

<b>Name of the Operation</b>	Integrated Management Plan for the Lujan River Basin	
<b>Country</b>	Argentina	
<b>Date of the Assessment</b>	May 2016	
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### **Executive Summary**

The project has as its object the prevention of floods, the controlled management of flows, and the moderation of the effect of flooding along the Lujan River Basin, which has recently been of greater magnitude and frequency, and as such, it seeks also to increase the resilience of the population and the environment in the face of extreme climate events. The goal is to achieve this objective by means of executing works and activities defined in the “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River”, which encompasses the counties/districts of: Campana, Chacabuco, Escobar, Exaltación de la Cruz, Gral. Rodríguez, José C. Paz, Luján, Malvinas Argentina, Mercedes, Moreno, Pilar, San Andrés de Giles, San Fernando, Suipacha and Tigre of the Province of Buenos Aires.

The execution of the anticipated structural and non-structural actions in the Integrated Management Plan of the Lujan River Basin has an estimated total cost of US\$ 313.8MM. The Province of Buenos Aires has included this project among its investment priorities, however, there are budgetary and financial restrictions. These restrictions led the PBA to divide the project into two stages (I and II).

Stage I comes close to US\$ 158.37MM. From this amount, US\$ 100 MM correspond to the DBLA loan (63%) and US\$ 58.37 MM are local counterparty resources (37%). The local counterparty will be provided by the government of the Province. At the same time, Stage II amounts to US\$ 155MM.

The borrower of this credit operation is the Province of Buenos Aires, with the Republic of Argentina as its guarantor. The budget for the environmental management during the implementation phase comes to nearly US\$ 1.2M for Stage I and a similar amount is estimated for Stage II.

The project has been divided into 8 components. Components 1, 2, 3 and 4 seek to solve the basin’s physical factors, component 5 focuses on the solution of the human factors that are affecting the basin and component 6 seeks to moderate the problem of almost immediate occurrence of the floods. Component 7 includes the aspects of strengthening, supervision and audit.

▪ **Component 1: Engineering Studies and others.**

This includes the elaboration of the executive projects and the sealed bidding documents for all the works related to the project.

▪ **Component 2: Channel flow and expansion construction**

This will allow for the improvement of the flow capacity of the Luján River, through the implementation of complementary canals, the expansion and shaping of natural channels and expansion of interface construction.

- The Santa María canal, which connects the Lujan River with the Paraná de las Palmas river, and that will have an sectional increase along its 7.1 km length.
- The channel of the Luján River, from the provincial route (PR) Nº 6 to the national route (NR) Nº 8 bridge in Pilar, which will be expanded with trapezoidal sections along 12 km.
- The channel of the Luján River, from NR Nº 8 to the railway bridge of the North Belgrano line, which will also be expanded with trapezoidal sections placed along 9.5 km.
- The improvement of the channel's capacity through an expansion of its section in: the locality of Mercedes, in the zone of Olivera and in a corresponding section to the vicinity of Lujan (15.5 km).

▪ **Component 3: Water retention and floodgate replacement works**

This will allow for the construction of temporary overflow retention areas (TORA).

- Temporary Overflow Retention Areas (TORA), in each of the following streams: Los Leones, Moyano, Leguizamón, Grande, del Oro and two on the Luján River.
- Replacement of floodgates with inflatable dams on the Luján and the Mercedes.

▪ **Component 4: Replacement and bridge expansion works**

This contemplates replacement and bridge expansion works that will allow for improving the present conditions of the runoff, unobstructing the restrictions that the river possesses and will complement the channel flow works.

15 bridges will be intervened throughout the entire basin. In general, the bridges will be augmented or replaced in function of the needs of expansion and their structural status.

▪ **Component 5: Environmental and regional planning aspects**

The demarcation of the lines of the riverbank is planned with the goal of demarcating appropriately the public domain from the private, and to determine with precision the floodable areas that will be subject to administrative or easement restrictions. This component is going to permit the generation of the necessary tools for the delimitation of the floodplain and to contribute to the strategic territorial and development plans of each municipality.

