■ The Project Proponent/EPC Contractor will provide compensation for businesses and households in the event that water and electricity supply is unexpectedly disrupted by project related activities. 	
<p><i>Residual impact evaluation</i></p> <p>With the implementation of the mitigation measures outlined above, the residual significance of the impacts on utilities have been assessed as minor.</p>	
Impact Rating for Utility Supply	Minor

6.5.11 Impacts on Worker Health and Safety

Key project activities that are relevant for assessing impacts to worker health and safety include:

- Clearance of the ground for new access roads involving exposure to dust;
- Excavations for construction wind turbine foundations involving exposure to noise, dust, mechanical hazards;
- Erection of turbines involving exposure to physical hazards such as working at heights, working in confined spaces, working with rotating machinery, and falling objects;
- Erection of electrical pylons and construction of transmission lines and substation involving work at heights;
- Interconnection of Project electrical systems to the existing grid involving electrical hazards;
- Transport of goods and services for the Project.

<p><i>Impact description</i></p> <p>Key workplace health and safety risks associated with the Project are typical of power infrastructure construction and operation activities, and related to use of heavy machinery, work at height, power / energy sources, exposure to chemical products (essentially maintenance chemicals or paints), and noise.</p> <p>Considering the utmost importance, for YPF Luz, of preserving the health and safety of each member of its own personnel and its contractors, a potential impact of a health and safety incident occurring at the site is conservatively rated as major.</p>
<p><i>Mitigation measures</i></p> <p>The inherent risks in construction and industrial activities are managed/mitigated through following all applicable labor laws and the development of worker health and safety plans, accident prevention plans, plans addressing emergency response and preparedness, appropriate health and safety training for each task, on-going monitoring during the course of work to ensure strict compliance with health and safety requirements, and methods for disciplining non-compliance.</p>

With regard to the worker camp, the Project Proponent and EPC Contractor will adhere to the health and safety standards of YPF S.A., which are consistent with the workplace health and safety requirements laid out in the International Finance Corporation’s (IFC) Performance Standards 2 – *Labor and Working Conditions*²⁶. Health programs/training will be provided to screen workers for health problems, and inform people how to minimize their health risks to ensure that disease incidence is not increased, and that workers’ health is maintained or improved.

During the construction phase, the EPC Contractor will be responsible for ensuring that workers are properly trained, with competencies assessed for safety critical jobs, adhere to safe practices, are equipped with the right tools for each task, and issued the appropriate level of personal protective equipment.

The Occupational Health and Safety Management Plan to be developed and implemented by the Project Proponent and EPC Contractor will include measures such as:

- Procedure for HIRA (Hazard Identification and Risk Assessment) system for each work task;
- Lockout/tagout procedures for equipment maintenance and repair;
- Development of standard operating procedures and standard maintenance procedures for all tasks that identify hazards and provide the requirements for the task to be safely performed;
- Development of a safety inspection and audit system and provisions for disciplining safety violations;
- Develop procedures addressing the requirements for periodic work place monitoring, i.e. noise, dust, safe work practices, adequacy of PPE, and other industrial hygiene requirements (operations phase only);
- Accident reporting, including investigation and corrective action, procedures;
- The Project Proponent/EPC Contractor will develop and implement an Emergency Preparedness and Response Plan, which will include procedures for addressing release of hazardous materials (including toxic gases) and ice-throw, with requirements for regular emergency drills and coordination of drills with local authorities;
- Personal Protective Equipment (PPE) use, including training requirements and PPE maintenance. PPE is the last line of defense for workers and will only be used if other controls (e.g., design features) are unable to completely control the hazard.

Residual impact evaluation

With the implementation of the mitigation measures outlined above, the residual significance of the impacts on worker health and safety have been assessed as **minor**.

Impact Rating for Worker Health and Safety	Minor
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6.5.12 Impacts on Worker Management and Rights

Workers management and rights covers a range of topics, including labor abuses, fair treatment, remuneration and working or living conditions, along with occupational health and safety. These issues are considered the responsibility of the Project Proponent, along with its contractors (including sub-contractors) and within the supply chain. Worker health and safety impacts are addressed in a separate section above, with this section discussing the main impacts in relation to worker rights.

Impact description

The Constitution of the Republic of Argentina defines workers’ rights such as dignified and equitable working conditions; limited working hours; paid rest and vacations; fair remuneration; minimum vital and adjustable wage; equal pay for equal work; participation in the profits of enterprises, with control of production and collaboration in the management; protection against arbitrary dismissal; stability of the civil servant; free and

²⁶ IFC Performance Standard 2 – Labour and Working Conditions. 2012.

democratic labor union organization. It also guarantees trade union rights to enter into collective bargaining, to resort to conciliation and arbitration, the right to strike, and the protection of union representatives.²⁷ The Labor Law and the Law on Contract of Employment in Argentina regulate:

- Maternity and pregnancy rights;
- Minimum wage and bonus;
- Trade union organizations and collective bargaining;
- Contract of employment, rights and obligations of employers and employees, special contracts of employment (such as part-time, fixed-term contracts, seasonal employment), remuneration and protection of wages, hours of work, public holidays and paid leave, maternity protection, minimum age and protection of young workers, suspension and termination of the contract of employment, transfer of enterprises.

Special laws have been enacted, to regulate employment relations in a number of occupations, such as construction workers, salespersons, janitors, journalists, home workers and domestic helpers.²⁸

Argentinian law forbids employment of minors below 14 years old in any kind of activity and employment of workers under 18 years of age for arduous, unhealthy, or hazardous work. The working week for young workers between 14 and 18 years of age should be not more 6 hours per day and 36 hours per week. Young workers over 16 years of age, may, however, be authorized to work the normal working hours (i.e. 8 per day and 48 per week).

Discrimination is forbidden on the grounds of sex, race, nationality, religion, political opinion, trade union activity or age.

Argentina ratified all 8 fundamental ILO Conventions and 3 out of 4 (Priority) Governance Conventions.²⁹ It is clear that Argentina has the legal provisions that cover many of the common risks to worker rights; however, it is unclear how effective these procedures are in practice.

Construction activities are expected to require considerable number of skilled and unskilled labor. The unskilled labor would be sourced from local villages and therefore attention needs to be made to minimum wages, child labor, worker compensation, working conditions, equal remuneration and health and safety policies (including provision of appropriate PPEs). For international workers (which are expected to be contracted from various countries from Latin America, North America and Europe), regulation of employment and condition of services needs to be monitored as per the pertaining act. The Project Proponent will comply with the existing rules and regulations in the country and will seek to adhere to the highest standards of corporate governance and business ethics, along with upholding human rights and labor principles throughout the value chain.

The Project will be required to cross check and monitor worker rights for both their direct employees and indirect employees through contractors and their supply chain. Use of informal labor by construction contractors poses a considerable risk to workers' rights and causes difficulty in monitoring of contracts, hiring practice and performance.

However, inbuilt mitigation measures, such as national legal requirements reduce the magnitude of the impact from high to medium. The vulnerability of the receptor, in this case the workers themselves, depends on the

²⁷ Source: International Labor Organization, *National Labor Law Profile: Republic of Argentina*, available here https://www.ilo.org/ifpdial/information-resources/national-labour-law-profiles/WCMS_158890/lang-en/index.htm and accessed on 30 May 2019

²⁸ Source: International Labor Organization, *National Labor Law Profile: Republic of Argentina*, available here https://www.ilo.org/ifpdial/information-resources/national-labour-law-profiles/WCMS_158890/lang-en/index.htm and accessed on 30 May 2019

²⁹ Source: ILO, *Ratifications by country*, available here https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO:11200:P11200_COUNTRY_ID:102536 and accessed on 30 May 2019

skill requirements of the construction staff. There will be a range of workers from low skilled, who are considered to be highly vulnerable, to semi-skilled and skilled workers, with skilled workers considered to have low vulnerability. Due to this range, the vulnerability of the receptor is assessed as being medium. When combined, the magnitude and vulnerability ratings result in a **minor** impact significance.

Mitigation measures

The Project Proponent and EPC Contract will develop and implement an Occupational Health and Safety Management Plan and a Worker Management Plan. The latter will include measures such as:

- All workers will, as part of their induction, receive information on Project employment rules and Company policy, consistent with Argentinian legislation;
- The Project Proponent will ensure that the EPC Contractor complies with YPF Luz’s Human Resources Policy, including due compliance with applicable regulations, definition of working hours in line with national and international law, compensation including consideration of overtime, holidays etc. The Project Proponent will require its contractors and subcontractors to put in place policies in line with national legislation;
- All workers (including those of contractors and subcontractors) will have contracts, which clearly state the terms and conditions of their employment and their legal rights.
- All workers (including those of contractors and subcontractors) will be free to join unions of their choice and have the right to collective bargaining.
- The Project Proponent will develop a Supplier Code of Conduct, along with policies on gender equality, human rights and labor principles, anti-corruption and child and forced labor and will require all contractors and subcontractors to adhere to these;
- The Project Proponent and the EPC Contractor will require all contractors and sub-contractors to put in place a worker grievance mechanism that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. The worker grievance mechanism shall be open to the contractor and subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. The Project will then have the authority to act to resolve this grievance.
- All working practices will be monitored throughout the construction process, with KPIs developed around worker rights, discrimination and management, workforce grievance mechanism and monitoring of outcome.
- All workers must follow the YPF Luz Code of Conduct in regards to commitment to fair and free competition, equal opportunities and non-discrimination and other applicable measures.
- YPF Luz will apply its workers benefit program in regards to education loans, programs for the recruitment of disabled persons, medical services and other applicable measures.

