



Environmental, Social, and Health Impact Assessment (ESHIA) for Vista Onshore Operations

Project Description



7 June 2019

Project No.: 0510093

Document details	
Document title	Environmental, Social, and Health Impact Assessment (ESHIA) for Vista Onshore Operations
Document subtitle	Project Description
Project No.	0510093
Date	7 June 2019
Version	1.0
Author	Luis Dingevan
Client Name	Vista Oil & Gas

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	00	Luis Dingevan	Andrea Fernandez	Alfrido Wagner	04/06/2019	Borrador a Vista
Final	01	Luis Dingevan	Andrea Fernandez	Alfrido Wagner	07/06/2019	

Signature Page

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2. PROJECT DESCRIPTION

2.1 Project Overview

Vista Oil & Gas Argentina S.A. (VOG hereafter) and Aleph Midstream S.A. (AM hereafter) are applying for financing for the development of unconventional oil and gas production in its Bajada del Palo Oeste block (BPO hereafter), within Bajada del Palo area (BP), as well as for the development of midstream facilities to gather, process and transport unconventional oil & gas production from BPO block. The BPO project is part of the Vaca Muerta (“VM”) shale oil formation.

The Project includes drilling and completion of 110 wells in the next 4 - 5 years, as well as the construction, installation, operation and maintenance of midstream facilities to gather, process and transport unconventional oil & gas production from BPO (i.e. gathering lines, early production facilities, EPFs, oil, gas and water pipelines, central processing facilities, CPFs, compressor stations, lease automatic custody transfer units, LACT, etc.) to be developed in the next 8 - 9 years. Additionally, some of the existing facilities (i.e. crude treatment plant, PTC, gas treatment plant, PTG, etc.) at Entre Lomas area (EL) are to be revamped in order to support the production from BPO.

VOG is carrying out a fast track development of the BPO block, moving forward to drilling & completion ramp-up and to full-scale development in 2020. This is possible given the advanced geological understanding of BPO block, with all the milestones of a typical delineation phase achieved (e.g.: 3D seismic acquisition & interpretation, data gathered from vertical wells, petrophysical analysis to determine landing zones, etc.), as well as for most of the initial pilot phase’s milestones (e.g.: pad configuration, batch drilling and optimization, completion design optimization, etc.). In 2020, the project is entering the full-scale development phase leveraged on Vista’s Vaca Muerta leadership team proven track record on the basin, premium acreage position and legacy conventional facilities.

VOG is going forward with a Cube development approach, which is a continuous portion of the acreage to be developed simultaneously. Each CUBE is projected to have approximately 6 PADS x 4-6 wells per PAD. By doing this, VOG can optimize rig and frac pace, minimize parent-child effects (which reduces oil productivity per well), mitigate frac hits and group PADs for oil, gas and water evacuation. The block BPO has been divided in 19 Cubes, of which the first 4 Cubes (#1, #2, #4, and #6) constitute the scope of the BPO Project presented to OPIC for financing.

VOG will be responsible for the upstream portion of the Project while AM in the near future will be in charge of the midstream component of the Project.

The aim of the Project is to develop the oil and gas reserves and increase the oil and gas production from Vaca Muerta (VM) formation.

2.2 Company Overview

Vista was born as a special purpose acquisition company (SPAC), made an Initial Public Offering raising funds that were then used for the initial business combination - an acquisition or merger with a company - that will generate value for Vista shareholders.

In February 2018, Vista announced its Initial Business Combination proposal, which consisted of a transaction in Argentina for USD800 million. In March Vista shareholders approve the Initial Combination of Businesses at the Shareholders Assembly. Finally, on April 4, 2018, Vista announced the acquisition of certain conventional and unconventional oil and gas assets, mostly located in the Neuquén Basin, which made the company the fifth producer and operator of oil in Argentina, according to the most recent data that were published by the Ministry of Energy and Mining of the Argentine Republic.

2.3 Project Location an Background

The Project is to be developed at Bajada del Palo (BP) and Entre Lomas (EL) areas.

BP area is located within the Añelo Department at the east of the Province of Neuquén, has an approximate area of 449.88 km², is divided in two blocks, Bajada del Palo Este (BPE) and Bajada del Palo Oeste (BPO), and includes the following ten oil fields:

- Aguada del Poncho (APo);
- Bajada del Palo (BP);
- Borde Montuoso (BMo);
- Borde Montuoso Norte (BMoN);
- Jagüel de los Rosauros (JdR);
- Jagüel Norte (JN);
- Médano de la Mora (MdM);
- Médano de la Mora Este (MdME);
- Puesto Opazo (POp); and
- Puesto sin Nombre (PSN).

It is important noting that the Project will be almost entirely developed at BPO block, with some few facilities to be installed at BPE block and EL area.

The EL area covers total area of 740.58 km², reaching the Provinces of Neuquén and Río Negro. The portion of EL area located at the Province of Neuquén belongs to the Department of Añelo and covers an area of 437.25 km². It comprises six deposits:

- Entre Lomas (EL);
- Lomas de Ocampo (LO);
- Borde Mocho (BoMo);
- Los Alamos (LA);
- El Caracol (EC); and
- Piedras Blancas (PB-NQN).

The portion of EL area located at the Province of Rio Negro covers a total area of 303.33 km² and includes three main deposits:

- Charco Bayo (CB);
- La Pista (LP); and
- Piedras Blancas (PB-RN).

It is important to mention that the upstream Project will be entirely developed within the Province of Neuquén.

The main entrance to the Project area is located at Km 89 of National Route No. 151 of the Province of Río Negro, although it can also be accessed from Añelo, in the Province of Neuquén, by Provincial Route No. 8.

The Project area is included within the Monte biogeographical region, a semiarid region whose climate is defined as of continental type, dry and warm in summer and wet and cold in winter, Mesothermal Aridic.

Regional topography evidences that winds and precipitation act as erosion and transportation agents. Soils are described as of low agricultural aptitude due to its texture, drainage, marked hydric deficit, high rocky characteristics and erosion risk.

Regional vegetal coverage presents marked characteristics of bushy squat and sparse scrub, while fauna includes species from arid and semi-arid regions of Argentina.

In Annex 2.1 Location Map, the area where the Project will be developed is shown.

2.4 Project Boundaries

As previously mentioned, the Project will be mainly developed at BPO block, with some few facilities to be installed at BPE block and EL area, although all activities are to be carried out within the Province of Neuquén. Therefore, the Project boundaries have been established to be coincident with the boundaries of the BP and EL areas. Geographical coordinates of the corners of the BP and EL areas are presented below:

Table 2-1 Geographical coordinates of the corners of the BP and EL areas

Area	Corner N°	Geographical Coordinates	
		Latitude	Longitude
Entre Lomas	1	38° 13' 28.018" S	68° 00' 57.467" W
Entre Lomas	2	38° 18' 37.358" S	68° 07' 32.388" W
Entre Lomas	3	37° 55' 12.000" S	68° 32' 31.200" W
Entre Lomas	4	37° 51' 22.914" S	68° 24' 34.155" W
Bajada del Palo Este	1	38° 13' 27.152" S	68° 27' 57.416" W
Bajada del Palo Este	2	38° 07' 36.895" S	68° 27' 59.731" W
Bajada del Palo Este	3	38° 07' 36.258" S	68° 25' 44.281" W
Bajada del Palo Este	4	38° 06' 14.369" S	68° 25' 44.918" W
Bajada del Palo Este	5	38° 06' 12.830" S	68° 20' 49.411" W
Bajada del Palo Este	6	38° 11' 58.451" S	68° 14' 40.391" W
Bajada del Palo Este	7	38° 13' 23.558" S	68° 16' 45.065" W
Bajada del Palo Oeste	1	38° 13' 27.152" S	68° 27' 57.416" W
Bajada del Palo Oeste	2	38° 14' 51.988" S	68° 29' 53.798" W
Bajada del Palo Oeste	3	38° 14' 54.327" S	68° 41' 06.192" W
Bajada del Palo Oeste	4	38° 07' 39.739" S	68° 41' 08.062" W
Bajada del Palo Oeste	5	38° 07' 36.895" S	68° 27' 59.731" W

Source: Vista

Annex 2.2 shows the EL, BPO and BPE area blocks within the BP area, as well as the location of main existing and projected facilities for the Project.

2.5 Project Schedule

The Project includes drilling, completion, operation and maintenance of 110 wells in the following 4 - 5 years, as well as the construction, installation, operation and maintenance of midstream facilities to

gather, process and transport unconventional oil & gas production from BPO to be developed in the next 8 - 9 years.

The following activities have already been completed for the BPO block, referred to the typical development for vertical wells: Delineation Phase, Pilot Phase 1, and Field Development in Factory Mode, which included:

- 3D seismic acquisition and interpretation
 - Prospective drillable area definition
- Data gathering in vertical wells
 - Core acquisition for the whole VM interval
 - Full service of logs (sonic and image)
 - Thermal maturity confirmation
- Petrophysical analysis to determine landing zones
- Horizontal well to confirm landing zone productivity
- Inputs for field development plan
 - PAD configuration definition
 - Number of wells per PAD
 - Batch drilling and optimization
 - Completion design optimization
- Field development plan elaboration (advanced understanding for BOP)
- Facilities construction (advanced understanding for BOP)
- Sand and water logistics optimization (advanced understanding for BOP)
- Scale contracts negotiation (advanced understanding for BOP)

As part of the Project, activities to be implemented during the year 2019 and until the second half of 2020:

- Construction and operation of 48 oil and/or gas production wells;
- Construction and operation of an early production facility 1, EPF 1, for gathering and processing fluids driven by the new non-conventional oil and gas production wells to be installed as part of the BPO project;
- Construction and operation of fluids gathering line, connecting wells PADs and EPFs. It is projected that PADs will be initially connected to a main manifold which will be connected directly to the EPF;
- Construction and operation of oil, gas and production water pipelines connecting each new EPF and the current existing pipelines connecting EPF 1 and Battery 1 at BMo oilfield;
- Construction and operation of an oil pipeline connecting Battery 1 at BMo oilfield and PTC at EL area;
- Construction and operation of the first stage of gas compressor station 11, EMC 11, at BMo oilfield;
- Revamping for existing facilities for initial evacuation plan:
 - Borde Montuoso Battery (1 BMo)

- Water Management Plant (PTA and PIA BMo)
- Entre Lomas oil treatment plant (PTC at EL area in order to support oil production increase).