▪ **Component 6: Early Warning System**

The EWS will be integrated into Provincial Early Warning System, which is being driven by the Ministry of Infrastructure and Public Services of the province, through the Provincial Directorate of Hydro-environmental Monitoring which answers to the Office of the Subsecretary of the Water Infrastructure. The EWS implemented in the framework of the Project involves, in turn, four systems:

- System of monitoring and oversight, that will consolidate the information related to: weather and precipitation forecasts; measurement and transmission network; and the processing of the information and follow-up of extraordinary events.
- Warning and alarm system, that has as its object setting the alert level threshold of and the actions to be developed for each one of the same, giving notice to the authorities and the community.
- Communication system, that includes communication with the National Meteorological Service, the measurement and transmission network, and the organizations and actors linked to the alert and evacuation.
- Evacuation system, that involves the efficacy of the EWS operator for communicating with the spokespersons or responsible parties the eventual extreme alert; the capacities of those responsible for putting into effect the Evacuation Plan; and the knowledge that the community has about the courses of action to be followed in case of evacuation.

▪ **Component 7: Strengthening, supervision and audit**

The component includes the institutional strengthening of the intervening actors in the execution of the Project and in particular of the LRBC, through the contracting of consulting, office and computer equipment, and operational expenses. Likewise, it also comprises the contracting of the technical, social and environmental supervision of the construction and of the external audit of the Project.

▪ **Component 8: Financing Costs**

This includes the assessment expenses and the finance commission of the DBLA loan.

The “Integrated Management Plan for the Lujan River Basin” project does not yet have an approved Environmental License, however, the Province of Buenos Aires, through a consultant, has developed a detailed study of the Environmental Diagnosis of the Lujan River Basin, which is found within of the “Integrated Plan and Regulation and Sanitation Construction Project for the Lujan River” Study - File N°2406-2391/11/DIPSOH, dated August, 2015, which serves as a basis for the development of the Environmental Impact Study (EIS). In this sense, the project contemplates the elaboration of an EIS, and the attainment of the Environmental License and the establishment of an Environmental and Social Management Plan (ESMP) that takes into account, not only the results of the EIS and the Environmental conditions that are mandatory according to respective License, but also the Environmental and Social Safeguards of the CAF and the results of the consultation of the LRBC all this prior to the start of construction.

In the area of influence of the Lujan River Basin, a notable patrimonial, historical and archaeological wealth is found, likewise, a significant biological wealth. The riverine forests of the Luján River, if indeed they constitute narrow and fragmented bands, they do represent an important ecosystem for the local fauna, that with time has adapted itself to the changes in the biodiversity of the vegetation, given that even with these changes provide shelter and nesting sites for varied species of native fauna.

In accord with the environmental assessment of the Project, a negative impact is noted principally in the construction stage, which are related to movement of soils and infrastructure works, which will generate an important reduction of the vegetation neighboring the works and effects on land on the current margins of the river, a place where the natural habitat of some species of birds can be found. Likewise, due to the

generation of noise and dust and interruption of the circulation of some routes for infrastructure works, will generate nuisances for the population located in the area of direct and indirect influence.

In the Operation Stage, the impact will be positive, taking into account that the interventions planned for in the Integrated Plan will avoid or minimize the effects of the flooding on affected human settlements, supposing a positive impact on the quality of life of these populations, as well as also on their assets, services and urban infrastructure and the sector's architectural and historical heritage.

Within the construction and operation of these works, the following are considered as aspects that may give rise to critical situations:

1. In the works of channel expansion and infrastructure works (establishment of bridges, among others), there will be effects on the vegetation and private property, among other affected lots, principally in the area neighboring the works, which could generate social conflicts and/or annoyances for the population.
2. The project still does not have an Environmental Impact Study (EIS), where specific impacts are assessed and prevention, mitigation and control measures are established for the environmental impacts. This could generate some delays, in the time for their approval, given that is a requirement prior to the start of the work.
3. Even when the LRMP project has developed a study of tendencies related to climate change (precipitations, among other parameters), a substantial change in these tendencies, can cause the hypotheses adopted in the design of the project to remain outdated, as well as the provisions made in the elaboration of the studies.
4. In the Lujan River Basin there is an inadequate management of household solid waste, having been observed the accumulation of waste along its entire length, in this sense, the accumulation and its drag could condition and contribute to an overflow, rendering futile all drainage improvement works.