Residual impact evaluation

Monitoring is key to ensuring that working practices for all staff (direct and indirect) are maintained throughout all Project phases, with the magnitude of impact after mitigation rated as small. There is the ongoing risk of forced labor and child labor or use of people aged below 18 to be involved in hazardous work within the supply chain, with reduced likelihood due to the implementation of mitigation making the impact magnitude small. If all measures are implemented then workers are considered to have a low vulnerability to risks, with children and forced labor considered to be highly vulnerable. With the application of mitigation measures set out above, the impact to worker rights, child and forced labor during construction has been assessed as **negligible**.

Impact Rating for Worker Rights	Negligible
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6.5.13 Impacts on Community Health, Safety and Security

The following project activities are considered relevant for assessing impacts on community health, safety and security:

- Road transport of heavy equipment (e.g. turbine components);
- Movement of personnel and vehicles in the project site area during the construction period;
- Influx of construction workers in the project area and the presence of the construction camp, requiring utility such as electricity, water supply and sanitation, throughout the construction period;
- Construction works in general, generating dust and noise;
- Potential interruptions in utility supply (e.g. electricity) during the interconnection of the project electrical system (substation and transmission lines) to the existing grid;
- Handling of chemicals, and generation and management of waste.

According to the Road Survey carried out by Ale and GE, the road from Puerto Deseado to the site has low traffic and clear conditions through most part of the road, and lack of visible attached road improvements costs. Puerto Deseado is a small village and the port is currently improving its facilities so the feasibility of blade transport via Provincial Road 281 should not represent an issue (in addition, there should be ongoing transports for the Parque Bicentenario Wind Farm). The remainder of the transportation road is through rural areas via National Road 3, Provincial Road 43 and, finally, Provincial Road 12 to the Site. From RP43 to RP12 there is a bypass at the Pico Truncado village so that the transportation of the wind farm equipment does not affect anybody at this location.

Impact description - Accidents and injuries related to project transport and construction activities

Construction activities will involve the use of heavy machinery and live transmission power lines. The major community health and safety risks during construction include structural safety of project infrastructure, life and fire safety, public accessibility and management of emergency situations. The Project will benefit from security control patrols located in the different locations of the site.

An increase in traffic volumes and an increase in the number of larger forms of transport, including industrial trucks, trailers and heavy machinery, could increase the risk of traffic related accidents in the area, in particular for local residents not accustomed to heavy traffic flows and larger vehicles. The Project is anticipated to generate additional traffic related to equipment and material transport in main roads. The impact magnitude is rated small with a short-term duration (12 months construction period) and a constant frequency. The extent of this impact is local to the workers in the oil field and communities in the project area.

The receptors for impacts on community health and safety include the very limited local community persons that may be present within the project area (Valdocco rehabilitation center, estancia La Rosa), workers in the oil field, who may be present in the vicinity of the project activities, for work or while commuting as well as users of the local roads. The area is not used for grazing purposes and therefore no animals or keepers could be impacted. Professional workers in the oil field area have occupation health and safety training and be aware of the risks and code of conduct required when being in the vicinity of construction works.

Given the distance at which the project site will be located from the closest settlement, and the fact that access to the project area is restricted due to it being an oil field area, it is considered unlikely that regular community members will be present in the project area or that environmental health hazards (dust, noise) could affect them. Therefore, the vulnerability of the receptors is considered to be minor. The significance of the impact on community health and safety is therefore assessed as **negligible**.

Mitigation measures

The following list of mitigation measures will be implemented in order to mitigate impacts on community health and safety:

<ul style="list-style-type: none"> ■ The Project Proponent/EPC Contractor will develop and implement a Community Health, Safety and Security Management Plan, which will include measures such as: <ul style="list-style-type: none"> - Ensuring that the excavated areas are properly fenced for safety and sign boards are put up; - Ensuring that drivers carrying turbine equipment and construction machinery and materials are instructed to drive within speed limits with careful consideration for local traffic; - Regulating movement of heavy equipment and construction materials during peak hours; ■ As part of the stakeholder engagement and information disclosure process, providing an understanding to the communities concerning the activities proposed to be undertaken and the precautions being adopted for safety; ■ The Project Proponent/EPC Contractor will develop and implement a Traffic Management Plan including measures to minimize risks of road accidents. ■ The Project Proponent/EPC Contractor will develop and implement an Emergency Preparedness and Response Plan, which will also include liaising with local authorities to make sure they have the resources in place to respond in case of emergency. The Plan shall also include management measures related to traffic accidents and security risks. ■ The Project Proponent/EPC Contractor will develop and implement a Waste Management Plan and Chemicals Management Plan, which will regulate handling, and management of waste and chemicals to avoid exposure of the local communities to these materials. 	
<p><i>Residual impact evaluation</i></p> <p>With the implementation of the mitigation defined above, the residual impact to community, health, safety and security is assessed as negligible.</p>	
Impact Rating for Community Health, Safety and Security	Negligible

6.5.14 Community Acceptance

Influx of speculative opportunity seekers moving into the area in the hope to benefit from work or other windfall from the Project is highly unlikely considering the low profile of the Project compared to ongoing oil and gas activity in the area. Some possible sources of challenges to community acceptance for the Project would be local expectations of project benefits such as employment, local community investment and improved energy supply not being met; however, the community does not have high expectations on employment or benefits. The construction subcontractors are approaching local Construction Workers' Union (UOCRA) representatives to assess background and skills of local workers to incorporate to the Project via the union's positions advertisement and candidate selection program.

<p><i>Impact description - Tensions between local community and workers</i></p> <p>Construction activities are expected to require considerable number of skilled and unskilled labor. Unskilled and semi-skilled labor will be sourced from local villages of Pico Truncado, Las Heras, Caleta Olivia and, very few, Cañadon Seco. Non-local or international workers (which are expected to be contracted from various countries from Latin America, North America and Europe), will be brought into the vicinity of project activities through a managed process of recruitment and transportation. No tensions are expected to arise between the local population and project workers, including non-nationals; and, as mentioned, subcontractors are addressing local employment expectation via local union representatives following usual practices in the province for construction workers.</p> <p>The vulnerability of the local communities is low considering previous patterns and potentially low employment expectations in relation to the Project and as a result that most people in the area are employed within the oil</p>
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field or public/service sector. The impact magnitude is rated small with a short-term duration (13 months construction) and a constant frequency. The extent of this impact is local.

Tension between communities and workers during construction is assessed as having an overall minor significance.

Impact description - Tensions within and between communities

Projects often raise tensions within communities (intra-community tension) or between communities (inter-community tension). The causes of such tensions may be many, but commonly include the following:

- Poor communication of information with regard to the Project and lack of engagement with the community;
- Perception of inequitable distribution of benefits or negative impacts;
- Changes in services, infrastructure and other resources which may be altered by the Project or by indirect effects such as in-flux (as discussed above); and
- The simple stress of change and of interacting within the community and with the Project. Often factors such as short timelines for decisions, lack of information, or lack of clarity of such information exacerbate these tensions.

Within the local context, no tensions between communities are known. Additionally, there are very few communities in or near the project area, the closest one being 1.2 km away. No vulnerable groups or groups receiving preferential or special attention have been particularly identified in the context of the Project, hence the vulnerability of local communities is considered low.

Given the limited scale of the Project, and limited environmental or social impacts thanks to its remoteness from local settlements, tensions between the Project and the local community seem unlikely. However, a direct negative impact on community cohesion cannot be excluded to arise as a result of the Project implementation activities. The impact magnitude is rated **small** with a short-term duration (12 months construction) and a constant frequency. The extent of this impact is local to the communities in the socio-economic study area.

Tension within and between communities as a result of perceived benefit sharing is assessed as having a **negligible** significance.

Impact description – Unmet Expectations of Benefits

The expectation of project related benefits is not uncommon among stakeholders. The main expectations for benefit could include employment, improved energy supply and reduced costs, improvements to other infrastructure, in particular roads, as well as other community investments, for example in schools and healthcare facilities. Unmet expectation could result in a reduction in local acceptance of the Project as it moves into the construction phase, which if unmanaged, could present a reputational risk as well as risks of Project delays. Given the local context, following consultation with the government representatives of Cañadon Seco, community expectations are clearly understood to be limited given the low number of jobseekers locally, and project employment is likely to meet the perceived project benefits, making this impact of **minor** significance.

Mitigation measures

Mitigation measures to reduce tension between local communities and workers will be addressed through a transparent Stakeholder Engagement Plan (SEP), compliance with project worker management practices, maintenance of a project grievance mechanism, development and implementation of different topic-specific Management Plans, e.g. Worker Management Plan, reflecting transparent recruitment practices. These are discussed below.

- **Dialogue:** Ongoing dialogue between the Project, through its Community Liaison Officers (CLOs) and local communities to assist in information sharing with regard to employment practices and the use of

non-local staff. Local communities to be provided information on the number of workers to be brought to the area, their housing arrangements and the measures that the Project is putting in place to ensure that all workers abide by local customary practices. Information will also be shared on the number of local unskilled and semi-skilled positions available to local residents, along with the recruitment methods used to identify potential candidates.