From 2nd half of 2020 on, the following activities are projected to be developed as part of the Project:

- Construction and operation of 62 oil and/or gas production wells;
- Construction and operation of early production facilities for primary fluids separation (1 every 2 CUBEs), EPF. 1 new EPF has been originally considered for evacuating and initially processing fluids driven by the new non-conventional oil and gas production wells to be installed as part of the BPO project;
- Construction and operations of fluids gathering pipelines connecting the well's PADs with the new EPF;
- Construction and operation of an oil treatment plant, PTC, at BMo oilfield. It is planned to be built in two modules of 2,500 m³/d of oil treatment capacity;
- Construction and operation of a gas treatment plant, PTG, at BPO block;
- Construction and operation of a power generation plant, CT, at BMo oilfield;
- Construction and operation of a gas pipeline connecting PTG at BPO block and CT at BMo oilfield;
- Construction and operation of oil, gas and production water pipelines connecting the EFP with the new PTC at BMo oilfield as well as the new PTG at BPO;
- Construction and operation of stage 2 of the gas compressor station 11, EMC 11;
- Construction and operation of a lease automatic custody transfer unit, ULACTION, connecting the new PTC and the Oleoductos del Valle's (OLDELVAL's) sale oil pipeline; and
- Construction and operation of an oil pipeline connecting new PTC and new ULACTION.

The BPO Field Development Plan projected by VOG is presented in Annex 2.3.

2.6 Employment and Labour

It is worth mentioning that the Vista Oil & Gas as well as the Aleph Project Management Team and technical staff has been one of the pioneer teams working on first Vaca Muerta projects (Loma Campana, La Amarga Chica, El Orejano). Over 700 wells have been developed by this team in Vaca Muerta, 90% of total Vaca Muerta wells. Including lead operational deployments of first Vaca Muerta joint ventures: Chevron, Petronas, Dow, Shell, and Schlumberger.

The team developed the first unconventional factory outside the US. It has already experienced the initial Vaca Muerta learning curve, and has a strong continuous improvement culture.

Tables N° 2.2 and 2.3 below, show the projected direct and indirect employment variation expected by VOG and AM for the implementation of the Project.

According to this information, VOG expects to increase its current staff in 10.4%, this is 24 new employees, while AM considers growing its staff in 22.2%, this is 50 new employees. Regarding indirect employment, it has been considered that the construction phase of the upstream portion of the Project will employ 378 contractor's persons, while the midstream portion of the Project will require of 680 contractor's employees.

Table 2-2 Vista Oil & Gas Projected Direct and Indirect Employment

Vista Oil & Gas				
	Current Direct Employment	Projected Direct Employment by the 5th year of operations	Total Projected Direct Employment by the 5th year of operations	Projected Indirect Employment - Construction Phase
Managerial	47	4	51	54
Professional/Technical	184	20	204	97
Unskilled Labor	0	0	0	227
Total	231	24	255	378

Source: Vista.

Table 2-3 Aleph Midstream Projected Direct and Indirect Employment

Aleph Midstream				
	Current Direct Employment	Projected Direct Employment by the 5th year of operations	Total Projected Direct Employment by the 5th year of operations	Projected Indirect Employment - Construction Phase
Managerial	22	0	22	30
Professional/Technical	188	50	238	600
Unskilled Labor	15	0	15	50
Total	225	50	275	680

Source: Vista.

2.7 Project Alternatives

The process for determining the location of each of the facilities composing the Project is implemented attending the following three principal variables:

- *Needs and restrictions for subsoil resource development (oil&gas):* multiple aspects intervene in the analysis of this variable such as the conditions of the objective reservoirs and the availability and capacities of the drilling, completion, stimulation and testing services. In addition, drilling and completion activities being conducted in the proximities of the proposed location may originate interferences in the subsoil that are to be avoided and that results in the implementation of strategies for availability of distant locations in order to program operations minimizing the risks associated to those interferences;
- *Interferences due to existing facilities:* own and/or third party current existing installations provide conditions and/or restrains at the time of defining the final location of a facility; and
- *Environmental sensibility of the area and potential impact zones:* finally, once the two previous variables have already been cleared and the Pad location is proposed, a detailed analysis of the environmental sensitivity of the proposed location for the facility is conducted. This evaluation is systematized and integrated in the execution of environmental and social impact assessment for each of the stages of the proposed facility as required per the local regulations.

An integrated and interdisciplinary analysis of these three variables results in a technically feasible, economically possible, and environmentally and social compatible location for the evaluated facility.

According to local applicable regulations, there is no need for evaluating different project alternatives, in particular for those minor projects requiring only an environmental assessment for its licensing. On the other hand, the low sensitivity of the area where the development of unconventional oil and gas production Project is to be placed, does not deserve to evaluate alternatives for the location of minor facilities.

However, medium to large facilities are required for developing environmental impact assessment (EIA) in order to obtain its license, including a justification supporting the selected project's alternative. In the case of the Project, the current evaluated facility that required to elaborate an EIA was the construction and operation of a 12" oil pipeline connecting the battery at BMO oilfield and the PTC present at EL area. The following paragraphs justify the alternative selected for the route of this pipeline.

From an **environmental** point of view, the advantages of the selected alternative include:

- *Lower Impacted Area*: the selected alternative will minimize impacts from land clearance for the future 12" oil pipeline. Taking into account the good conditions of the existing right of way, it will only be necessary to conditionate them, reducing the impacts associated with land clearance for the construction of the right of way of the pipeline;
- *Lower Consumption of Materials and Services*: the minimization of soil movement and clearing will result in reducing the necessary amount of arid as well as the associated light and heavy duty vehicles movement. This will result in a lower consumption of fuels and lubricants and the consequent reduction of emission of greenhouse gases and particulate matter;
- *Minimization of Habitats Alteration*: affection of native flora and fauna habitats will be reduced given the reduction of clearing activities, vehicles and machinery movement, and consequently, the reduction of particulate and noise emissions; and
- *Lower Contingency Risks*: risk for environmental contingency (leaks and/or spills of fluids from vehicles, dispersion of solid wastes, etc.) occurrence will be reduced.

From a **technic-economical** point of view, the following relevant factors can be mentioned:

- The route of the oil pipeline is oriented in straight line from the header of the pipeline at BMO's Battery 1 to the PTC at EL area, which means the minimum possible length and the reduction of impacts associated to construction, operation and abandonment of the pipeline;
- The current right of way for the existing pipelines is in good transitivity conditions allowing easy access to work fronts; and
- All the special crossings, both natural and anthropic (pipes, internal or local roads, routes, etc.), are already identified, evaluated and monitored.

From a **safety** point of view, the following aspects are noted:

- Given the good transitivity conditions of the existing right of way and the easy access to the work fronts, in case of a contingency, the evacuation of injured people and/or the arrival of necessary resources will be facilitated;
- When minimizing the construction of a new right of way, the exposure to risks associated to these activities will be reduced;
- The knowledge and experience of the lookout working at the existing right of way will result in an optimization of the use of this resource given that they will monitor both pipelines simultaneously, minimizing their exposure to risks associated to these activities.

2.8 Project Utilities

2.8.1 Water Supply

Fresh water to be used at the Project includes both surface water and groundwater.

A total amount of 776,200 m³ of surface water supply from Río Neuquén at the Añelo municipal loading facility was approved by the SRH through a “Gathering Permit” (“Permiso de Captación”) for the drilling and completion of production wells. However, only 4,300 m³ of water was abstracted, transported by cistern truck to the Water Management Facility (CGA) and used for the drilling of the first four wells. VOG does not foresee to continue abstracting water from the Río Neuquén at the Añelo municipal loading facility given the risks associated with water transportation from this loading facility to the CGA.

Fresh water used for the completion of the first four wells, was obtained from Cruz de la Lorena (CdL) Reservoir, operated by *O&G Developments S.A (Shell)* and transported to the CGA by means of a temporary pipeline. This operation has been authorized by the SRH through a second “Gathering Permit” of 200,000m³.

Water to be used for wells fracking will be stored in ten 5,000-m³ reinforced concrete or steel sheets ponds which will be connected with storage tanks/ponds at the Water Management Facility (CGA) by 8” to 10” portable aqueducts. At CGA, also flow back water is treated to reduce fresh water consumption.

Lastly, groundwater will also be obtained from water production well YPF.Nq.BMo-4 located at BMo oilfield. VOG has also been authorized by SRH to extract up to 800 m³/day of water for industrial use, from said reconverted water production well called YPF.NqnBMo-4.

2.8.2 Power Supply

Power will be supplied to the Project through electrical installations linked to the 13.2 kV network of the EL area. Power at EL is obtained from two main sources: external, with connection to the line of Centennial AT - Medanito (132 kV); and internal, from its own generation by means of gas-fired generators at the EL power generation plant (PMG).