With the intent of guaranteeing an adequate environmental and social management of the project as well as compliance with the Environmental and Social Safeguards established by the DBLA, the Client must, to DBLA's satisfaction:

**Prior to the start of construction bidding processes**

At least 10 business days before the start of the construction bidding processes, the Client will deliver to the DBLA for the approval of the environmental and social issues:

1. The bidding documents for the contracting of the work, including the general and particular technical specifications, as well as the environmental and social ones. Likewise, the specifications related to the environmental and social supervision of the project.

2. Updated environmental and social budget, broken down per item, including provision of amounts for measures identified by the DBLA.

#### **Prior to the start of the work**

At least 15 business days before the start of the works, the Client will deliver to the DBLA:

1. The required environmental permits or licenses for the start of the work and/or work stage (approved Management Environmental Instrument, archaeological permits, water use permits, among others).
2. An Environmental and Social Plan of Action (ESPA) or Environmental and Social Management Plan (ESMP) adjusted to the work of the project, which must include: i) Environmental Management Plan; ii) Prevention, Mitigation and Control Measures; iii) Contingencies Plan; iv) Plan for the closure of the the construction phase; v) Plan for compensation due to effects of the project. vi) Citizen Participation Plan: must include participation mechanisms (under the responsibility of the Province of Buenos Aires, before) and during the construction (informative workshops and others) to the population locate in the area of influence of the project, with an emphasis in the zones where the vegetation will be affected, areas of vehicular transit and/or private lands, if applicable. Likewise, a communications strategy must be established with respect to solid waste management in the basin, that include the actors involved in the management, principally the population in the area of influence and vii) Health and Industrial Safety Plan. The ESPA must establish, as a minimum: a) schedule and frequency; b) detailed environmental and social budgets; and c) human resources and those responsible for its execution.
3. Evidence that the environmental and social supervision is operative, with an independent company, national or international, of recognized experience, with the goal of verifying the compliance of the environmental and social management measures established in the various environmental studies and administrative writs issued by the competent environmental authority (licenses, concessions, authorizations and other environmental and social permits) and the follow-up to the mitigation and/or compensation actions.
4. Evidence that the Client has included in the contract with the contractor: i) the obligation of assuming charged to its general expenses, all those that entail environmental, social and industrial safety management during the development of the project and is not made explicit in the "Environmental Budget" per items; and ii) the mechanisms for sanction of non-compliance with all the environmental, social and contractual obligations, that permit the Audit and Supervision to demand the adequate compliance with the environmental regulations, including the environmental safeguards of the DBLA and that established in the studies and other environmental management document.

#### **During the period of disbursements**

Comply with:

1. Environmental and Social Safeguards of the DBLA applicable to the Operation and the environmental regulations in effect, which the Client acknowledges.
2. In case of any eventuality, deliver to the DBLA a Corrective Actions Plan to correct or remediate damages or attend to other adverse consequences due to any cualquier eventual operational failure that may have occurred. This plan must include, as a minimum, the following: (i) the description and magnitude of the damage, environmental effect or failure; (ii) the actions proposed for its investigation, correction, remediation, mitigation of damage and other adverse consequences adversas; (iii) the assignment of responsibilities of the corrective measures to be implemented; (iv) the estimated costs for the application of corrective measures; and (v) the actions proposed for anticipating similar events in the future. This Plan can be updated as many times as necessary, as more situations to be reported present themselves.
3. Comply with the following requirements as regards reports relating to the progress of each one of the projects, in the formats which the DBLA approves to this end, having received the proposals from the Executive Entity.
  - i) Quarterly reports, in electronic format, analyzing the following: (i) the progress in the implementation of the project's Environmental and Social Action Plan (ESAP); (ii) the execution of the project's environmental and social budget; and (iii) the assignation of human resources to the environmental and social management.
  - ii) Inform when there is any significant change in the characteristics of the project or of the natural or social milieu where it will be developed and may generate new environmental and social impacts not foreseen in the assessment originally done in the EIS presented to the DBLA or augment those already anticipated. The Borrower must design and implement the management actions and measures necessary to control, mitigate and/or offset said impacts, in such way as to preserve the integrity of the communities and the ecosystems or natural resources involved.