- *Recruitment Practices:* The EPC Contractor will be required to adhere to the requirements of YPF Luz's labor policy, in particular with regards to equal opportunity, workers' rights, and appropriate workplace conditions.
- *Grievance mechanism:* A project grievance mechanism will be developed and implemented, and information about this mechanism will be shared amongst local communities from the pre-construction phase. The EPC Contractor will also be responsible for managing a grievance mechanism that allows communities and employees to raise complaints. This will be a key monitoring and reporting requirement of the Project. The grievance mechanism will be implemented prior to commencement of the construction phase, with all relevant staff fully cognizant of their roles in the grievance resolution process so that quick and effective response is provided to the concerns raised by local stakeholders. Additional resources may be required to resolve concerns within a set timeframe.
- *Monitoring:* Monitoring and communication will occur at regular intervals, with quarterly project update leaflets to be prepared and widely distributed from six month prior to construction to the end of the construction phase. Information sharing between the EPC Contractor and the Project will be a key monitoring requirement and will cover a range of aspects including performance, health and safety, along with community issues with the construction process of staff.
- *Investment:* YPF Luz will continue to promote social investment initiatives in the community to address development needs. The activities should be developed by the Project in consultation with local communities, with active engagement required to determine the location and nature of projects. All stakeholders will be kept informed on the progress of activities and opportunities.

Residual impact evaluation

It is likely that with the implementation of the above mitigation measures, the Project will be able to reduce the significance of the impact to **negligible**.

Impact Rating for Community Cohesion

Negligible

6.5.15 Impacts on Cultural Heritage

Impact description

The original EIA included a specific archaeological impact assessment, which included a specific survey whose main findings was the virtual absence of archaeological materials; suggested to be a consequence - among so many others variables- of the area already having a relatively high anthropogenic development and impact. Another variable could be related to that most of the area surveyed is located on the mesetary sector, which could be more linked to seasonal transit places within known population dynamics in the area, so site formations where evidences could be present tends to be low or null.

Nonetheless, the development of access roads, like other work that includes earth movements, can generate incidental findings under the surface.

Mitigation measures

- Prohibit the collection and / or manipulation of archaeological material, in case of a find. .
- Implement informative meetings with the personnel responsible for the earth works in regards to cultural heritage values.

<ul style="list-style-type: none"> ■ Establish a monitoring program during the development of earthworks projected in order to mitigate and correct on the fly the possible impacts archaeological. ■ Establish a chance-finds procedure aligned with the recommendations of the Archaeological Impact Assessment of the original EIA. 	
<p><i>Residual impact evaluation</i></p> <p>The Impact Magnitude has been assessed to be negligible due to the limited archaeological findings expected in the area; with mitigation measures allowing to evaluate if any relevant findings are made.</p>	
Impact rating for cultural heritage on construction phase	Negligible

6.6 Impacts on Operations Phase

6.6.1 Impacts on Air Quality

<p><i>Impact description</i></p> <p>During the operations phase, the emissions of pollutants (SO₂, NO_x, CO₂) to the air will be scarce and limited to the traffic of light vehicles for maintenance purposes and occasionally heavy vehicles to replace equipment in the wind turbines.</p> <p>Similarly, in the absence of earthworks, the emission of dust will be reduced and limited to the wind action along the existing tracks and to the passage of vehicles. As a result, the magnitude of the impact on air quality directly from the operations phase is assessed as negligible.</p> <p>There will be, however, a secondary positive impact on the air quality derived from the electricity generation from wind power during the operations phase that will result in a reduction of the overall emissions of greenhouse gases. The energy to be produced by the windfarm is estimated to be enough to supply to more than 150.000 homes.</p>	
<p><i>Mitigation measures</i></p> <p>The following prevention measures aimed at ensuring atmospheric emissions are as low as practicable will be implemented:</p> <ul style="list-style-type: none"> ■ Regular maintenance of vehicles and machinery to guarantee emissions in compliance with manufacturer specifications ■ Limitation of vehicles speed on unpaved surfaces; ■ Apply dust suppression techniques (e.g. watering); ■ Optimization of traffic volumes and minimization of vehicles movement. 	
<p><i>Residual impact evaluation</i></p> <p>Air quality residual impacts due to emissions deriving from the use of vehicles and machinery as well as dust generation is considered to be negligible throughout the operations phase based on the reduced amount of emissions expected and the positive impact derived from the generation of energy without associated greenhouse gases emissions.</p>	
Impact rating for Air Quality on construction phase	Negligible

6.6.2 Impacts on Water Quality and Resources

<p><i>Impact description</i></p> <p>Water requirements for the Project during the operations phase will be considerably lower than in construction phase and mainly limited to drinking water that will be supplied by means of bottled water. Impact magnitude associated to water consumption is therefore assessed as <i>Negligible</i>.</p> <p>In terms of potential pollution of surface and groundwater resources, during the operations phase no activities are foreseen likely to lead to any type of affection, apart from non-planned events such as spills of fuel or improper waste management. In any case, these situations are unlikely and of negligible magnitude, especially considering that in the absence of permanent water bodies within the wind farm, any potential spill would primarily affect the soils where clean up actions would take place before water resources may be affected. The magnitude of the impact of polluting water resources is also considered as negligible.</p>	
<p><i>Mitigation measures</i></p> <p>The following prevention measures aimed at ensuring potential impacts on water resources are as low as practicable will be implemented:</p> <ul style="list-style-type: none"> ■ Apply all mitigation measures indicated for a proper waste management (see impacts on soils – Section 6.6.4). 	
<p><i>Residual impact evaluation</i></p> <p>Given the lack of effluents planned for the operations phase and the limited amount of water that will be consumed residual impacts on water resources have been assessed of negligible significance.</p>	
Impact rating for Water Resources on Operations phase	Negligible

6.6.3 Impacts on Noise Levels

<p><i>Impact description</i></p> <p>During the operations phase, noise is generated by the operation of the wind turbines. This noise is of the following two types: (a) mechanical noise, from interaction of turbine components; and (b) aerodynamic noise, produced by the flow of air over blades. Mechanical sounds originate from the relative motion of mechanical components and the dynamic response among them. Sources of such sound include the gearbox, the generator, the cooling fans and auxiliary equipment.</p> <p>Aerodynamic sound is typically the largest component of wind turbine acoustic emissions. It originates from the flow of air around the blades. Aerodynamic sound generally increases with rotor speed.</p> <p>The Project will have 29 wind turbines GE V117 with a rated capacity of 4.2 MW each with 117 m rotor diameter. The hub height will be 85 m. Based on the available information from the turbine manufacturer; the noise generated at the hub height in strong wind conditions is around 106.5 dB.</p> <p>The closest sensitive receptor to the windfarm is the settlement of Cañadon Seco, located 1.2 km northeast of the closest wind turbine. Apart from this village, no other sensitive receptors, apart from the passers-by along the main road, have been identified.</p> <p>Based on the distance to the village, 1.2 km, and considering the attenuation of the sound levels from the generation point at 84 m height to the village, it is expected that noise levels at the receptor will be mostly imperceptible and always below the 45 dB recommended by US Environmental Protection Agency for nighttime. Modelling studies conducted for similar wind turbines (Morán and Arguelles, 2014) showed that noise levels decrease rapidly from the source attaining levels around 35 dB at 800 m distance. Noise levels generated may also lead to secondary impacts on fauna, resulting in avoidance and displacement behaviors. However, the existence of a persistent noise source such as that generated by wind turbines can lead to</p>

<p>habituation in fauna species that would therefore return to site independently of the existent noise, resulting in an impact of negligible magnitude on fauna.</p>	
<p><i>Mitigation measures</i></p> <ul style="list-style-type: none"> ■ YPF will undertake a dedicated noise modelling study to verify that project related noise is not predicted to significantly raise ambient noise levels at receptor locations (Cañadon Seco village and other nearby stakeholder locations); ■ Regular maintenance of wind turbines; ■ Periodic monitoring of noise near to the sources to ensure compliance with design specifications; ■ Annual monitoring of ambient noise levels at identified residential receptors; and ■ Monitor reported noise-related nuisance (if any) through the project's grievance procedure. 	
<p><i>Residual Impact evaluation</i></p> <p>Based on the distance to the existing sensitive receptors and the expected attenuation of the noise with the distance the residual impact of noise generated during the operation of the windfarm is expected to be negligible over sensitive human receptors. Similarly, despite initial displacement behaviors, the habituation of fauna to persistent noise levels would result in a negligible impact in the long term.</p>	
<p>Impact rating for noise on Operation phase</p>	<p>Negligible</p>

6.6.4 Impacts on Soils

<p><i>Impact description</i></p> <p>During the operations phase, potential impacts on soils are related to the movements of maintenance vehicles and to the generation of wastes that could pollute the soils if not properly managed.</p> <p>In terms of erosion and compaction, the passage of vehicles during the operations phase will be very limited and will only occur through the accesses, not taking place any type of vegetation clearance. In addition, the passage of heavy vehicles and machinery will be, if any, punctual. As a result, the magnitude of the impact of erosion and compaction is assessed as negligible.</p> <p>Similarly, the amount of wastes to be generated during operations will be minimal and limited to maintenance activities, implying a negligible risk of polluting the soils.</p>	
<p><i>Mitigation measures</i></p> <ul style="list-style-type: none"> ■ Vehicles will utilize existing roads to access the site and to move within the windfarm; ■ Off-road traffic will be banned; ■ Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages; ■ Unloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers should be trained to prevent/contain spills and leaks ■ Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface and with secondary containment; ■ Proper receptacles or designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured and ■ All waste should be stored in a shed protected from the elements (rain, winds, etc.) and away from natural drainage channels. 	
<p><i>Residual Impact evaluation</i></p> <p>Given the small scale of the activities posing a risk to generate impacts on soils, together with the mitigation measures indicated above, the residual significance of the impact on soils during the operations phase has been assessed as negligible.</p>	
<p>Impact rating for soils on Operations phase</p>	<p>Negligible</p>