Power for the drilling and completion rigs, and associated camps, is generated by their own diesel-fired portable generators.

The Project also considers the construction and operation of a PMG at BMo oilfield as well as a 33 kV network for feeding surface facilities.

2.9 Current Activities

Current activities developed by VOG at Entre Lomas (EL) and Bajada del Palo (BP) areas include exploratory and production wells drilling, construction, operation and maintenance of pipelines, aqueducts, treatment facilities, injection plants, pumping and compression stations, and storage facilities.

2.9.1 Bajada del Palo (BP)

As mentioned before, VOG operates the following oilfields located at BP area:

- Aguada del Poncho (APo);
- Bajada del Palo (BP);
- Borde Montuoso (BMo);
- Borde Montuoso Norte (BMoN);
- Jagüel de los Rosauros (JdR);

- Jagüel Norte (JN);
- Médano de la Mora (MdM);
- Médano de la Mora Este (MdME);
- Puesto Opazo (POp); and
- Puesto sin Nombre (PSN).

BP is composed of three oil fields and three loading bays. The water plants operated in the BP area are as follow:

- Fresh Water Production Plant (PTAD).
- Saltwater Injection Plant (PIAS) in Battery 1 BMo.
- Saltwater Injection Pilot Plant for Secondary Recovery (PIAS- RS Pilot).

Regarding BP operations, fluids from the BMo deposit are produced daily, which are dehydrated and sent to the dispatch tanks from where are pumped through a 38.5 km pipeline to the PTC at EL. The fluids produced by the BP deposit have two components. The first corresponds to the production of wells that join to the Early Production Facility 1 (EPF 1) and are then pumped through a 6 km long pipeline to NODE 1 of the Battery 1 BMo - PTC EL oil pipeline. The other component corresponds to the fluids that join the loading dock, which are transported in trucks and unloaded in the Battery 6 PB or in the Battery 2 PB.

The gas produced in the Battery 1 BMo is sent to the circuit of the Compressor Station (EMC-8) and later taken to a dehydration process. On the other hand, the gas coming from wells that produce in high pressure go directly to the dehydration stage, together with the gas coming from the EMC-8. Once dehydrated, the gas is injected into the BMo – Tratayén gas pipeline owned by Pampa Energía.

On the other hand, the gas produced in the Battery 1 BP enters the Compressor Station (EMC-9), from where it is compressed from low to high pressure. As in Battery 1 BMo, the gas coming from wells producing high pressure goes directly to the dehydration stage. Once dehydrated, the gas is sent to the Gas Treatment Plant (PTG) at EL.

Both the BMo and BP operations are powered with electricity supplied by the EL 13.2 Kv network, and with telemetry data with visualization from the central office.

In relation to the development of unconventional oil and gas production at BPO, current activities include the following facilities:

- 4 oil and gas production wells located at PAD 2;
- Early Production Facility 1 (EPF 1);
- Gathering lines connecting PAD 2 and EPF 1;
- Oil, gas and production water pipelines connecting EPF 1 and Battery 1 BMo, and
- Aqueduct Cruz de Lorena (CdL) – Médano de la Mora (MdM).

Oil, gas and production water extracted at wells PEL.Nq.MdM-1013(h), 1014(h), 1015(h) and 1016(h) are conducted through a pipeline to the EPF 1, where they are separated and pumped separately through oil, gas and production water pipelines to Battery 1 at BMo block where they are treated and managed as described above.

PAD 1, 3 and 4 have already been constructed, and surface and intermediate sections of wells PEL.Nq.MdM-1025(h), 1026(h), 1027(h) and 1028(h) at PAD 3 have been drilled and are waiting for the drilling rig in order to be completed.

2.9.2 *Entre Lomas (EL)*

As previously commented, VOG operates at EL area, which extension covers the Provinces of Neuquén and Río Negro.

The portion of EL located at Province of Neuquén comprises six deposits:

- Entre Lomas (EL);
- Lomas de Ocampo (LO);
- Borde Mocho (BoMo);
- Los Alamos (LA);
- El Caracol (EC); and
- Piedras Blancas (PB-NQN).

The portion of EL area located at Province of Rio Negro includes three main deposits:

- Charco Bayo (CB);
- La Pista (LP); and
- Piedras Blancas (PB-RN).

EL area has a Crude Treatment Plant (PTC) and 18 oil fields. Its Gas Complex is constituted by the Gas Treatment Plant, the Compressor Stations and the Gas sales points. The Gas Treatment Plant (PTG) is located in the EL area, and consists of two processes: Dew Point Conditioning Plant (HRU) and Liquefied Petroleum Gas Separation Plant (LPG). The gas production of the different deposits is directed to the Compression Stations, called EMC, which are distributed within the EL, BP and Agua Amarga (AA) areas.

LPG Plant includes the separation of Propane, Butane and Gasoline, through the process of Refrigerated Absorption, with the use of a liquid absorbent. The gas separated from the oil in oil fields together with the free gas produced from rising wells is sent to the Compressor Stations. In units EMC-1, 2, 3, 4, 5, 7 and 9 the gas is compressed, dehydrated and sent to the Gas Treatment Plant. Compression Stations EMC-1, 2, 3 also have a sweetening process for the removal of sulphur compounds from gas, a process carried out in solid-bed towers. The compressed gas in EMC-8 is subsequently dehydrated and injected to the gas pipeline at the Gas Point of Sale PM-200. The compressed and dehydrated gas in the Jarilla Quemada Conditioning Plant, in which the EMC-10 is located, is injected into a gas pipeline for sale at the Jarilla Quemada Field at the Gas Point of Sale PM-530.

One Effluent Treatment Plant (PTE) and six water plants are operated in the EL:

- Saltwater Treatment Plant (PTAS)
- Saltwater Injection Plant (PIAS)
- Plant of Transfer of Fresh Water PTAD / PB-CB)
- Charco Bayo Freshwater Injection Plant (PIAD / CB)
- Fresh Water Injection Plant Entre Lomas (PIAD / EL)
- El Caracol Fresh Water Injection Plant (PIAD / EC).

EL is supplied with electricity from two sources: external with connection to the line of Centennial AT - Medanito (132 kV); and internal, from its own generation.

The EL distribution system consists of 16 gas discharge pipelines from oil fields to moto-compressor stations. The pipeline network of the area is composed of 19 oil pipelines. It also has fresh water and saltwater aqueducts.

EL has a central camp and offices installed 10 km to the west of National Route No. 151, at Km 89. They also include the central camp and the contractors' facilities affected by the operation.

2.9.3 Vista Activities

Currently, VOG is the responsible for both upstream and midstream activities conducted at EL and BP areas, including the construction, operation and maintenance of oil and gas production facilities as well as oil and gas wells drilling, and operation and maintenance of assets up to the collector of the well pad (i.e. wells and wells pad). VOG personnel do not directly execute activities but specialized third party companies are contracted for it. VOG staff plans, manages and supervises proper execution of daily activities.

2.9.4 Contractors Activities

Contractors activities currently being executed as part of the Project are related to existing access roads conditioning and stabilization, new access roads construction, PAD construction, wells drilling, geological control of the wells, dry location and solids control, tubing, cementation, under-balance, trepans, injection, transportation of solids and liquids, effluents treatment at the PAD, wells logging, puncturing, rig-less, fracking/stimulation, cargo and personnel transportation, surface facilities detail engineering, procurement, construction, operation and maintenance, among other.

The main third parties to be contracted for developing the above-mentioned activities are included as part of Table N° 2.4.

Table 2-4 Main VOG and/or AM Contractors

CONTRACTOR	USER	SERVICE PROVIDED
ALLIED HORIZONTAL WIRELINE SERVICES S.R.L	VOG	Wireline services
ARENAS ARGENTINAS DEL PARANA S.A.	VOG	Sand provision
BAKER HUGHES ARGENTINA S.R.L	VOG	Logging services
BOLLAND Y CIA. S.A.	VOG	Deep pump disarm
CAMERON ARGENTINA S.A.I.C.	VOG	Drilling elements and equipment provision
CHAMPION TECHNOLOGIES DE ARGENTINA S.R.L	VOG + AM	Chemical products
CIA ADMIN. MERC.MAYORISTA ELECTRO S.A.	VOG + AM	Power supply
CRISTAMINE S.A.	VOG	Sand provision
DELTA ARENAS INDUSTRIALES S.A.	VOG	Sand provision
GABINO CELSO CORREA COMPANIA DE SERVICIOS	VOG + AM	Liquid cargo transportation

CONTRACTOR	USER	SERVICE PROVIDED
HALLIBURTON ARGENTINA S.R.L.	VOG	Mud services – logging services
HERNANDEZ LUIS Y HERNANDEZ HECTOR S.H.	VOG + AM	Solid cargo transportation
INDUSTRIAS JUAN F. SECCO S.A.	AM	Power generation
INGENIERIA SIMA S.A.	AM	Operation & maintenance services
INGENIERIA TERRA SA	VOG + AM	Water storage
METALMECANICA S.A.	VOG	Drilling elements and equipment provision
NABORS INTERNATIONAL ARGENTINA S.R.L	VOG	Drilling and completion services
NALCO ARGENTINA S.R.L.	VOG + AM	Chemical products
NEUVIAL S.A.	AM	Arid provision
OLEODUCTOS DEL VALLE S.A.	VOG	Oil transportation
PAMPA ENERGIA SA	VOG	Gas transportation
PECOM SERVICIOS ENERGIA S.A	AM	Operation & maintenance services
PETREVEN S.A	VOG	Drilling and completion services
POLYAR SACIF	VOG	Solids control service
QUINTANA WELLPRO S.A.	VOG	Drilling and completion services – Pulling service
REINFORCED PLASTIC S.A.	AM	ERFV pipeline provision
SAN ANTONIO INTERNACIONAL S.A.	VOG	Completion service
SAN MARCOS TRADING S.A.	VOG	Sand provision
SCHLUMBERGER ARGENTINA S.A.	VOG	Drilling service
SERVICIOS ESPECIALES SAN ANTONIO S.A.	VOG	Well services
SIDERCA S.A.I.C.	VOG	Tubing and casing provision
SWACO DE ARGENTINA S.A.	VOG	Drilling service
TRANSPORTES RADA TILLY S.A.	VOG	Sand transportation
TUBHIER S.A.	VOG	Tubing provision
TUBOSCOPE VETCO DE ARGENTINA S.A.	VOG	Tubing and casing inspection
VALVULAS WORCESTER DE ARGENTINA S.A.	VOG + AM	Spherical valves provision
ZILLE S.R.L.	AM	Engineering and pipelines construction services

Source: Vista.