All the reports must be delivered to the DBLA in digital format.

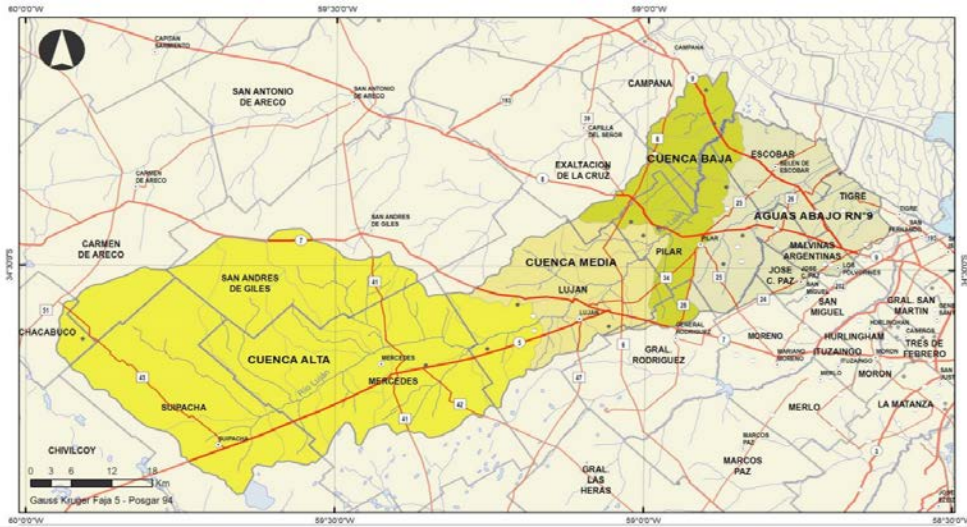
I. ***Description of the Borrower, the Executing Entity and the Operation***

The project is developed in the Lujan River Basin, the same one that occupies a total surface area of 3,379 Km<sup>2</sup> located in the counties/districts of Campana, Chacabuco, Escobar, Carmen de Areco, Exaltación de la Cruz, Gral. Rodríguez, José C. Paz, Luján, Malvinas Argentina, Mercedes, Moreno, Pilar, San Andrés de Giles, San Fernando, Suipacha and Tigre.

The Lujan River Basin is found to the northeast of the Province of Buenos Aires, and is born from the confluence of the Durazno and Los Leones streams in the county of Suipacha, presenting an axis of central flow with a southwest-northeast direction, where it twists toward a parallel southeast course to the Paraná de las Palmas, finally, the river becomes confused with the Paraná delta, until emptying into the River Plate (Río de La Plata).

In Figure 1, the location of the Lujan River Basin is presented.

**Figure N°1**



The project has as its object preventing overflows, managing flows in a controlled manner, and moderating the effect of flooding in the Lujan River Basin, which affect principally the population in the basin area, through the execution of works and activities defined in the Study for the Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River

For the development of this project, the basin has been divided into 4 sections: high, mid, and low basin and downriver of the Route No. 9, as indicated in Figure N° 1. At the same time, the components and the implementation of the project have been divided into 2 stages, as is detailed below:

### **Stage I**

This corresponds principally to the high, mid, and low basin and downriver of Route No. 9 of the Lujan River, and is divided in 6 components:

- **Component 1: Engineering Studies and others:**

Required in order to design executive projects and the sealing bid documents for the works contemplated in the project.