6.6.5 Impacts on Topography and Landscape

<p><i>Impact description</i></p> <p>The visual effects of a windfarm are directly related to the number of wind turbines, their height, the size of the blades and the difference of its color when compared with the dominant colors in the area, though all these effects decrease with the distance to the receptors. The effects on the visual conditions are also dependent on the scenic quality of the area and the presence of iconic landscape elements, together with its heterogeneity.</p> <p>Landscape perception is however subjective and while one element can be obtrusive for some, it can also be positive for others.</p> <p>Based on this, the presence of the 29 wind turbines will affect the visual scenario within the area by the introduction of new elements that will be seen by observers from the nearby roads and from the village of Cañadon Seco.</p> <p>The existing landscape is mainly rural and slightly undulated, though with no mountains elements considered to be indicative of areas of higher visual sensitivity. Existing landscape considered of low scenic value with absence of iconic elements that could be disturbed by the presence of the wind turbines.</p> <p>Wind turbines will be located in elevated areas and considering the absence of obstacles they will be visible from large distances and will constitute prominent structures, though provided the distance to observers is more than 500 m, they will be perceived as a distant structure.</p> <p>Given the size of the windfarm and of each of the wind turbines, together with their location in elevated sites, the magnitude of the impact can be considered as large. The sensitivity of the area in terms of landscape, considering its degraded condition and the absence of iconic and relevant elements is assessed as low.</p>	
<p><i>Mitigation measures</i></p> <p>Reduce illumination to the extent possible to avoid visualization of safety lights from nearby settlement.</p>	
<p><i>Residual impact evaluation</i></p> <p>Considering the mitigation measures in place together with the design of the windfarm and the low sensitivity of the existing landscape, the impacts on the visual conditions of the area as a result of the operation of the windfarm is assessed to be of moderate significance.</p>	
<p>Impact rating for Topography and Landscape on operation phase</p>	<p>Moderate</p>

6.6.6 Impacts on Flora and Habitats

<p><i>Impact description</i></p> <p>Operation activities likely to result in impacts to flora and habitats are limited to the transit of vehicles and to the regular maintenance activities. However, considering that traffic will take place only along existing tracks and accesses impacts on flora will be limited to punctual maintenance activities that could lead to the occupation of areas that may have been recolonized by previously cleared vegetation, such as the substitution of a blade of a wind turbine. It must be noted in any case that such activities are not initially planned and could therefore not occur.</p> <p>As a result, the expected potential impacts on flora and habitats during the operation phase can be considered of negligible magnitude.</p>
<p><i>Mitigation measures</i></p> <p>Unnecessary disturbance of vegetation due to off-roading, fuel wood procurement, and destruction of floral resources should be prohibited.</p>

Residual impact evaluation

Considering that the existing habitat and flora species are common and widespread along the region and the practically absence of potentially disturbing activities during the operation phase, the residual impact on flora and habitats is assessed as of **negligible** significance.

Impact rating for Flora on operation phase	Negligible
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6.6.7 Impacts on Fauna

Impact description

Main impacts on fauna associated to the operation of the windfarm are associated to the movement of the wind turbine blades that could result in the following:

- Collision risk for flying fauna (birds and bats);
- Behavioral avoidance by flying species and increased energy expenditure; and
- Barrier effects that lead to connectivity issues and access to resources.

The rotating blades and the varying speeds of their movement is a collision hazard to flying birds and bats. The hazard is especially pronounced for aerial hunters that have a flight height that matches the blade height of the wind turbines. Night flying species are also at great risk due to the difficulty of detecting the blades. A bird or a bat that avoids collision with the blades can still be impacted by the visual movement of the blades.

Birds adjust to the presence of the wind farm by changing their behavior. Flight deviation, alternate resource utilization, dispersion from the wind farm area and changing flight heights are types of behavioral changes that the birds can utilize to adjust to the wind farm. The avoidance behavior can still result in night collisions and collisions due to sudden change in wind speeds. The energy expenditure to avoid the wind farm can be a strain on birds and decrease energy reserves for foraging, hunting, socializing and breeding. The avoidance and dispersion can also lead to loss of foraging resources, habitats and migration pathways.

In addition to the risks of impacts posed by the blades, there are potential impacts associated to electrical hazards from roosting or nesting on transmission lines and towers, as several species of birds are found roosting on wire and poles of existing transmission lines in the wider study area. The addition of more transmission lines and poles can create a greater risk for electrocution for these perching bird species. Some birds also utilize these poles for nesting by placing the nests across wires or using holes in the tower itself.

All avifauna observed on the site are Least Concern species according to the IUCN Red List. No bat species have been observed on site. The receptor sensitivity has been assessed as medium given the confirmed presence of raptors at the windfarm site and the use of the region by several migratory species together with the common use of electrical lines for roosting, while the impact magnitude has been assessed as **medium**.

Mitigation measures

- Pursue avifauna monitoring in order to further assess the presence of sensitive species, including migratory birds, and develop a Biodiversity Management Plan (including, if impacts to critical habitats are identified, a Biodiversity Action Plan).
- Inter-turbine distance should be large enough that birds can avoid turbine blades and utilize minimal energy while doing so;
- Flash lamps on the wind turbines will prevent bird collisions at night;
- Waste materials should not be left uncovered as it will attract birds and other fauna to the wind farm boundary;
- Bird-safe strain poles with insulation chains at least 60 cm in length should be adopted;
- Regular checking of the vacuums or holes in the towers for nesting bird species should be practice; and

<ul style="list-style-type: none"> ■ Maintain a bird mortality register for the windfarm, recording all carcasses within 500 m of any project element (including transmission lines) and apply Adaptive Management measures (e.g. turbine management plan, consultation with local experts) if mortality is significant. 	
<p><i>Residual impact evaluation</i></p> <p>Considering that no protected or endangered species are present in the wind farm site and the implementation of the above mentioned mitigation measures, which will decrease the magnitude of the impact to small, the residual impacts on fauna derived of the operation of the wind farm has been assessed to be of minor significance.</p>	
Impact rating for Fauna on operation phase	Minor

6.6.8 Impacts on Economy and Employment

The assessment with respect to economy and employment has been done for the following project activities representing sources of impact during the operation phase:

- The Project will employ approximately 10 permanent staff for operation and maintenance during the 20-year operational lifetime of the wind farm. In addition, it is assumed that the Project will employ a security company, which is assumed to employ local staff. The Project will pay local taxes to the local government spurring local economic development.
- The Project will generate renewable energy, which will contribute to securing stable and cost effective energy supply in the country.
- The Project will contribute to making the national market more attractive to investors as more and more companies are looking to power their businesses with wind energy.

<p><i>Impact description – Employment</i></p> <p>The operation and maintenance of the wind farm will require approximately 10 staff directly employed by the Project Proponent. It is estimated that the operating personnel will be able to be sourced from regional or local level. Security personnel is also foreseen to be present at the site during operation. Security personnel would be hired from security service companies or potentially also recruited locally. The Project will also benefit from the third-party security contractor in place for the YPF oilfield.</p> <p>In addition, contractors will be involved in the maintenance of the substation and transmission lines. However, workforce needed for these activities is estimated to be small.</p> <p>The impact of the Project on generating employment is considered positive.</p>	
<p><i>Enhancement measures</i></p> <p>Prior to starting the employment process, the Project Proponent will develop and implement an Employment Policy for Operation, which will lay down the following:</p> <ul style="list-style-type: none"> ■ Clear and transparent employment criteria for all openings; ■ Targets for employment from the settlement near the Project (Cañadón Seco). <p>Additionally, as part of the recruitment process, the Project Proponent will:</p> <ul style="list-style-type: none"> ■ Provide clear information on the number and skills requirements of employment opportunities; ■ Advertise job openings through means accessible to the local communities. 	
<p><i>Residual impact evaluation</i></p> <p>Measures defined above will enhance positive impacts on employment. The residual impact of the Project will remain positive.</p>	
Impact Rating for Employment	Positive

<i>Impact description – Economy</i>	
<p>The Project Proponent will operate the wind farm for 20 years. The primary economic impact during the operation phase will be the payment of taxes by YPF to the Government, as required under the laws of Argentina. Tax revenues will be generated through income taxes and corporate taxes on expenditures, operational and corporate revenues and incomes of employees.</p> <p>Once the wind farm is operational and contributes to securing a stable and renewable energy supply, it is expected that additional foreign investors would take the opportunity of setting up new businesses in the country, thus benefiting economic growth at national level.</p> <p>The overall and long-term economic impacts of the wind farm operation on the economy in Argentina are considered to be positive.</p>	
<i>Enhancement measures</i>	
None proposed.	
<i>Residual impact evaluation</i>	
Measures defined above will enhance <i>Positive</i> impacts on economy. The residual impact of the Project will remain positive .	
Impact Rating for Economy	Positive

6.6.9 Impacts on Land and Livelihoods

The following project activities are relevant for assessing impacts to land and livelihoods during the project operation:

- Permanent land take required for the wind turbines, project substation, electrical pylons, access roads and transmission lines right-of-way. The final footprint of the Project will be 0.3455 km². 0.18 km² will be from already existing roads meaning that only 0.1655 km² will be new land take.