2.10 Proposed Activities

As previously mentioned, Project's proposed activities include drilling and completion of 110 wells at BPO as well as the construction, installation, operation and maintenance of midstream facilities to gather, process and transport unconventional oil & gas production from BPO. Additionally, some of the existing facilities (i.e. PTC, PTG, etc.) at EL area are to be revamped in order to support the production from BPO.

2.10.1 Upstream

The objective of the upstream portion of the Project is to drill, complete and exploits 110 oil and gas unconventional production wells at Vaca Muerta formation.

Environmental impact assessments (EIA) for 48 of these 110 wells have been submitted to the Environmental Authority of the Province of Neuquén, and have been properly authorized and licensed. The remaining 62 wells are to be licensed as long as the drilling program progresses.

4 of these 110 wells, PEL.Nq.MdM-1013(h), 1014(h), 1015(h) and 1016(h), have already been already drilled and completed at PAD 2, and are currently operative. Additionally, another 4 wells, PEL.Nq.MdM-1025(h), 1026(h), 1027(h) and 1028(h), have their surface and intermediate sections of wells already drilled and are waiting for the drilling rig in order to be completed. These wells form part of PAD 3.

PADs for 24 of the 110 wells have already been constructed (PADs 1, 2, 3, 4, 5 and 6) considering that a total of 4 wells will be installed in each PAD. However, the following 24 licensed wells will be installed at 6-wells PADs. Construction of the remaining PADs will advance as long as the drilling program progresses.

Three main stages have been considered for the development of wells drilling:

- Construction;
- Operation and maintenance; and
- Abandonment.

2.10.1.1 Construction

Construction stage is divided into the following three sub-stages:

- Preparation;
- Drilling;
- Completion; and
- Abandonment.

2.10.1.2 Preparation

This sub-stage basically consists of conditioning and stabilizing existing access roads to the PAD, construction of new access road to the PAD and construction of the PAD itself.

Main activities considered for the conditioning and stabilizing existing access roads to the PAD as well as construction of new access road to the PAD are:

- Cleaning, shrub removal, vegetable soil removal and leveling;
- Outline and grading;

- Soil movement;
- Arid transportation; and
- Backfilling and compaction.

Main activities to be carried out as part of the construction of the PAD are:

- Cleaning, shrub removal, vegetable soil removal and leveling;
- Outline and grading;
- Soil movement;
- Arid transportation;
- Backfilling and compactation
- Installation of moorings;
- Construction of the burning pit;
- Installation of the camp and other facilities; and
- Construction of the cellar.

The PAD's surface will vary between 18,400 m² (160 m x 115 m) and 22,400 m² (160 m x 140 m areas) for PADs including 4 wells and 25,200 m² (180 m x 140 m) for PADs including 6 wells. It has been considered the construction of nine 4-wells PADs, twelve 6-wells PADs and one 2-wells PAD. This last PAD will be used for well design tests.

Each PAD will house camp, parking, materials storage and logging truck totaling 2,000 m², the burning pit of approximately 200 m² (20 m x 10 m) to be located no less than 50 m down gradient from the well head.

In order to condition and stabilize existing access roads to the PAD, as well as the construction of new access road to the PAD and the PAD itself, soil movement will be implemented by using excavators, backhoes, loaders, trucks, etc.

Location of equipment, installations, camp, parking, burning pit, etc., is shown in the following sketches.

2.10.1.3 *Drilling*

Main activities to be included as part of the drilling sub-stage are:

- Mobilization of the drilling rig;
- Well drilling;
- Well logging;
- Well tubing;
- Well cementation; and
- Demobilization off the drilling rig.

According to the VOG's drilling plan, it has been estimated that the whole drilling process (drilling + completion) for each well will last for 26 days. Therefore, both drilling and completion rigs will be operating for 104 days at 4-wells PADs and for 156 at 6-wells PADs.

Oil and gas Wells drilling consists of 3 main steps: a) drilling of the surface section; b) drilling of intermediate section; and c) drilling of deep or final section. The first two steps are drilled vertically while the remaining one will be drilled horizontally.

The surface section will be drilled up to depths varying between 350 and 450 meters below well head (mbwh) using a 12 1/4" PDC trepan as well as bentonite/water drilling mud. Once reaching the mentioned depth, the well will be tubed using 9 5/8" casing and the annular space will be cemented from the surface/well head to the 350 - 450 m depth in order to protect the fresh water aquifers and provide the well with structural integrity at the time of installing the blow out preventer (BOP).

As soon as the 9 5/8" casing is placed, an 11" well head will be installed as well as a 13 5/8" x 10.000 psi BOP.

The intermediate section will be drilled using 8 3/4" PDC trepan up to depths varying between 2,100 and 3,000 mbwh and oil-based drilling mud. This section will be tubed by means of 7" casing and the annular space will be cemented from 2,100 – 3,000 m depth up to 300 m depth, this is, 50 m above the lower extreme of the 9 5/8" casing.

The last section is initially drilled vertically up to 3,100 m using a 6 1/8" trepan. At this depth, the well will be logged and after that, a cement plug will be pumped within the well, side track will be performed and will start the horizontal drilling using the same trepan as mentioned before until the final length of 5,800 m is reached. Then, the well will be tubed using a 5" tubing and the annular space will be cemented 150 m after and 150 m before the lower extreme of the 7" casing. Additionally the annular space of the whole horizontal portion of the well is cemented.

6,300 m-rotary conventional rig will be mobilized, conventionally mounted and used for drilling purposes. The rig will be oriented accordingly to the predominant winds in the area.

Drilling methodology proposed to be use is "dry location". This methodology ensures that drilling muds are not discarded but collected in metallic ponds and recycled by means of shakers, hydro cyclones (desander and desilter) and centrifugation equipment. The following equipment have been initially considering for the dry location system:

- shakers MI Swaco Mongoose PT;
- 1 mud cleaner equipment MI Swaco 212/BT4 Mongoose PT, composed by one desander 2" x 16", one desilter 16" x 4" and 2 centrifuge pumps Mission 6" x 8" x 75 HP;
- 1 Vacuum truck; and
- 1 tipper truck.

Cutting resulting from the drilling will be accumulated in 5-m³ metallic containers and periodically sent for proper treatment out of the Project and using authorized and licensed companies for both transportation and treatment.

Drilling Muds

With regards to the characteristics of the drilling muds, as previously mentioned, two types of muds will be used: i) water and bentonite-based mud; and ii) oil-based mud during.

The water/bentonite-based mud will be prepared and used when drilling the surface stage of the well. The viscosity of these muds will be of approximately 40 to 70 qt gallon and its solids percentage will monitored in order to maintain it as lower as possible. Hydrated lime will be used for flocculation of the system and a bentonite expander may be used. Additionally, detergents will be added for avoiding balling up of the tools in the well. Any solids flow back will be conducted to the shakers, where the mud will be cleaned and returned to the process.

Main chemical compounds used for the preparation of the water-based muds are listed below:

- Water – Continuous phase
- POLYPAC UL - polyanionic cellulose for control fluid loss;
- Bentonite –increase viscosity and control fluid loss;
- Potassium Chloride (KCl)– inhibitor;
- DUO VIS – xanthan gum for increasing viscosity;
- PA 10 – liquid additive for increasing penetration velocity and control fluid loss;
- Sodium Hydroxide (NaOH) – for lubrication purposes and Lubricante - Antiaccrete
- Baritine – increasing density; and
- Calcium Carbonate (CaCO₃ 150μ, 50μ, 25μ) - LPM material.

It is important mentioning that chemical substances used for the preparation of water-based mud as well as it quantities, will be finally defined by the specialized third party company contracted by VOG for providing mud services and agreed with VOG mud specialists.

The intermediate and final stages of the Wells will be drilled using oil-based muds (OBM). Essentially, this type of mud is composed by a continue oil phase and a water phase emulsified with certain chemical products. The most common ratio between oil and water is 65% - 70% gasoil and 30% - 35% water.

Main chemical compounds used for the preparation of the oil-based muds are listed below:

- Gasoil – Continuous phase
- Water – Disperse phase
- MEGAMUL – emulsifier;
- COAT ARCW – emulsifier;
- VERSAWET - increase density;
- Lime (CaO)- increase alkalinity;
- Calcium Chloride (CaCl₂) - control water activity;
- Versatrol M – control fluids loss;
- FL 44 – control fluids loss;
- VG 69 – increase viscosity;
- VERSAMOD – rheologic modifier;
- Calcium Carbonate (CaCO₃ 150μ, 50μ, 25μ) – sealing agent;
- Graphite (100μ, 400μ) – stabilizer; and
- M-I BAR – increase density.