- **Component 2: River flow works - Channel Expansion:**

These works aim at the Improvement of Flow Capacity, and are linked to possibility of implementing complementary canals, expansion and shaping of natural channels and/or expansion of interface construction.

- **Component 3: Replacement Works and Bridge Expansions**

The expansion of the section of the channels (component 2), undoubtedly will determine that many of the the existing bridges present, for the new section of the channel, reduced dimensions. Within this component Replacement Works and Bridge Expansions which will allow for improving the current conditions of runoff, unobstructing the restrictions that the river possesses in the mid and low part of the basin.

▪ **Component 4: Environmental aspects and regional planning**

This component consists principally of the demarcation of the riverbank lines with the goal of: a) demarcating adequately the public domain from the private, and; b) determining with precision the flood zones to be subject to administrative restrictions or easements.

▪ **Component 5: Early Warning**

The proposal of the formulation of an Early Warning System (EWS) in the framework of the LRMP involves four systems: Monitoring and Oversight System, Warning and Alarm System, Communications System, and Evacuation System.

▪ **Component 6: Management, Inspection and Audit**

This includes the costs for the administration of the Project, the strengthening of the technical and environmental inspection and the contracting of the external audit.

**Stage II**

This corresponds principally to the section of the high basin of the Lujan River, and is divided in 7 components:

▪ **Component 1: River flow Works - Channel Expansion:**

These works aims at the improvement of flow capacity, and are linked to the possibility of implementing complementary canal, expansion and shaping of natural channels and/or expansion of interface construction.

▪ **Component 2: TORA Works** (Temporary Overflow Retention Areas)

This Includes the construction of TORA (Temporary Overflow Retention Areas), that must remain empty while awaiting retention of part of the volumes brought by the floods. These attenuations result more effective in the elevated zones, avoiding the accumulation of overflows in mid and low areas, and giving sufficient time so that these excesses drain away.

▪ **Component 3: Replacement Works, Expansion and Cleaning of Bridges**

The expansion of the section of the channels (component 2), undoubtedly will determine that many of the the existing bridges present, for the new section of the channel, reduced dimensions. It must also be taken into account that some bridges in the basin, currently are in a poor state of repair, manifesting the need to put into effect in the framework of the global systematization plan of the basin. Within this component Replacement, Expansion and Cleaning of Bridges Works are contemplated which will allow for improving the current runoff conditions, unobstructing the restrictions that the river possesses in the mid and low part of the basin.

▪ **Component 4: Replacement of Floodgates Works**

This concerns the reconstruction which will allow for runoff in the floods and to continue fulfilling its current recreational function.

▪ **Component 5: Startup of the LRBC** (Lujan River Basin Committee)



The objective of this component is provide the institutional capacity to face the responsibilities that the law confers on it.

▪ **Component 6: Environmental aspects and regional planning**

This component consists of:

- Continuation of the demarcation of the riverbank lines with the goal of: a) demarcating adequately the public domain from the private, and; b) determining with precision the flood zones to be subject to administrative restrictions or including easements;
- Integral revision of the master plans of the municipalities; and
- Creation of a network of protected areas at the basin level.

▪ **Component 7: Management, Inspection and Audit**

This Includes the costs for the administration of the Project, the strengthening of the technical and environmental inspection and the contracting of the external audit.

The execution of the structural and non-structural actions provided for in the Integrated Management Plan for the Lujan River Basin has a total estimated cost of USD \$313MM. For the implementation of these activities, the Provincia of Buenos Aires has divided the investment plan into two stages (I and II). Stage I comes to an amount of USD \$158MM and Stage II a total of USD \$155MM. The borrower of the project is the Province of Buenos Aires, with the the Republic of Argentina as the its guarantor.