<i>Impact description</i>	
<p>Given that the project site is owned by the Project Proponent and it is anticipated that no landowners or land users will be affected in their ability to gain a livelihood from the land, vulnerability of receptors is considered to be low. The magnitude of the impact is assessed as Medium given that the Project will bring little differences from the baseline conditions in terms of land use but will have a long-term duration. Overall, impact to land and livelihoods from the permanent land take for the Project is considered to be minor.</p>	
<i>Mitigation measures</i>	
The grievance mechanism will be maintained during the operational phase as well.	
<i>Residual impact evaluation</i>	
With the implementation of the above mitigation, residual impact is assessed as negligible .	
Impact Rating for Land and Livelihoods	Negligible

6.6.10 Impacts on Infrastructure and Utilities

<i>Impact description</i>	
The operation of a modern power generation facility will contribute to achieving the country targets for energy out of renewable sources and will have a <i>Positive</i> impact on the national power generation infrastructure in the country. The Project will also contribute to avoiding air emissions, which would otherwise be generated in the case of using fossil fuels. The impact is therefore considered positive .	
<i>Enhancement measures</i>	
None proposed.	
<i>Residual impact evaluation</i>	
The residual impact of the Project will remain positive .	
Impact Rating for Infrastructure and Utilities	Positive

6.6.11 Impacts on Worker Health and Safety

The activities, which will be relevant for worker health and safety at this stage of the Project, include:

- Operation and maintenance of the electrical substation;
- Maintenance of the wind turbines;
- Road travel within the wind farm for security purposes;
- Rehabilitating access roads on an as needed basis.

<i>Impact description</i>
<p>Approximately 10 people will be working during the project operational phase and additional ones are assumed to be contracted for security services. In addition, the Project will benefit from current third-party security patrols in place for the YPF oilfield.</p> <p>Working at height is frequent throughout all the life cycle of a wind farm and is especially relevant for maintenance purposes. However, additional hazards that are relevant for worker health and safety during operation include:</p> <ul style="list-style-type: none"> ■ Physical injury as a result of falling objects or falling/slips/trips during maintenance work; ■ Heat/cold stress issues from working in adverse weather conditions (wind speed, extreme temperatures, humidity and wetness); ■ Physical injury as a result of road accidents while travelling within the wind farm site; ■ Potential injury as a result of exposure to biological hazards from working in open environments (insect bites, etc.); ■ Potential injury due to blade and ice throw; ■ Electrical shocks from accidental contact with live electrical lines/equipment; ■ Injury due to fire/explosion accidents. <p>Because of the potential for serious injury or even death at an unmanaged industrial site, the scale of the impact is high. The impact is long-term in duration, extent would be localized to the wind farm site, and the frequency of a serious injury is likely to be rare; however, the magnitude of impact is still large. The overall impact on operational worker health and safety is therefore be considered major.</p>

<i>Mitigation measures</i>	
Please refer to mitigation measures listed in Section 6.6.11 under Impacts to Worker Health and Safety during construction phase.	
<i>Residual impact evaluation</i>	
With the implementation of the mitigation measures outlined in Section 6.6.11 above, the residual significance of the impacts on worker health and safety have been assessed as minor .	
Impact Rating for Worker Health and Safety	Minor

6.6.12 Impacts on Worker Management and Rights

<i>Impact description</i>	
<p>The issues faced by the Project during construction are the same as those faced during operation, in terms of requiring sound and fair employment practices, avoiding child and forced labor. The number of required employees will be significantly lower during operation, which will allow easier oversight, however, careful attention is still required to ensure that direct and indirect employees (including those in the supply chain) are not at risk from infringements to their working rights.</p> <p>The workers required for operations will be employed directly by the Project Proponent, meaning that there will be inbuilt mitigation measures that limit the likelihood of risks to workers' rights and child and forced labor. The magnitude of impact for all worker management and rights issues remains small, as any recorded incidences over the 20-year life of the Project are likely to be isolated. The vulnerability of workers during operation is considered to be low, as all staff will require training on their rights and have access to information on what to do should they experience infringements of their rights. The overall impact significance impacts to workers' rights is considered to be negligible.</p>	
<i>Mitigation measures</i>	
Mitigation measures established during construction will continue and be adapted throughout operation and decommissioning, pursuant to the changing conditions, laws and good international practices. Additional measures will include for example to ensure that working procedures include precautions such as shutting down wind turbines before maintenance personnel access the site in icing conditions.	
<i>Residual impact evaluation</i>	
In order to maintain this impact risk rating, issues with implementation and capacity that result in some breaches of workers' rights especially within the supply chain will be identified, documented and resolved as soon as possible. With mitigation there is a very low likelihood of workers' rights being at risk or suppliers engaging in child or forced labor. Workers are considered to have a low vulnerability, as detailed above, with children and forced labor considered to be highly vulnerable. If the proposed mitigation measures are fully implemented then risks to workers' rights, child and forced labor during operation and decommissioning are assessed as negligible .	
Impact Rating for Worker Rights	Negligible

6.6.13 Impacts on Community Health, Safety and Security

The following project activities are considered relevant for assessing impacts on community health, safety and security:

- Local traffic of security and maintenance personnel on the access roads to the turbines;
- Operation of wind turbines and electrical substation;
- Rehabilitation of access roads as needed.

Impact description - Accidents and injuries related to project transport and construction activities

The operational activities of the wind farm may result in impacts on the health and safety of the community as a result of:

- Potential injury due to blade and ice throw to field workers.

A failure of the rotor blade can result in its “throwing” and this could remotely affect workers’ safety. The overall risk of blade throw is extremely low³⁰. If ice accretion occurs on blades, which can happen in certain weather conditions in cold climates, then pieces of ice can be thrown from the rotor during operation, or dropped from it if the turbine is idling. Receptors, which may be affected, include workers in the oil field area, as the Project is located in an existing industrial area where regular community members are highly unlikely to be at risk. Considering the potential severity in case of blade or ice throw the vulnerability is assessed as Medium. The wind turbines have ice detection by means of an “unbalance system”, which is designed to detect ice from the blade surface. The magnitude of the impact is considered small due to low frequency of this occurring, the small proportion of receptors and the workers’ training and stoppage of works if risks arise. This significance of the impact is assessed as Moderate.

Considering electrical infrastructure, there have been increasing concerns over the past years about the health effects of electromagnetic fields caused by wind turbines. A study published in 2014³¹ involving magnetic field measurements in the proximity of 15 Vestas 1.8 MW wind turbines, two substations, various buried and overhead collector and transmission lines, and nearby homes concluded that magnetic field levels in the vicinity of wind turbines were lower than those produced by many common household electrical devices and were well below any existing regulatory guidelines with respect to human health. Yet, given the absence of receptors in the near vicinity of the Project, this impact significance is considered Negligible.

There have been concerns that noise generated by turbines can disturb sleep. A study undertaken in 2015³² indicated that “there is some evidence that exposure to wind turbine noise is associated with increased odds of annoyance and sleep problems. Individual attitudes could influence the type of response to noise from wind turbines”.

Shadow flicker is “the flickering effect caused when rotating wind turbine blades periodically cast shadows through constrained openings such as the windows of neighboring properties. Based on modeling results due to topography, location of sensitive receptors and typical wind directions, no impacts are expected. An assessment is provided in Annex D

However, considering that the closest residential area to the wind farm is located 1.2 km away, the vulnerability of the impact is assessed as low. The wind farm will be generating noise levels of a long-term (20 years of operation), which will be intermittent and remotely perceived locally (see Section 6.6.3); the impact magnitude is assessed as Medium. The overall impact significance is considered **minor**.

³⁰ Source: International Finance Corporation Environmental, Health, and Safety Guidelines for Wind Energy, 2015

³¹ Source: Online article *Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern?*, available here <https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-13-9> and accessed on 31 May 2019

³² Source: *The effect of wind turbine noise on sleep and quality of life: A systematic review and meta-analysis of observational studies* (Abstract), available here <https://www.ncbi.nlm.nih.gov/pubmed/25982992> and accessed on 31 May 2019

<p><i>Mitigation measures</i></p> <p>To following list of mitigation measures will be implemented in order to mitigate impacts on community health and safety:</p> <ul style="list-style-type: none"> ■ Continue raising awareness of the community on the operational effects of the wind farm as part of the communications defined in the Stakeholder Engagement Plan; ■ Maintain a Community Health, Safety and Security Management Plan also during operation, consistent with YPF S.A.'s management of the oil field where the Project is located; ■ Prevent access of unauthorized people at the turbine locations; ■ Sign post hazards associated to climbing turbine towers and electrical pylons; ■ Maintain the grievance mechanism during the operational phase. ■ No specific measures are required for shadow flicker other than implementing a process to assess the real occurrence of the shadow flickering locally at residential dwellings in order to exclude the phenomena in real operation conditions. 	
<p><i>Residual impact evaluation</i></p> <p>With the implementation of the mitigation defined above, the residual impact to community, health, safety and security is assessed as negligible.</p>	
Impact Rating for Community Health, Safety and Security	Negligible

6.7 Impacts on Decommissioning Phase

6.7.1 Impacts on Physical/Biological Receptors

Potential impacts on decommissioning phase are similar to those identified for construction phase in terms nature and magnitude as well as on sensitivity of the receptors, given that activities causing the impacts are mainly related to civil works like the dismantling of the wind turbines and electrical transmission lines towers. Equipment to be used is similar (cranes, bulldozers) and similar traffic volumes of heavy trucks is expected to transport the demolished materials. Similarly, the area affected will extend all over the Project site focusing on the location of the facilities.

As a result expected human presence, air pollutant emissions (dust and exhaust emissions), and noise levels are similar and therefore the impacts are likely to remain equal. Water consumption will be however reduced as it will not be needed to build the foundations and limited to human consumption and cleaning purposes, resulting in even reduced impacts when compared to construction phase.

Main differences arise from the waste generation and management given the large amount of demolition waste to be generated that could result in impacts to soil and landscape if not properly managed. The assessment, however, remains equal to construction phase given the nature of the demolition wastes.

Similarly, impacts to landscape will be based on the presence of machinery and workforce, though unlike in the construction phase, the outcome will be positive in terms of aesthetic values, as the landscape will recover its natural condition.