Chemical substances used for the preparation of oil-based mud as well as it quantities, will be finally defined by the specialized third party company contracted by VOG for providing mud services and agreed with VOG mud specialists.

Cement

The cement slurry to be used for cementation purposes will be basically composed by cement, water, additives and, if needed, other chemical products.

Slurry will be prepared in a closed circuit system formed by metallic tanks where cement, additives, water and chemical products are mixed. Then, the slurry will be pumped through the annular space of the well until the whole annular space is fulfilled. It has been considered that there will be necessary to use 350 barrels of type A cement (or equivalent), 1,200 barrels of type G cement (or equivalent), and 700 m³ of water for the whole cementation of each well.

Although the amount of cement to be used during the cementation of the well was calculated considering no exceedance of slurry, in case that any exceedance exists, it will be derived to drilling treatment circuit.

Completion

Main activities to be included as part of the completion sub-stage, are as follow:

- Mobilization of the completion rig;
- Well logging;
- Casing testing;
- Well puncturing;
- Well stimulation;
- Well testing;
- Demobilization of the completion rig.

After drilling stage finalizes, hydraulic fracking equipment will be used for well stimulation.

Once the completion rig has been mobilized and installed at the PAD, a CBLVDL logging will be conducted in order to ensure the isolation between different formations at different depths, including the production reservoirs. After that, an integrity test of well is conducted and the casing is tested up to 1,000 psig.

Stimulation will be performed by means of water-based gel systems and natural and artificial support agents. Stimulation will be performed in various pumping steps each of which will require puncturing the well by means of a cannon in order to connect the well and the Vaca Muerta formation.

Once the well is punctured, an oil and gas services contractor will stimulate the well by using 1,450 m³ of fresh water for transportation of approximately 5,000 sacks of support agents per stimulation step.

After each fracking step, a bridge plug (tapón puente) is installed for the next step by means of wireline equipment. When this plug is correctly located, the following fracking step is pumped. This operation is repeated until the stimulation is finished. It is estimated that 33 fracking/stimulation steps are to be conducted at each well.

Each of the punctured stratum is essayed in order to determine the volume, composition and quality of the produced fluids as well as evaluate whether the well is to be considered for production or is to be abandoned. Additionally, it is determined if the pressure of the stratum is enough for natural flow of the production to the surface or if it will be needed to install artificial extraction systems.

Abandonment

As soon as the test of the formations, and subsequently the completion sub-stage, is finalized, the well is to be temporarily abandoned, in case the well resulted in a productive well, or definitively abandoned, in case that the well resulted in a non-productive (sterile) well.

Temporary abandonment includes demobilization of the completion rig, removal of temporary structures and equipment (camp, storage areas, burning pit, etc.), clean-up of the PAD (oil stains, rest

of cuttings, etc.), clean-up of the cellar, closure of secondary access roads to the PAD (if any), and implementation of erosion control (grading and scarification), stabilization of slopes (if applicable), and revegetation measures in order to allow the recuperation of the affected area and maintain a reduced operative area for the production, operation and maintenance stage.

In case of a sterile well, abandonment activities will include demobilization of the completion rig, removal of temporary structures and equipment (camp, storage areas, burning pit, etc.), clean-up of the PAD (oil stains, rest of cuttings, etc.), removal of the cellar, closure of secondary access roads to the PAD (if any), cementation and closure of the well (details described in section 1.10.1.3), and implementation of erosion control (grading and scarification), stabilization of slopes (if applicable), and revegetation measures in order to allow the recuperation of the affected area to its original status.

2.10.1.4 Operation and Maintenance

Once the completion stage is finalized, the production and operation of the well starts. 4" and 6" gathering pipeline will be constructed between the manhole at the PAD and the early or temporary production facility (EPF or TPF) in order to evacuate fluids produced by the well and subsequent separation and later conditioning and commercialization.

It is assumed that each well will produce approximately 875 barrels of oil per day (140 m³/day), as well as 636,000 standard cubic feet per day (18,000 Sm³/day) and 600 barrels of production water per day (100 m³/day).

During the production, operation and maintenance of the wells, periodical verification and maintenance will be provided, including well head, accessories, production tree, manhole, etc. All surface installations at the PAD will be clean and painted, in order to detect any potential leakage.

Wells operation will be in charge of VOG personnel, who will permanently monitor, through telemetry systems, operative parameters such as separator and ponds levels, well head and separator pressures, existence of leakages or spills, status of the burning pit, etc.

2.10.1.5 Abandonment

When the useful life of the well has finalized, VOG will analyse and decided whether or not the well will be abandoned. Based on the risks associated to the PAD, the production history of the well, the well's logs, the age of the well, the well's maintenance status, the well head pressure, the presence of corrosive fluids and the possibility of toxic gases emissions, it will be determined if the abandonment will be temporary or permanent (definitive).

Main activities to be developed as part of the abandonment stage are presented below:

- Dismantling and removing surface infrastructure and equipment;
- Cementation (depending on the depth of the well, the amplitude of the punctured sections as well as the characteristics of the reservoir, this is pressure, temperature, type of fluid exploited, etc., at least 2 cement plugs are to be executed) and closure (cutting the casing at a depth of 2 meters below the ground level, welding a steel cap to the casing, covering the cap with a 1-m³ concrete cube and finally backfilling the hole with soil up to ground level) of the well;
- Demolition and removal of the cellar and any other civil constructions present at the PAD;
- Grading and scarification (perpendicularly to the direction of the predominant winds) of the PAD; and
- Revegetation of the PAD.

2.10.1.6 Use of Arid

It is estimated that amounts between approximately 500 m³ and 2,600 m³ of arid will be incorporated for the construction of each PAD, as well as for improving and stabilizing the existing access to the PAD and the construction of new access roads to the PAD. It is important noting that the final quantity of arid to consume for PAD backfilling will depend on the size of the PAD, the topography of the area where the PAD is to be located, and the amount of natural soil that can be obtained from soil movement at the PAD.

Arid to be used are proposed to be obtained from authorized and licensed quarries, one of which is NEUVAL S.A. This quarry is located at Lot 2-9, Fraction C, Section XXVIII, Department of Añelo, Province of Neuquén and holds authorization from the Neuquén's Environmental Authority for arid exploitation and extraction through Disposition N° 300/16.

2.10.1.7 Water Consumption and Supply

Water will be used for the improvement and stabilization of existing access to the PAD, 600 m³, as well as for the construction of new accesses to the PAD and the PAD itself, 1,200 m³.

Drilling mud preparation as well as cementation of the different stages of the well will require an estimated amount of 700 m³ of water per well. Each fracking step will consume approximately 1,450 m³, being estimated that 33 fracking steps are to be needed per well.

Water to be used for wells fracking will be stored in ten 5,000-m³ reinforced concrete or steel sheets ponds which will be connected with the storage tanks/ponds at the PAD by 8" to 10" portable aqueducts. The water storage ponds will be placed at a 31,250-m² dedicated PAD (125 m x 250 m) known as Water Management Facility (CGA).

Fresh water to be used for the upstream portion of the Project includes both surface water and groundwater. A total amount of 776,200 m³ of surface water supply from Río Neuquén at Añelo municipal loading facility was approved by the Neuquén's Province Water Authority, Water Resources Sub-secretariat (SRH), through Disposition N° 0204/18 for the drilling and completion of production wells. However, only 4,300 m³ of water was abstracted, transported by cistern truck to the CGA and used for the drilling of the first four wells. VOG does not foresee to continue abstracting water from the Río Neuquén at the Añelo municipal loading facility given the risks associated with water transportation from this loading facility to the CGA.

Fresh water used for the completion of the first four wells, was obtained from Cruz de la Lorena (CdL) Reservoir, operated by O&G Developments S.A (Shell) and transported to the CGA by means of a temporary and portable aqueduct. This operation has been authorized by the SRH through a second "Gathering Permit" of 200,000m³.

Lastly, groundwater will be obtained from water production well YPF.Nq.BMo-4 located at BMo block. This well has been authorized by the SRH through Disposition N° 281/18 for fresh water abstraction.

Water for human consumption has been estimated in 2 – 3 liters/person/day. Potable water will be provided in 10 or 20-liters jars through cold/hot water dispenser which will be distributed as necessary in the offices and dining room-trailers forming the camp.

2.10.1.8 Wastewater

Wastewater generated during the wells drilling will include:

- Domestic wastewater (sewage);
- Oily liquid residues from the drilling process;
- Flow back water; and
- Production water.

It is estimated that 100 liters/day of sewage is generated at bathrooms, kitchen and dining room of the camp. Sewage is collected by a dedicated network and conducted to a portable sanitary wastewater treatment plant (WWTP) provided by the drilling and completion contractors as part of the rigs, for proper treatment. Treated wastewater is finally used for irrigation purposes at the area near the PAD. In case that portable WWTP cannot be provided, portable chemical toilettes bathrooms will be used. Toilettes will be periodically emptied and evacuated wastewater will be transported to external and authorized operators for proper treatment and disposal. Wastewater from kitchens and dining rooms will be collected in plastics drums or recipients and transported to external and authorized operators for proper treatment and disposal.

Oily liquid residues from the drilling process will be collected separately in metallic containers or directly into vacuum trucks and sent for proper treatment at external authorized and licensed hazardous wastes operators.