***Description of the environmental and social characteristics***

The project “Integrated Management Plan for the Lujan River Basin” does not yet have an approved Environmental License, however, the province of Buenos Aires [la República de Argentina], through a consultant, has developed a detailed Environmental Diagnosis study of the Lujan River Basin, which is found within the the Study for “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River” - File N°2406-2391/11/DIPSOH, dated August, 2015, which serves as a basis for the development of the Environmental Impact Study (EIS). In this sense, the project contemplates the elaboration of an EIS, and the attainment of the Environmental License and the establishment of an Environmental and Social Management Plan (ESMP) that takes into account, not only the results of the EIS and the Environmental conditions that are mandatory according to respective License, but also the Environmental and Social Safeguards of the DBLA and the results of the consultation of the LRBC; all this prior to the starting of construction.

The Lujan River Basin is considered a continental wetland, understanding as such an area that remains in flooded conditions or, at least, with water saturated ground over considerable periods of time. Of the distinct ecological services linked to the wetlands, these are considered to be relevant for the region: hydrological regulation; biodiversity sanctuary; water purification; and the expression of cultural, recreational and residential values.

The basin is formed by 71 courses of water which jointly run through an extension of approximately 450

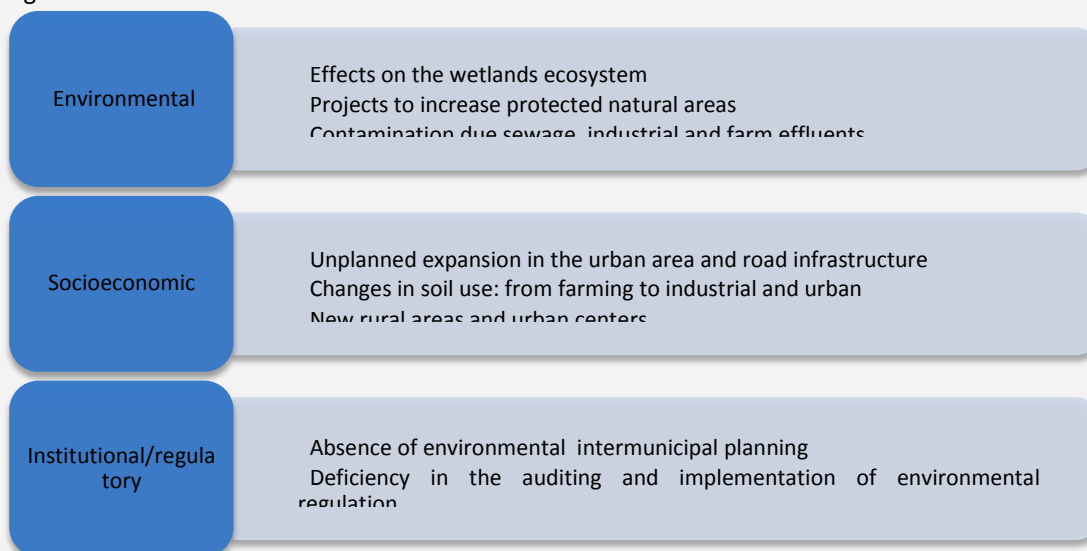
km. The principal streams (arroyos) are:

- Arroyos Durazno and Los Leones, in the district of Suipacha from whose confluence the Lujan River is born
- Arroyo Moyano in the area surrounding J.M. García
- Arroyo de los Ranchos between Suipacha and Mercedes
- Arroyos Leguizamón (or del Chimango), Grande and Oro to the north of the city of Mercedes
- Arroyo Balta to the west of the vicinity of Olivera
- Arroyo de las Acacias to the east of the vicinity of Olivera
- Arroyo del Campo to the east of the city of Luján
- Arroyos Gutiérrez, Pereyra, Chaña and El Haras in the vicinities of Villa Flandria and Luján
- Arroyo Las Flores between Open-Door and Manzanares
- Arroyo Carabassa in the vicinity of National Route N.8
- Arroyo Burgos and numerous lesser courses between the National Routes N.8 and N.9

After receiving the input from the Escobar, Garín, Claro, de las Tunas streams and from the Reconquista River and other streams on its left margin, it empties into the River Plate.