Expected potential impacts on flora, fauna and habitats, will also be very similar to those arising from construction activities, though of lower magnitude given there will be no new areas affected and the outcome will imply the restoration of the site.

Mitigation measures associated to the decommissioning phase will therefore be similar to the construction phase and mainly focused on the avoidance of off-road driving, proper maintenance of equipment and vehicles and specially on ensuring an adequate management of wastes.

6.7.2 Impacts on Economy and Employment

The assessment with respect to economy and employment has been done for the following project activities representing sources of impact during the decommissioning phase:

- The Project will require workforce during the Project decommissioning, which, however, is likely to be much smaller than the construction workforce.
- The Project decommissioning will require good and services during the decommissioning phase, somewhat similar to the construction phase.

<p><i>Impact description – Employment</i></p> <p>Assuming the wind farm will employ 10 direct staff; these people will become unemployed at the end of the wind farm operational time (20 years). Workers can be expected to suffer from significant increases in personal and family stress following a shutdown announcement. This change can have an indefinite duration depending on the resilience of each individual and his or her ability to access another employment. The magnitude of this impact is therefore considered to be <i>Medium</i>. The next 20 years will bring a greater shift towards renewable energy, and skills available with the retrenched workforce will continue to be attractive to employers. Therefore, it is estimated that these people will not have difficulties accessing future employment. Their vulnerability to the impact generated by the wind farm decommissioning is considered low.</p> <p>The significance of the impact is thus assessed as being <i>Minor</i> for the people losing employment when the wind farm ends its operation.</p> <p>At this stage, it is assumed that all Project components will be demolished and the sites would be reinstated. The number of workers needed for decommissioning will be less compared to the workforce needed for construction and could be estimated to a couple of hundred staff. The number of staff could be depending on the time schedule of the decommissioning and dismantling. However, the duration of the decommissioning phase is unknown at this stage.</p>	
<p><i>Mitigation measures</i></p> <p>The following recommendations are set out to mitigate the negative impacts identified:</p> <ul style="list-style-type: none"> ■ Retrenchment of the workforce will follow national and international standards as well as relevant contractual agreements. ■ The Project Proponent will develop a retrenchment plan to aim at minimizing the impact of job losses on the workers. ■ The retrenchment plan will be based on detailed and comprehensive consultation with affected workers, which should begin as early as possible. 	
<p><i>Residual impact evaluation</i></p> <p>Measures defined above will mitigate impacts on employment. The residual impact of the Project will remain negligible.</p>	
Impact Rating for Employment	Negligible

<i>Impact description – Economy</i>	
Economic impacts during the decommissioning phase will be relatively minimal. There will be a relatively small amount of procurement of goods and services and some induced economic impacts from employee spending. Overall, impacts are anticipated to be positive .	
<i>Mitigation measures</i>	
Specific measures to enhance economic impacts will include: The Project Proponent will conduct a comprehensive demand and supply side analysis to identify and quantify local content potential, identify potential suppliers and subcontractors. The Project Proponent will adopt policies for employment and purchasing within the project area. The sourcing of local goods and services, wherever possible, will be made obligatory for the sub-contractors and in all major procurement activities.	
<i>Residual impact evaluation</i>	
Measures defined above will enhance <i>Positive</i> impacts on economy. The residual impact of the Project will remain positive .	
Impact Rating for Economy	Positive

6.7.3 Impacts on Land and Livelihoods

<i>Impact description</i>	
At this stage, it is unclear if, at the end of the operational lifetime of the Project, the site will be rehabilitated and reused as an industrial facility or if the land will be sold and/or used for other purposes. This will require further discussion with the Project Proponent and local authorities and KEK at the future time. Impacts from land use changes at the time of decommissioning are assessed as Minor to negligible .	
<i>Mitigation measures</i>	
At the time of decommissioning, the Project Proponent will conduct an assessment of possible uses for the land once the wind farm has been dismantled and site rehabilitated.	
<i>Residual impact evaluation</i>	
With mitigation, the overall significance will be negligible .	
Impact Rating for Land and Livelihoods	Negligible

6.7.4 Impacts on Infrastructure and Utilities

<p><i>Impact description</i></p> <p>Decommissioning of the wind farm is anticipated to have effects on the local infrastructure and utilities, similar to the construction phase. However, at this stage, it is difficult to assess this future aspect and hence predict the vulnerability of the receptors at the time of decommissioning. No doubt in future the baseline conditions will be different from today, as will be the technologies and regulations for undertaking decommissioning works. It can be assumed that appropriate precautions will be made to minimize disruption to the public due to disruptions of infrastructure and utilities.</p> <p>Therefore, the significance of the impact of the Project decommissioning for this topic is estimated to be minor, but cannot be accurately assessed at this stage.</p>	
<p><i>Mitigation measures</i></p> <p>A Decommissioning Management Plan will need to be set up by the Project Proponent. This Plan should be developed in line with modern techniques and procedures available at that time and include:</p> <p>Consultation with potentially affected stakeholders (authorities and communities);</p> <p>Mitigation measures similar to those listed above under mitigation measures for construction: identifying improvement works to the roads prior decommissioning, restoring damaged infrastructure to initial conditions; avoiding traffic through residential areas etc.</p>	
<p><i>Residual Impact evaluation</i></p> <p>Measures defined above will mitigate impacts on infrastructure and utilities. The residual impact of the Project will remain negligible.</p>	
Impact Rating for Infrastructure and Utilities	Negligible

6.7.5 Impacts on Worker Health and Safety

<p><i>Impact description</i></p> <p>It is expected that the workforce for the wind farm decommissioning will be significantly smaller than the construction workforce. Decommissioning impacts are assumed to be similar as for construction and are rated as major.</p>	
<p><i>Mitigation measures</i></p> <p>Please refer to mitigation measures listed in Section 6.6.11 under Impacts to Worker Health and Safety during construction phase.</p>	
<p><i>Residual impact evaluation</i></p> <p>With the implementation of the mitigation measures outlined in Section 6.6.11 above, the residual significance of the impacts on worker health and safety have been assessed as minor.</p>	
Impact Rating for Worker Health and Safety	Minor

6.7.6 Impacts on Worker Management and Rights

<p><i>Impact description</i></p> <p>During the decommissioning phase there is potential for the same impacts seen during construction to occur in relation to worker rights and the use of child and forced labor. The workforce number and use of contractors will increase compared to operational levels and as such, there is an increased likelihood of impacts occurring.</p> <p>It is assumed that policies, both nationally and internally will progress over the next 20 years, thus reducing the likelihood that this impact will occur, which is why all worker management and rights impacts have been assessed as having a small magnitude. Despite this, the vulnerability ratings remain the same, with workers assessed as having adequate recourse for infringements to rights making them low, and child and forced labor rated as high. This results in a significance impact rating of negligible for risks to workers' rights and moderate for risks of child and forced labor.</p>	
<p><i>Mitigation measures</i></p> <p>Mitigation measures established during construction will continue and be adapted throughout operation and decommissioning, pursuant to the changing conditions, laws and good international practices.</p>	
<p><i>Residual impact evaluation</i></p> <p>If the proposed mitigation measures are fully implemented then risks to workers' rights, child and forced labor during operation and decommissioning are assessed as negligible.</p>	
Impact Rating for Worker Rights	Negligible

6.7.7 Impacts on Community Health, Safety and Security

<p><i>Impact description</i></p> <p>Decommissioning impacts are assumed to be similar as for construction and are rated as minor.</p>	
<p><i>Mitigation measures</i></p> <p>Please refer to mitigation measures listed in Section 6.5.13 under Impacts to Community Health, Safety and Security during construction phase.</p>	
<p><i>Residual impact evaluation</i></p> <p>With the implementation of the mitigation measures outlined in Section 6.5.13 above, the residual significance of the impacts on community health, safety and security have been assessed as negligible.</p>	
Impact Rating for Community Health, Safety and Security	Negligible

6.7.8 Impacts on Community Cohesion

<p><i>Impact description</i></p> <p>With decommissioning, communities surrounding the wind farm site may experience benefits, such as changed land use and increased land value. Communities that are further away from the settlements closest to the Project may not experience the same benefits during decommissioning, which may lead to resentment between communities. Similarly, the restoration of the site could allow different land uses and further development.</p> <p>Impacts during decommissioning have been assessed as having a minor significance.</p>	
<p><i>Mitigation measures</i></p> <p>Engagement with communities must continue throughout all Project lifecycles, with stakeholders informed of the decommissioning process at least a year in advance. Additional assessment will be required at this time, including;</p> <ul style="list-style-type: none"> ■ Assessment of the current baseline conditions and of predicted Project impacts; ■ Identification of vulnerable groups; ■ Design and implementation of mitigation measures; and ■ Monitoring and evaluation of implementation. 	
<p><i>Residual impact evaluation</i></p> <p>Implementation of mitigation measures will reduce impacts to community cohesion experienced during decommissioning to negligible.</p>	
Impact Rating for Community Cohesion	Negligible