Flow back water, this is the water used at the fracking step along with production water, will be collected in metallic containers/ponds, conditioned and treated, and reused in the fracking process. When not possible, flow back water will be transported to authorized and licensed hazardous wastes operators for proper treatment. It is estimated that 15% to 40% of the total water used at each fracking step (between 217 m³ and 580 m³) will be converted in flow back water.

Production water obtained when testing the well will be collected and sent to the EPF and later to the battery 1 BMo PTAS and PIAS for injection at disposal wells (BMo 2040).

2.10.1.9 Power Supply

Power for the drilling and completion rigs, and associated camps, is generated by their own diesel-fired portable power generators.

2.10.1.10 Fuels and Lubricants

Drilling activities will consume a total of 700,000 liters of gasoil per well, 180,000 liters of which are to be used for power generation, and the remaining 520,000 liters for oil-based muds preparation. It is estimated that approximately 6,000 liters of lubricants oil are to be used during each well drilling.

For the completion of each well, it is estimated that 400,000 liters of gasoil and 1,500 liters of lubricant oil will be consumed for all purposes.

2.10.1.11 Solid Wastes

Solid wastes generated during drilling and completion of the well, include:

- Domestic wastes;
- Metallic wastes;
- Non-metallic wastes;
- Hazardous wastes;
- Drilling cuttings with water-based mud;
- Drilling cuttings with oil-based mud;
- Soil and cuttings with oil; and
- Fracking sand.

Solids wastes are to be managed according to the wastes management procedure developed as part of the integrated management system hold and implemented by VOG. Collection, transportation, treatment and/or final disposal of wastes will be contracted to third party companies duly authorized

and license by the Neuquén Province Environmental Authorities. General wastes management policy adopted by VOG is to, primarily, reduce wastes generation, recycle and reuse as much as possible, and finally to treat and final dispose of wastes.

It is estimated that 12 kg/day of biodegradable domestic solid wastes are to be generated. These wastes will be collected within metallic or plastic containers which will be temporary stored at the PAD until they are sent to the BMo's wastes storage area near Battery 1 BMo. Periodically, these residues are transported and disposed at the Añelo's municipal landfill.

10 kg/day of metallic wastes are expected to be generated during drilling and completion of each well. These residues are to be transported to the BMo's wastes storage area and later sold as metallic scrap. Components, parts, pieces, etc., from this metallic residues can be recovered and internally reused as much as possible.

Empty drums will be recycled and reused as much as possible, particularly as wastes containers. Those drums which have contained hazardous substances, will be temporarily stored at the PAD, then sent to the BMo's wastes storage area and finally transported to authorized and licensed hazardous wastes external operators for treatment.

During drilling and completion of each well, non-metallic wastes such as paper, cardboard, glasses, plastics, etc., are expected to be generated at an amount of 5 kg/day. These wastes will be collected separately within metallic or plastic containers which will be temporary stored at the PAD until they are sent to the BMo's wastes storage area for later recycle through external operators. Non-metallic wastes could also be transported and disposed at the Añelo's municipal landfill.

Hazardous wastes including solids impregnated with oil, drilling, muds, chemical products, production water, lubricants, gasoil, etc., will be collected separately within proper containers, conditioned, and temporary stored at the PAD until they are sent to the BMo's wastes storage area for later transportation to duly authorized and licensed hazardous wastes external operators.

Drilling cuttings with water-based mud are initially separated from the drilling mud at the shakers, hydro cyclones and centrifugation equipment that form part of the "dry location" system used for drilling the wells. Once separated, cutting is collected in metallic containers and transported for dehydration at a dedicated and authorized area within BMo block identified as Water-based Mud's Cutting Repository (placed at BMo 2020's) quarry. After undergoing this dehydration, cutting are sampled and analyzed for chemical parameters, and when getting authorization from the Environmental Authority of the Province of Neuquén, cutting is transported and disposed at an authorized quarry in exploitation and/or rehabilitation.

Drilling cuttings with oil-based mud are initially separated from the drilling mud at the shakers, hydro cyclones and centrifugation equipment that form part of the "dry location" system used for drilling the wells. Once separated, cutting is collected in metallic containers and transported for proper treatment at authorized and licensed hazardous wastes external operators.

Flow back sands coming from the fracking steps will be collected in metallic containers/ponds at the PAD, and transported and treated through authorized and licensed hazardous wastes external operators.

2.10.1.12 Air Emissions

Air emissions from the upstream portion of the Project will include:

- Suspended particulate matter (PM) originated at conditioning and stabilization of existing access roads to the PAD, construction of new access roads to the PAD and construction of PAD itself;
- Suspended particulate matter (PM) due to personnel and cargo transportation activities;
- Combustion gases (CO₂; CO; NO_X; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from personnel and cargo transportation activities;

- Combustion gases (CO₂; CO; NO_X; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from engines and power generators present at rigs and camps;
- Combustion gases (CO₂; CO; NO_X; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from gas burning at the burning pit;
- Gases (CO₂; CH₄; non-methane hydrocarbons, HCNM) from process vents (muds degas), and
- Gases (non-methane hydrocarbons, HCNM) from oil and/or gasoil tanks vents.

Given the fact that engines and generators present at the drilling rig run on diesel oil, it is expected that impacts on air quality to be temporary and of low intensity.

According to 2015 greenhouse gases (GHG) inventory developed by Petrolera Entre Lomas S.A., PELSA, GHG emissions generated during 2015 at EL area 264,300 tCO₂e (78,4%) while BP area generated 64,700 tCO₂e (19,2%). Emissions of CO₂ represented 70.3% of the total emissions, while CH₄ emissions represented 28.3% of total emissions and N₂O emissions represented 1.5% of the total emissions.

GHG emissions from drilling process have been ranked 7th in importance, with emissions of 7,100 tons of carbon dioxide equivalent (tCO₂e), this is 2.1% of the total emissions for 2015.

2.10.2 Midstream

Midstream portion of the Project includes the design, construction, installation, operation and maintenance of surface facilities to support the increase of non-conventional oil and gas production obtained from the 110 new wells comprising the BPO project within the Vaca Muerta shale oil formation. These facilities may include but will not be limited to gathering lines, early and/or temporary production facilities, oil, gas and/or production water pipelines, oil and/or gas treatment plants, compressor stations, etc.

As part of the Project, the following facilities were proposed to be constructed during the year 2019 and until the second half of 2020:

- Early production facility, EPF, for gathering and processing fluids driven by the new non-conventional oil and gas production wells to be installed as part of the BPO project;
- Fluids gathering line, connecting wells PADs and EPFs. It is projected that PADs will be initially connected to a main manifold which will be connected directly to the EPF;
- Oil, gas and production water pipelines connecting each new EPF and the current existing pipelines connecting EPF 1 and Battery 1 at BMo block;
- Oil pipeline connecting Battery 1 at BMo block and PTC at EL area; and
- Gas compressor station, EMC.

Although will not require significant modifications, it has been considered the revamp of the PTC at EL area in order to support oil production increase. Revamp will include:

- i. addition of 2 filters at the entrance of the PTC, 1 mass flow meter at the entrance of one of the free water knock out (FWKO), and 1 mass flow meter at the oil and water exit of each FWKO;
- ii. various pipelines (and accessories, i.e. valves) for connecting the new entrance to the PTC with filters, flow meters and FWKO, FWKO with heaters, oil overflow from TK 100 with oil storage tanks 130 and 131, and TK 101 with process pumps; and
- iii. provision and installation of plunger with greater diameters at the dispatch pumps.

In addition, it has been considered that some changes will occur at the BMo's PIAS including:

- a. provision of a transfer pump, a 320-m³ production water lung tank, two basket filters, two injections pumps (1 x 1,400 m³/day and 125 kg/cm² + 1 x 750 m³/day and 210 kg/cm²), 6" carbon steel pipeline, valves and other accessories;
- b. replacement of current 6" ERFV 1,000 psi pipeline connecting the PIAS with injection well BMo 2040 (300 meters) for a 6" ERFV 2,000 psi pipeline;
- c. conversion of production well BMo 10 and/or BMo 11 to injection wells (currently under technical evaluation) and connection of this well the PIAS through a 6" ERFV 2,000 psi pipeline of 200 meters long; and
- d. drilling and installation of new injection well BMo.(s) 3081 and its connection with the PIAS through 6" ERFV 2,000 psi pipeline of 100 meters long.

Environmental and social impact assessments (ESIA) for the following facilities have been submitted to the Environmental Authority of the Province of Neuquén, and have been properly authorized and licensed for construction and operation:

- Early production facility 1, EPF 1. It is important to note that a temporary production facility, TPF, is currently constructed and in operation, but will have to be converted to EPF;
- Fluids gathering line, connecting PADs and EPF 1. It is important to note that gathering lines connecting PAD 2 and the main manifold (which will receive lines from PAD 1 to 6) as well as the line connecting this manifold and the EPF 1 (current TPF) are already constructed and in operation;
- Oil, gas and production water pipelines connecting EPF 1 and Battery 1 at BMo block (already constructed and in operation);
- Oil pipeline connecting Battery 1 at BMo block and PTC at EL area;
- Fresh water aqueduct connecting Cruz de Lorena area and water management facility (LGA) (already constructed and in operation); and
- Compressor station 11, EMC 11 (not constructed yet). It is planned to build the first stage of this EMC.

ESIAs for the facilities to be constructed during the period 2019 – 2nd half 2020 and that have not yet been developed, are under current elaboration in order to be submitted for analysis and approval of the Environmental Authority of the Province of Neuquén, and it consequently authorization and licensing.