The total population of the districts involved in the basin is 2,795,648 persons, which represents 16.7% of the provincial population (16,659,931 inhabitants). The population density is 227.4 inhab/km<sup>2</sup>, which represents a value approximately 4 times greater than the population density of the Province of Buenos Aires (50.8 inhab/km<sup>2</sup>).

In the figure below the principal socio-territorial characteristics of the Lujan River Basin are brought together:



The project has an “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River” - File N°2406-2391/11/DIPSOH, dated August, 2015, which serves as a basis for the development of the Environmental Impact Study (EIS).

**Environmental Physical Factors**

**Geological System:**

The stratigraphic units that are present in the Lujan River Basin correspond to sediments from the Quaternary Period, with ages that extend from the Pleistocene until the Holocene.

Stratigraphic units of greatest antiquity than those referred to are found in the subsoil. In this case, the general stratigraphic characterization is completed with geological units of the Tertiary Age and mid Precambrian period, which do not outcrop in the study zone and only can be recognized through perforations. In the stratigraphic table in Figure N°2 is indicated the totality of the geological units in the Lujan River Basin and located in the subsoil, with their corresponding age.

Figure N°2

Período	Formaciones Continentales	Formaciones Marinas
Holoceno	Platense	Querandínense
	Lujanense	
Pleistoceno	Formación Buenos Aires	Belgranense
	Geosuelo El Tale	
	Formación Ensenada	
Plioceno Superior	Formación Puelches	
Mioceno Medio		Formación Parana
Eoceno-Mioceno	Formación Olivos	
Precámbrico Medio	Basamento Cristalino	

In the study zone and its neighboring areas are found geomorphic units of distinct order. These same ones were separated in the Regional Geomorphic Units and secondary Geomorphic Subunits.

**Regional Geomorphic Units**

They were determined starting with a Regional Survey of the Basin that allowed for obtaining a general vision of the landscape forms and their principal components. Under this analysis three geomorphic units defined were which are: Pampean Plain, Estuarine Plain and the Lujan River Valley, Figure N°3.

Figure N°3



### **Pampean Plain**

This geomorphic unit is recognized regionally with the name of *Pampa Ondulada*. This geoform constitutes a surface composed of soft slopes where the interflows that separate the principal river basins are represented by flat areas, which are considered flowing and derived from the riverine dismantlement of the Loess Plain.

### **Estuarine Plain**

It manifests as a uniform surface situated between the topographical level from 0 and 5 meters, of almost undetectable inclination toward the northeast, and over which are recognized constructional forms linked to previous environmental of shoreline accumulation of varying degrees of energy.

### **Lujan River Valley**

The channel of the Lujan River corresponds in large measure to that of a lowland river. The slope variations present along the Lujan River, the morphogenetic potential of each sector, the structural control it has, the overlap of the geomorphic processes that acted and act on the basin in its fluvial evolution, the channel's habitat, the development of its floodplain and the presence of levels of alluvial terraces, among other particularities, permits separating this river, from the geomorphological point of view, in three well-defined sections: Superior, Intermediate and Inferior, which are described below.

#### Superior Section

This extends from the headwaters of the principal trunk until approximately 5 km upstream from its intersection with route 8, configuring in this way the fraction of greatest longitudinal mayor development. In the sections without evident human modifications, the cross section of the channel goes from rectangular to trapezoidal. In these sections there are localities with instability on the edge of the canal, this situation driven by the existence of pathways toward the fluvial course generated by cattle. These manifest themselves as indentations located on both sides of the channel.

#### Intermediate Section

The intermediate section of the Lujan River begins in a site located 5 km upstream of its intersection with route 8, and continues for 2400 m downstream from its contact with the Pan-American branch route, Campana. As an outstanding feature, this section is characterized by presenting a broad floodplain, its width progressively opening up, within which the Lujan River extends itself.

#### Floodplain

This has a flat surface, with slight inclination in its longitudinal profile. During the flood event, the totality of this surface, the geoforms that are found there and the lower terrace levels situated on the sides of the valley, end up below water. If the event is of a significant magnitude, including the most elevated parts of the riverbank hillocks that are overwhelmed by the flooding.