6.8 Environmental and Social Management Plan

6.8.1 Summary of Physical / Biological Impacts, Mitigation and Monitoring

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
Air Quality								
<ul style="list-style-type: none"> Construction and strengthening of access roads and tracks. Site clearance and excavation works. Movement of vehicles. Construction of facilities. Operation of generators. Demolition activities. 	<ul style="list-style-type: none"> Vehicle and machinery exhaust emissions. Emission of dust and particles. 	<ul style="list-style-type: none"> Construction Operation Decommissioning 	<ul style="list-style-type: none"> Regular maintenance of vehicles and machinery to guarantee emissions in compliance with manufacturer specifications. Limitation of vehicles speed on unpaved surfaces. Apply dust suppression techniques (e.g. watering). Prevent idling of vehicles and equipment. Optimization of traffic volumes and minimization of vehicles movement. Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities. 	EPC Team	Site inspection and record keeping.	During construction.	YPF HSE Department	Report from site HSE Officer of EPC contractor to YPF HSE Department.
Water								
<ul style="list-style-type: none"> Construction of foundations for wind turbines and electrical towers. Construction of ancillary facilities. Domestic water consumption. 	Depletion of water resources.	<ul style="list-style-type: none"> Construction Operation 	<ul style="list-style-type: none"> Permitting for the groundwater extraction shall be obtained from authorities before beginning of activities. Construction labor deputed on site should be sensitized about water conservation and encouraged for optimal use of water. Optimum use of water during sprinkling on roads for dust settlement, washing of vehicles, concrete mixing for wind turbines and electrical lines towers foundations. Regular inspection for identification of water leakages and preventing water wastage. 	EPC Team	Site inspection and record keeping.	Prior to and during construction and operation.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> Storage of hazardous substances and waste on site. Construction and demolition activities that causes dust and erosion. 	Water resources pollution.	<ul style="list-style-type: none"> Construction Operation Decommissioning 	<ul style="list-style-type: none"> Adequate planning of tracks, roads and drainage to avoid affection to existing drainage channels and temporary water accumulations in the area. Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface and with secondary containment. All waste should be stored in a shed protected from the elements (rain, winds, etc.) and away from natural drainage channels. 	EPC Team	Site inspection and record keeping.	Prior to and during construction and operation.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
Noise								
<ul style="list-style-type: none"> General construction activities and earthworks. 	Increase of noise levels.	<ul style="list-style-type: none"> Construction Operation Decommissioning 	<ul style="list-style-type: none"> Normal working hours of the contractor to be defined (preferable 8 am to 6pm) and limited to daylight hours. If work needs to be undertaken outside these hours, it should be limited to activities 	EPC Team	Site inspection and record keeping.	During construction.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
<ul style="list-style-type: none"> ■ Transport of materials and workers ■ Operation of wind turbines (blade rotation) ■ Demolition activities. 			<ul style="list-style-type: none"> ■ that do not generate noise, except under exceptional circumstances. ■ Only well-maintained equipment should be operated on site. ■ If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible. ■ Machinery and construction equipment that may be in intermittent use should be shut down or throttled down during non-work periods. ■ Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged. 					
		Operation	<ul style="list-style-type: none"> ■ Regular maintenance of wind turbines. 	EPC Team	Site inspection and record keeping	As per Maintenance Planning	YPF HSE Department	Report from site HSE Officer of YPF to YPF HSE Department
		Operation	<ul style="list-style-type: none"> ■ As part of the study phase (pre-construction), YPF will undertake a dedicated noise modelling study to verify that Project related noise is not predicted to significantly raise ambient noise levels at receptor locations (Cañadon Seco village and other nearby stakeholder locations); ■ Regular maintenance of wind turbines; ■ Periodic monitoring of noise near to the sources to ensure compliance with design specifications; ■ Annual monitoring of ambient noise levels at identified residential receptors; ■ Monitor reported noise-related nuisance (if any) through the project's grievance procedure. 	EPC Team and YPF HSE Team	Monitoring and Record keeping	Quarterly Yearly	YPF HSE Department	Report from site HSE Officer of YPF to YPF HSE Department
Soil								
<ul style="list-style-type: none"> ■ Construction/ strengthening of access roads. ■ Vehicle movements. ■ Stripping and stockpiling of soil layers. ■ Vegetation clearance. ■ Excavation for foundations and construction of ancillary facilities. ■ Waste generation and storage. 	Soil compaction.	Construction Decommissioning	<ul style="list-style-type: none"> ■ Vehicles will utilize existing roads to access the site and to move within the windfarm. ■ Off-road traffic will be banned. ■ Soil should be ploughed in compacted areas after completion of construction work. 	EPC Team	Site inspection and record keeping.	During construction and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
<ul style="list-style-type: none"> ■ Removal and demolition of infrastructures. 								
<ul style="list-style-type: none"> ■ Construction/ strengthening of access roads and tracks. ■ Vegetation clearance. ■ Excavation for foundations and construction of ancillary facilities. ■ Stripping and stockpiling of soil layers. ■ Removal of wind turbines and electrical towers. 	Soil erosion.	Construction Operation Decommissioning	<ul style="list-style-type: none"> ■ Vehicles will utilize existing roads to access the site and to move within the windfarm. ■ Off-road traffic will be banned. ■ Stripping of top soil should be conducted only when required and top soil should be retained for landscaping. ■ Restoration works and revegetation with local species should be initiated as soon as possible as the construction works end in a given location to prevent erosion. ■ The stockpiles of top soil should be kept moist to avoid wind erosion of the soil. 	EPC Team	Site inspection and record keeping.	During construction, operation and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> ■ Storage and transport of materials. ■ Storage of oil and other substances. ■ Maintenance activities. ■ Storage of wastes. 	Soil pollution.	Construction Operation Decommissioning	<ul style="list-style-type: none"> ■ Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages. ■ Unloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers should be trained to prevent/contain spills and leaks. ■ Construction and demolition waste should be stored separately and periodically collected and delivered to an authorized treatment and storage facility. ■ Hazardous waste should be properly labelled, stored onsite at a location provided with impervious surface and with secondary containment. ■ Proper receptacles or designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured. ■ All waste should be stored in a shed protected from the elements (rain, winds, etc.) and away from natural drainage channels. 	EPC Team	Site inspection and record keeping.	During construction, operation and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
Landscape								
<ul style="list-style-type: none"> ■ Presence of vehicles and machinery. ■ Erection of wind turbines and electrical towers. 	Visual quality reduction.	Construction Decommissioning	<ul style="list-style-type: none"> ■ Store machinery, materials and equipment in areas not directly visible from the village or the nearby roads to the extent possible. ■ Reduce illumination to the extent possible. ■ Avoid construction activities for wind turbines along existing drainage channels and adequate those channels when crossed by new accesses. 	EPC Team	Site inspection and record keeping.	During construction and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> ■ Construction of ancillary facilities (i.e. electrical substation). 		Operation	<ul style="list-style-type: none"> ■ Reduce illumination to the extent possible to avoid visualization of safety lights from nearby settlement. 	EPC Team	Once upon design of safety lights.	Once before construction.	YPF HSE Responsible of the project	Report from YPF HSE Responsible of the

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
<ul style="list-style-type: none"> Operation of wind turbines and aerial electrical lines. 								project to YPF HSE Department.
Flora and Habitats								
<ul style="list-style-type: none"> Vegetation clearance. Traffic. Storage of materials. 	Loss of habitats and vegetation diversity.	Construction Decommissioning	<ul style="list-style-type: none"> Vegetation clearance should be restricted to the Project activity area(s). Any mature vegetation found should be avoided when planning any site clearance activities. Top soil should be stored separately for restoration of habitat after construction. Unnecessary disturbance of vegetation due to off-roading, fuel wood procurement, and destruction of floral resources should be prohibited. Local grass species can be seeded in disturbed areas once the construction phase has finalized. 	EPC Team	Site inspection and record keeping.	During construction and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
Fauna								
<ul style="list-style-type: none"> General construction activities and associated noise. Vehicle movements. Presence of workforce. 	Loss of habitat. Disturbance due to noise, human-wildlife conflicts, collisions with wildlife.	Construction Operation Decommissioning	<ul style="list-style-type: none"> Construction activities should be conducted in a phased manner to prevent excessive noise, anthropogenic movement and vehicular movement throughout the entire wind farm area at any given time. A 'code of conduct' shall be established for all workers that will prohibit hunting, gathering, chasing or disturbance of any wildlife. The adoption of good waste management policies, ensuring waste is stored in appropriate and adapted sites that prevent fauna access and periodic removal of domestic wastes generated. Avoid, to the extent possible, any traffic movement at night and dawn times. 	EPC Team	Site inspection and record keeping	Prior to and during construction, operation and decommissioning	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department
<ul style="list-style-type: none"> Wind turbine blades operation. 	Bird collisions, increased energy expenditure and barrier effects.	Operation	<ul style="list-style-type: none"> Pursue avifauna monitoring in order to further assess the presence of sensitive species, including migratory birds, and develop a Biodiversity Management Plan (including, if impacts to critical habitats are identified, a Biodiversity Action Plan). Inter-turbine distance should be large enough that birds can avoid turbine blades and utilize minimal energy while doing so. Flash lamps on the WTGs will prevent bird collisions at night. 	Project development team	Monthly monitoring report	Ongoing through study and construction phase	YPF HSE Department	Monthly avifauna monitoring report
				EPC Team	Site inspection and record keeping.	One-time monitoring of site prior to construction.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
				EPC Team	Site inspection and record keeping.	One-time monitoring of Wind turbines prior to operation.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
			<ul style="list-style-type: none"> Waste materials should not be left uncovered, as it will attract birds and other fauna to the wind farm boundary. 	EPC Team	Site inspection and record keeping.	During operation.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
			<ul style="list-style-type: none"> Maintain a bird mortality register for the windfarm, recording all carcasses within 500 m of any project element (including transmission lines). 	EPC Team	Site inspection and record keeping.	Weekly.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> Operation of aerial electrical lines. 	Electrocution from live electrical components.	Operation	<ul style="list-style-type: none"> Bird-safe strain poles with insulation chains at least 60 cm in length should be adopted. 	EPC Team	Site inspection and record keeping.	One-time prior to operation.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
			<ul style="list-style-type: none"> Regular checking of the vacuums or holes in the towers for nesting bird species should be practice. 	EPC Team	Site inspection and record keeping.	Quarterly.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.