From 2nd half of 2020 on, the following surface facilities are projected to be included as part of the Project:

- Early production facilities, EPF. 1 new EPF have been originally considered for evacuating and initially processing fluids driven by the new non-conventional oil and gas production wells to be installed as part of the BPO project;
- Oil treatment plant, PTC, at BMo oilfield. It is planned to be built in two modules of 2,500 m³/d of oil treatment capacity;
- Gas treatment plant, PTG, at BPO block;
- Power generation plant, CT, at BMo oilfield;
- Gas pipeline connecting PTG at BPO block and CT at BMo oilfield;

- Oil, gas and production water pipelines connecting the EFP with the new PTC at BMo oilfield as well as the new PTG at BPO;
- Construction and operations of fluids gathering pipelines connecting the well's PADs with the new EPF;
- Gas compressor station 11, EMC 11. The second stage of this EMC is planned to be built.
- Oil, gas and production water pipelines connecting the new EPF and the new PTC and PTG;
- Lease automatic custody transfer unit, ULACT, connecting the new PTC and the Oleoductos del Valle's (OLDELVAL's) sale oil pipeline; and
- Oil pipeline connecting new PTC and new ULACT.

Environmental impact assessments for the surface facilities to be constructed from 2nd half 2020 will have to be submitted for analysis and approval of the Environmental Authority of the Province of Neuquén, and it consequently authorization and licensing.

Given the diversity of surface facilities considered as part of the Project, as well as the particularities of each of them, it is not intended to present an exhaustive description of the stages of the construction, operation and maintenance of the midstream portion of the Project.

Three main stages have been considered for the development of surface facilities:

- Construction and Installation;
- Operation and Maintenance; and
- Closure, Dismantling and Abandonment.

Brief and general description for each stage is presented in the following sections. In addition, in Annex 2.4 Initial Oil Production Plan, Annex 2.5 Long term: Oil Production Plan and Annex 2.6 Water Management Plan, the oil production plans and the water management plan are shown.

2.10.2.1 Construction and Installation

Two sub-stages are identified as part of the construction and installation stage:

- Construction; and
- Installation.

During the construction sub-stage, main activities to be implemented are related to those allowing the conditioning the area where the facilities will be erected. These will include clearing and cleaning of the area, leveling of the area (if needed), addition of arid (when needed), etc.

Once the area has been prepared, the installation or assembly sub-stage starts. This includes the construction, installation, assembly and testing of the different elements, equipment and systems that form part of the facility being developed.

Heavy duty equipment to be used for the construction and installation stage of the midstream portion of the Project will include retro-excavators, front loaders, bulldozers, backhoes, road rollers, cranes, tow trucks, irrigation trucks, dump trucks, concrete trucks, cargo trucks, semi-trailer truck, cistern trucks, among others.

In particular, for the construction and installation of the pipelines, pipe-bending and pipe-laying equipment will be used. For all facilities, it is planned that welding machines are to be used.

Pick-up trucks and buses will be used for personnel transportation to and from the area where the facilities are being constructed.

2.10.2.2 *Operation and Maintenance*

Two sub-stages are identified as part of the operation and maintenance stage:

- Operation; and
- Maintenance.

Depending on the type of facility, activities included in the operation sub-stage include those related to the operation and control of equipment and systems participating in the transportation or treatment of fluids (oil, gas and production water) coming from the non-conventional production wells.

Maintenance sub-stage activities are related to the periodical inspection of equipment and systems involved in the transportation or treatment of fluids from the production wells, verification of their proper operation and the implementation of corrective and/or preventive actions in order to ensure proper functioning and avoid future failures, defects, non-proper functioning, breakdown, interruption, etc.

2.10.2.3 *Closure, Dismantling and Abandonment*

Three sub-stages are identified as part of this stage:

- Closure;
- Dismantling; and
- Abandonment.

Closure starts with the definitive stoppage of equipment and installations operation. After this, AM will proceed with inertisation, de-energisation and depressurisation of process and auxiliary equipment and installations, will continue with the purging, emptying and cleaning of equipment, installations, systems, pipes, etc., and finally with the isolation of equipment and installations with the objective of avoiding the non-desired liberation or interchange of any energy or substance, including the electrical, steam, compressed air or any other auxiliary service. Once the closure finishes, AM will implement mechanisms for access control, conservation and monitoring to guarantee that equipment and installations remain in safe conditions and to prevent any non-desired event until the dismantling sub-stage starts.

Dismantling implies to disassembly, remove, recuperate and dispose, in safe conditions, of all structures, equipment, installations, materials, fluids, wastes, etc. There will be two options for removal: i) total removal; and ii) partial removal. AM will develop an inventory of equipment, installations, structures, etc., to be removed and will evaluate which of them are to be definitively removed and which will be left on site, previous adequate isolation, purge, cleaning and in safe conditions. It will also be considered any material and/or waste present at the site or generated during this sub-stage, as well as the proper strategy for its management. Dismantling sub-stage will finalize with the recuperation, sell and/or disposal of equipment, installations, structures, pipes, valves, accessories, materials, auxiliary systems, etc.

Abandonment includes leaving the site in safe conditions for the considered future use of the land. In order to do this, clean-up of the site (determine whether or not the site is contaminated, characterize potential contamination, if any, and remediate contaminated media, if any), erosion control (grading and scarification), stabilization of slopes (if applicable), and revegetation measures will be implemented in order to allow the recuperation of the affected area. Lastly, a monitoring plan would

be implemented in order to identify, control and/or mitigate risks related with structures, equipment and/or installations left on site.

2.10.2.4 Use of Arid

Although it is not expected that arid will be used for the construction of facilities such as pipelines and aqueducts, it has been considered that facilities such as compressor stations, oil treatment plant, early production facilities, among others, will require to utilize arid for its construction and/or installation.

Amount of arid to be used will depend on the type and dimensions of the facility to be constructed. For example, it has been estimated that the construction of the compressor station EMC 11 will require between 3,200 m³ and 3,300 m³ of arid. Additionally, the construction of the 12" oil pipeline connecting Battery 1 at BMo block and the PTC at EL area would require 4,500 m³ of arid for backfilling the pipeline trench. Lastly, the construction of access roads to PADs 5, 6, 7, 8, 9 and 10 from the local road as well the access road to EPF 1 from the same local road will need approximately 2,600 m³ to 2,700 m³ of arid.

Even though EPF 1 has not required to use arid for its construction due to it was located in a previously constructed PAD, the construction of this PAD required approximately 23,600 m³ of arid for its construction. Lastly, according to the ESIA's reviewed, no use of arid was considered for the construction of the oil, gas and production water pipelines connecting EPF 1 and Battery 1 at BMo block.

Arid to be used for the construction of the projected but still not constructed facilities are proposed to be obtained from authorized and licensed quarries, one of which is NEUVAL S.A. This quarry is located at Lot 2-9, Fraction C, Section XXVIII, Department of Añelo, Province of Neuquén, and holds authorization from the Neuquén's Environmental Authority for arid exploitation and extraction through Disposition N° 300/16. Another quarry to be potentially used is CANTERA OPAZO. This quarry is located at Lots 4 and 5, Fraction C, Department of Añelo, Province of Neuquén and holds Disposition N° 152/08 for exploitation and extraction of arid.

2.10.2.5 Water Consumption and Supply

Amount of fresh water to be used will depend on the type and dimensions of the facility to be constructed.

It has been estimated that the construction of the compressor station EMC 11 will require 1,000 m³ of fresh water. Additionally, the construction of the 12" oil pipeline connecting Battery 1 at BMo oilfield and the PTC at EL area would require 2,800 m³ of fresh water for the hydraulic proof of the pipelines and approximately 60 m³/day for roads and pipeline rout irrigation purposes, while it was considered that the construction of the oil, gas and production water pipelines connecting EPF 1 and Battery at BMo required between 1,900 m³ and 2,000 m³ of fresh water for conducting the pipelines hydraulic proof. Lastly, the hydraulic water proof of the fluid pipelines connecting PADs 5, 6, 7, 8, 9 and 10 with EPF 1 will use an estimated volume of approximately 150 m³ of fresh water.

Independently of the type of facility to be constructed and whether these have been or are to be constructed, fresh water was and will be obtained from water production well YPF.Nq.BMo-4 located at BMo block. This well has been duly authorized by the Neuquén's Province Water Authority, Water Resources Provincial Direction, through Disposition N° 281/18 for fresh water abstraction.

Water for human consumption has been estimated in 2 – 4 liters/person/day. Potable water will be provided in 10 or 20-liters jars through cold/hot water dispenser which will be distributed as necessary in the different work fronts.

2.10.2.6 Wastewater

Main wastewater streams generated during the construction and installation of the facilities considered by the Project will include:

- Domestic wastewater (sewage); and
- Hydraulic proof's water (only for pipelines).

Sewage is collected by a dedicated network and conducted to a portable wastewater treatment plant (WWTP) provided by BACS S.A., for proper treatment. Treated wastewater is finally used for irrigation purposes at the area near the WWTP is located. Only if needed, it has been considered to use portable chemical toilettes.

With regards to the water used for the hydraulic proof of the pipelines, once the test finalizes, water is retained within the pipes until they are start operation. At that time, water is included within the production circuit of the block and treated as production water at the saltwater treatment plant (PTAS) and later injected at saltwater injection wells through the saltwater injection plants (PIAS).

Main wastewater streams generated during the operation and maintenance of the facilities considered by the Project will include:

- Domestic wastewater (sewage);
- Industrial wastewater; and
- Production water.

Facilities where personnel are to be permanently or semi-permanently-present will be provided by BACS S.A. with portable wastewater treatment plant (WWTP) where sewage is collected and treated. Treated wastewater is finally used for irrigation purposes at areas near the facility.

Industrial wastewater generated at facilities such as the new PTC and PTG, will be conducted and treated at a saltwater treatment plant (PTAS) and later injected at disposal wells through the saltwater injection plant (PIAS) that will form part of the PTC and/or PTG.

Production water is treated at the saltwater treatment plant (PTAS) and later injected at disposal wells through the saltwater injection plant (PIAS) that will form part of the new PTC and/or PTG. Additionally, production wastewater may be also treated at PTAS and injected through PIAS present at Battery 1 BMo.

2.10.2.7 Power Supply

Power for the construction of the facilities comprising the Project will be obtained through portable diesel-fired portable generators provided by third party companies contracted for their construction and installation. For example, and just for reference, it has been estimated that gasoil to be used during the construction and installation stage of the 12" oil pipeline connecting Battery 1 at BMo block and the PTC at EL area would be of 160 m³, while the construction and installation of the compressor station EMC 11 will require 900 liters/day of gasoil.

Power for the operation and maintenance of the facilities considered for the Project, will be supplied through electrical installations linked to the 13.2 Kv network of the EL area. Power at EL is obtained from two main sources: external, with connection to the line of Centennial AT - Medanito (132 kV); and internal, from its own generation by means of gas-fired generators at the EL power generation plant. The Project also considers the construction and operation of a PMG at BMo oilfield as well as a 33 kV network for feeding surface facilities.

2.10.2.8 Solid Wastes

Solid wastes expected to be generated during construction and installation, as well as operation and maintenance drilling, include:

- Domestic wastes;

- Metallic wastes;
- Non-metallic wastes; and
- Hazardous wastes.

Solids wastes are to be managed according to the wastes management procedure developed as part of the integrated management system hold and implemented by VOG. Collection, transportation, treatment and/or final disposal of wastes will be contracted to third party companies duly authorized and license by the Neuquén Province Environmental Authorities. General wastes management policy adopted by VOG is to, primarily, reduce wastes generation, recycle and reuse as much as possible, and finally to treat and final dispose of wastes.

It is estimated that 35 to 60 kg/day of biodegradable domestic solid wastes are to be generated during construction and installation stage, while approximately 80 kg/day of biodegradable domestic solid wastes are to be generated during operation and maintenance stage. These wastes will be collected within metallic or plastic containers which will be temporary stored at the facility until they are sent to the BMo's wastes storage area near Battery 1 BMo. Periodically, these residues are transported and disposed at the Añelo's municipal landfill.

10 to 100 kg/day of metallic wastes are expected to be generated during construction and installation stage of facilities, depending of the type of facility. 5 to 50 kg/day of metallic wastes are estimated to be generated during operation and maintenance stage of facilities, depending of the type of facility. These residues are to be transported to the BMo's wastes storage area and later sold as metallic scrap. Components, parts, pieces, etc., from this metallic residues can be recovered and internally reused as much as possible.

Empty drums will be recycled and reused as much as possible, particularly as wastes containers. Those drums which have contained hazardous substances, will be temporarily stored at the facility, then sent to the BMo's wastes storage area and finally transported to authorized and licensed hazardous wastes external operators for treatment.

During the construction and installation of facilities, non-metallic wastes such as paper, cardboard, glasses, plastics, etc., are expected to be generated at an amount of 20 to 55 kg/day depending of the type of facility, while 30 kg/day of non-metallic wastes are considered to be generated as part of the operation and maintenance stage of facilities. These wastes will be collected separately within metallic or plastic containers which will be temporary stored at the facility until they are sent to the BMo's wastes storage area for later recycle through external operators. Non-metallic wastes could also be transported and disposed at the Añelo's municipal landfill.

Hazardous wastes including solids impregnated with oil, chemical products, production water, lubricants, gasoil, etc., will be collected separately within proper containers, conditioned, and temporary stored at the facility until they are sent to the BMo's wastes storage area for later transportation to duly authorized and licensed hazardous wastes external operators. 10 to 30 kg/day of hazardous wastes, depending of the type of facility, are considered to be generated during the construction and installation of facilities. In addition, 30 kg/day of hazardous wastes are considered to be generated as part of the operation and maintenance stage of facilities.

2.10.2.9 Air Emissions

Air emissions from the construction and installation of facilities comprising the Project are listed below:

- Suspended particulate matter (PM) originated at conditioning and stabilization of existing access roads to the PAD, construction of new access roads to the PAD and construction of PAD itself;
- Suspended particulate matter (PM) due to personnel and cargo transportation activities;

- Combustion gases (CO₂; CO; NO_x; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from personnel and cargo transportation activities; and
- Combustion gases (CO₂; CO; NO_x; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from portable power generators.

Air emissions from the operation and maintenance stage of the Project's facilities, comprise:

- Suspended particulate matter (PM) due to personnel and cargo transportation activities;
- Combustion gases (CO₂; CO; NO_x; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from personnel and cargo transportation activities;
- Combustion gases (CO₂; CO; NO_x; CH₄; non-methane hydrocarbons, HCNM; and SO₂) from diverse equipment operating at the facilities, such as power generators, gas compressors, torches, heaters, furnaces, power generators, etc.;
- Gases (CH₄; non-methane hydrocarbons, HCNM) from gas venting without burning;
- Gases (CH₄; non-methane hydrocarbons, HCNM) from dehydration of gas and/or glycol, scrapper and pigging; and
- Gases (non-methane hydrocarbons, HCNM) from storage tanks, ponds, etc.

It is important mentioning that most of the combustion gases emissions sources included as part of the Project will run on gas, that few sources may run on diesel oil and none is projected to run on fuel oil, it is expected that impacts generated by these emissions will be more related to alteration of air quality (ozone layer) than human health.

According to 2015 greenhouse gases (GHG) inventory developed by Petrolera Entre Lomas S.A., PELSA, GHG emissions generated during 2015 at EL area 264,300 tCO₂e (78,4%) while BP area generated 64,700 tCO₂e (19,2%). Emissions of CO₂ represented 70.3% of the total emissions, while CH₄ emissions represented 28.3% of total emissions and N₂O emissions represented 1.5% of the total emissions.

The most important sources of air emissions were the engines (for power generation and gas compression), heaters and furnaces, gas venting without burning, and gas burning. Other relevant sources of air emissions were, in order of importance, methane evaporation from storage tanks, dehydration of gas, fugitive emissions, dehydration of glycol, and finally, scrapper y pigging.

Air emissions from engines represented 59.4% of the total emissions. Of these, 64.3% corresponded to emissions from power generators and 33.5% to gas compression. Emissions from heaters and furnaces represented 13.8% of total emissions, while gas venting without burning represented 8.6% of total emissions and gas burning represented 6.9% of the total emissions.

2.10.3 Vista Activities

As mentioned before, VOG will be responsible for the upstream portion of the Project while AM will be in charge of the midstream component of the Project. Thus, VOG will be responsible for oil and gas wells drilling, and operation and maintenance of assets up to the collector of the well pad (i.e. wells and wells pad), as long as AM will be in charge of the design, construction, installation, operation and maintenance of midstream facilities to gather, process and transport VOG's oil and gas production driven by the BPO project within the Vaca Muerta shale oil formation.

It is intended that future activities will not be directly executed by AM personnel and that specialized third party companies will be hired for it. As it currently stands, AM staff will plan, manage and supervise daily activities conducted at the Project.

2.10.4 Contractors Activities

Contractors activities to be executed as part of the Project are related to existing access roads conditioning and stabilization, new access roads construction, PAD construction, wells drilling, geological control of the wells, dry location and solids control, tubing, cementation, under-balance, trepans, injection, transportation of solids and liquids, effluents treatment at the PAD, wells logging, puncturing, rig-less, fracking/stimulation, cargo and personnel transportation, surface facilities detail engineering, procurement, construction, operation and maintenance, among other.

The main third parties to be contracted for developing the above mentioned activities are pretty the same than those currently contracted and listed in section 2.9.4. It is not expected to involve a significant amount of new contractors for the implementation of the Project

2.11 Project Investigations

An ERM team worked both in Buenos Aires City and Neuquén Province from May 15 through May 21, 2019 to collect project information / data in support of the SEIA effort. The objectives of the investigations were to:

- Collect as much existing information as possible on the development of unconventional oil and gas production project in BPO;
- Collect as much existing information as possible on the environmental, social, and health and safety aspects of the Project; and
- Conduct a field trip to the Project area to become familiar with the region where BP and EL areas are located, and to validate some of the gaps identified in the previous phase and the extent of the ESIA content in those aspects related to social and labour management, including some interviews with key stakeholders.

2.12 Field Inspections and Surveys

Site-specific social data were obtained during the May 2019 field effort. ERM visited the Project area to recognize the magnitude of the Project area, confirmed social impacts and met with VOG's key representatives in order to validate some of the gaps identified in the previous phase and the extent of the ESIA content in those aspects related to social and labour management.

The site visit included some interviews with landowners, suppliers, local government authorities and external consultants hired by VOG. Semi-structured interviews were conducted in order to better understand the socio-economic and cultural environment in which the BPO project is operating and expects to expand.

The social baseline was developed through the review and analysis of secondary information from official sources, including the National Institute of Statistics and Census of Argentina, the Provincial Government of Río Negro, and the Provincial Government of Neuquén. In addition, an external factors review of Project news in media was also implemented and comprise in the analysis.

No fieldwork was conducted in order to gather primary site-specific information on environmental aspects, issues and impacts. Given that no physical or biological media was sampled, environmental baseline was elaborated based on information gathered from previous ESIA's developed at the Project area as well as the results of the environmental monitoring performed by VOG.