6.8.2 Summary of Socioeconomical Impacts, Mitigation and Monitoring

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
Economy and Employment								
<ul style="list-style-type: none"> Wind turbine project construction. 	Employment – peak of 200 employees - 20% will be skilled, 50% semi-skilled and 30% unskilled personnel.	Construction (12 months)	<ul style="list-style-type: none"> Equal recruitment procedures. Priority to local employment. Consideration for a skilled development program. Workforce retrenchment done in accordance with legal requirements. Support to YPF Luz social investment. 	YPF Team	Site inspection and record keeping; audits.	During construction.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.
	Economic effects of construction worker spendings.		<ul style="list-style-type: none"> Demand and supply analysis to identify local potential beneficiaries. Policies for employment and purchasing within the project area. Goods and services to be sourced locally wherever possible. 	Project Proponent	Analysis reports and record keeping.	During construction.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> Wind farm operation and maintenance. 	Employment – 10 local staff.	20-year operational lifetime	<ul style="list-style-type: none"> Clear and transparent employment criteria. Employees targeted from the settlement area. <p>Information from the project proponent about:</p> <ul style="list-style-type: none"> Number of openings and skills required for employment opportunities. Advertise job openings through accessible means for the local communities. 	Project Proponent	Record keeping.	During operation.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements	
	Economy – Payment of taxes by YPF. Promote foreign investors.		n/a	YPF	Record keeping.	During operation.	n/a	n/a	
■ Project Decommissioning.	Employment – loss of full time positions and limited temporary jobs for decommissioning work.	Decommissioning	<ul style="list-style-type: none"> ■ Workforce retrenchment to follow national and international standards and contractual agreements. ■ Retrenchment plan to minimize job losses. ■ Retrenchment plan based on consultation with affected workers. 	Project Proponent	Record keeping.	As early as possible.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
	Economy – Worker expenditure.		<ul style="list-style-type: none"> ■ Comprehensive demand and supply side analysis. ■ Policies for employment and purchasing. ■ Goods and services to be sourced locally wherever possible. 	Project Proponent	Record keeping.	Before and during decommissioning.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
Land and Livelihoods									
■ Permanent land take for wind turbines, substation, pylons, access roads, transmission lines. Final footprint of 0.3455km ² , 0.18km ² accounting for existing roads and 0.1655 km ² for new land take.	Land take – land use change.	Construction Operation	■ 0.016 km ² will be utilized during construction only and not during operation.	EPC Team	Site inspection and record keeping.	Prior to and during construction and operation.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
Infrastructures and Utilities									
<ul style="list-style-type: none"> ■ Road rehabilitation and construction. ■ Transport of equipment. ■ Construction camp establishment. ■ Construction of platforms and pylons. ■ Construction of substation and transmission lines. 	Disruption and damage to road transport and infrastructure.	Construction	■ Preparation of a Traffic and Transportation Management Plan (TTMP).	Project Proponent	Record keeping.	During construction.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
	Traffic congestion and delay.	Construction	<ul style="list-style-type: none"> ■ Vehicle convoys. ■ Time-of-day travel restrictions. 	EPC Team	Communication protocols, observations.	All truck movements.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
	Increased traffic safety risk.	Construction	<ul style="list-style-type: none"> ■ Vehicle convoys. ■ Time-of-day travel restrictions. 	EPC Team	Communication protocols, observations.	All truck movements.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	
	Contribute to renewable energy country targets.	Operation				Record keeping.	During operation.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.
	Effects on the public due to disruptions of infrastructure and utilities.	Decommissioning	Decommissioning plan to be set up and to include: <ul style="list-style-type: none"> ■ Stakeholder consultation. ■ Mitigation measures. 	Project Proponent	Monitoring and Record keeping.	Before and during decommissioning.	YPF HR Department	Report from site HR Officer of EPC Contractor to YPF HSE Department.	

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
Worker Health and Safety								
<ul style="list-style-type: none"> Ground clearance (road access). Construction excavation. Structure erections involving physical hazard exposure. Electrical grid connection. Transport of goods and services. Decommissioning works. 	Physical injury, hearing loss, chemical inhalation.	Construction and Decommissioning	<ul style="list-style-type: none"> Procedure for HIRA (Hazard Identification and Risk Assessment). Lockout/tagout procedures for equipment maintenance and repair. Develop standard operating and maintenance procedures and provide the requirements for the task to be safely performed. Development of a safety inspection and audit system. 	Project Proponent and EPC Contractor	Site inspection and record keeping.	During construction and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
<ul style="list-style-type: none"> Operation and maintenance of the electrical substation. Maintenance of the wind turbines. Road travel within the wind farm. Rehabilitating access roads. 	Potential physical injury due to falling, slips, trips, heat/cold stress, road accidents, biological hazard exposure, blade and ice throw, electrical shocks, fire/explosion accidents.	Operation	<ul style="list-style-type: none"> Develop procedures for periodic work place monitoring. Accident reporting. Emergency response plans. Personal Protective Equipment (PPE) use. 	Project Proponent and EPC Contractor			YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
Worker Management and Rights								
<ul style="list-style-type: none"> Construction activities. 	Sound and fair worker rights for direct employees and indirect employees.	Construction Operation and Decommissioning	<p>Develop and implement an Occupational Health and Safety Management Plan and a Worker Management Plan, including:</p> <ul style="list-style-type: none"> Induction to all workers on project employment rules and Company policy. Compliance to YPF Luz's Human Resources Policy. All worker contracts to include terms and conditions of their employment and their legal rights. All workers will be free to join unions and have the right to collective bargaining. Develop a Supplier Code of Conduct; and require all contractors and subcontractors to adhere. All contractors and sub-contractors to put in place a worker grievance mechanism. Working practices to be monitored (with KPIs). 	Project Proponent and EPC Contractor Project Proponent will ensure that the EPC Contractor complies with YPF Luz's Human Resources Policy.	Site inspection and record keeping.	During construction and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
Community Health, Safety and Security								
<ul style="list-style-type: none"> Heavy equipment road transport. Movement of personnel. Influx of construction workers. Construction works (dust, noise caused). Utility supply potential interruption. 	Community health and safety risks include structural safety of project infrastructure, life and fire safety, public accessibility and management of emergency situations. Potential increase of traffic related accidents.	Construction Decommissioning	<ul style="list-style-type: none"> Develop and implement a Community Health, Safety and Security Management Plan. Stakeholder engagement and information disclosure process, to ensure understanding of proposed project and precautions to adopt for safety. Develop and implement a Traffic Management Plan. 	Project Proponent/EPC Contractor	Site inspection and record keeping	During construction and decommissioning	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department

Project Activities	Impact/Issue	Applicable Project Phase	Mitigation /Enhancement/ Monitoring Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of verification that mitigation has been implemented	Timelines /Frequency	Supervision Responsibility	Reporting Requirements
<ul style="list-style-type: none"> Chemical handling, waste management. 			<ul style="list-style-type: none"> Develop and implement an Emergency Preparedness and Response Plan. Develop and implement a Waste Management Plan and Chemicals Management Plan. 					
<ul style="list-style-type: none"> Local traffic. Turbine and substation operation. Rehabilitation of roads. 	<p>Potential injury due to blade and ice throw to field workers.</p> <p>Potential electromagnetic interference with community-used telecommunication systems.</p>	Operations	<ul style="list-style-type: none"> Continue raising awareness on the operational effects of the wind farm. Maintain a Community Health, Safety and Security Management Plan. Prevent access of unauthorized people to turbine locations. Sign post hazards. Maintain the grievance mechanism. 	Project Proponent/EPC Contractor				
Community Cohesion								
<ul style="list-style-type: none"> Local expectations of Project benefits. Workers moving into the local area. Tension within and between communities. 	<p>Tensions within and between communities.</p> <p>Unmet expectations of benefits.</p>	Construction	<ul style="list-style-type: none"> Addressed through a Transparent Stakeholder Engagement Plan (SEP), compliance with Project worker management practices, maintenance of a Project grievance mechanism, development and implementation of different topic-specific Management Plans. 	The project proponent, EPC Contractor, YPF Luz	Record keeping.	Prior to and during construction, operation and decommissioning.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
			<ul style="list-style-type: none"> Ongoing dialogue: assist in information sharing with regard to employment practices and the use of non-local staff. 	Community Liaison Officers (CLOs) and local communities	Record keeping.	Throughout construction.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
			<ul style="list-style-type: none"> Recruitment practices: development of a Worker Management Plan. 	EPC Contractor	Record keeping.	Prior to construction.	YPF HSE Department	Report from site HSE Officer of EPC Contractor to YPF HSE Department.
			<ul style="list-style-type: none"> A Project grievance mechanism will be developed and implemented. 	EPC Contractor	Record keeping.	During operation.		
			<ul style="list-style-type: none"> Monitoring and communication about performance, health and safety, along with community issues with the construction process of staff. 	EPC Contractor and the Project Proponent	Record keeping.	Quarterly, starting six month before construction to the end of the construction phase.		
			<ul style="list-style-type: none"> Investment: promote social investment initiatives in the community. 	YPF Luz and Project Proponent	Record keeping.	During operation.		

ANNEXES

ANNEX A. HEAVY TRAFFIC ASSESSMENT

ANNEX B. CLIMATE CHANGE ANALYSIS

ANNEX C. CRITICAL HABITAT ASSESSMENT

ANNEX D. SHADOW FLICKER ASSESSMENT

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ERM Argentina

2677 Cabildo Ave. 6th floor
C1428AAI, Buenos Aires City
Argentina

T: +54 11 5218 3900

F: +54 11 5218 3999

www.erm.com