#### **Hydrology**

The Lujan River Basin is found to the northeast of the Province of Buenos Aires, and is born from the confluence of the Durazno and Los Leones streams in the county of Suipacha, presenting an axis of central flow with a southwest-northeast direction, where it twists toward a parallel southeast course to the Paraná de las Palmas, finally, the river becomes confused with the Paraná delta, until emptying into the River Plate (Río de La Plata).

The basin occupies a total surface area of 3,379 Km<sup>2</sup> located in the counties/districts of Campana, Chacabuco, Escobar, Carmen de Areco, Exaltación de la Cruz, Gral. Rodríguez, José C. Paz, Luján, Malvinas Argentina, Mercedes, Moreno, Pilar, San Andrés de Giles, San Fernando, Suipacha and Tigre. The topography is predominantly uniform. It is defined as a sedimentary type pampean plain in the Buenos Aires sector and of an alluvial plain still in process of formation in the delta of the Paraná.

With relation to the water quality of the Lujan River, it is characterized by presenting a larger proportion of organic material in a state of decomposition, which was demonstrated in the high levels of Organic Material, Total Organic Carbon, and Sulphurs. In addition to the levels of organic content, the site housed upstream on the Lujan River was the only sector in which concentrations of total hydrocarbon and of copper were detected at levels above environmental standards.

Starting with the analysis carried out, it was possible to verify that the geomorphological units linked to the danger of flooding are those that correspond to the Floodplain and the Estuarine Plain. For both the extremely high Danger of Flooding category is considered.

The danger of flooding that these two geomorphic units show is inherent to them and the anthropogenic modifications detected (change in soil use) have favored and driven the aforementioned geological and hydrological peril. Another risk to consider are the effects related to natural phenomena, such as *El Niño* and *La Niña*, that can drive the risk of flooding already present in the area, events that are accentuated by climate change.

#### **Climate**

Within the Study for the "Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River", an analysis is included on climate change, where the influence this aspect could have on precipitation is made manifest, through climate change scenarios (which are used to estimate future changes that could be experienced in this century), taking into account the contribution of human beings

to global warming.

Through the Intergovernmental Panel on Climate Change (IPCC) emissions scenarios will be elaborated, based on suppositions about the world's possible socio-economic evolution, producing projections of GHG concentrations (Greenhouse Gases). These constitute the basis on which the majority of future climate scenarios is elaborated.

This project used information provided by the report "Climate Change in Argentina; tendencies and projections" elaborated by the Center for Sea and Atmosphere Research (CIMA, for its initials in Spanish), as a contribution to the Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) Project, from the office of the Subsecretary of the Environment and Sustainable Development of the Nation (SAyDS, for its initials in Spanish), with the object of presenting an assessment of the climate trends in the recent past (from the second half of the 20th Century) and a projection of the future climate (21st Century) in Argentina.

A large part of the general commentaries presented come from the aforementioned report.

In the case of the Province of Buenos Aires (humid region), the models selected for elaborating the climate scenarios were: CCSM4, CMCC-CM and NorESMI-M.

The climate scenarios for the 21st century were calculated on two time horizons: near future climate (2015-2039), of interest for the adaptation policies (case applicable to the design of flood control works in the current project), and distant future climate (2075-2099), that is considered informational over the long term.

Two climate scenarios, RCP 4.5 and 8.5, were elaborated. The first corresponds to moderate greenhouse gas emissions and scenario RCP8.5 to the case in which the emissions will continue to grow with the current trends until the end of the century, that is to say, the same is more conservative as regards the impacts of the greenhouse effect.

In figure N°4 the percentual change is shown in the yearly precipitation with respect to the period 1981-2005. Averages from 42 models considering an RCP8.5 scenario. The figure to the left, represents the near future (2015-2039) and the figure on the right, distant future (2075-2099). Source: CIMA (2015).

FigureN°4

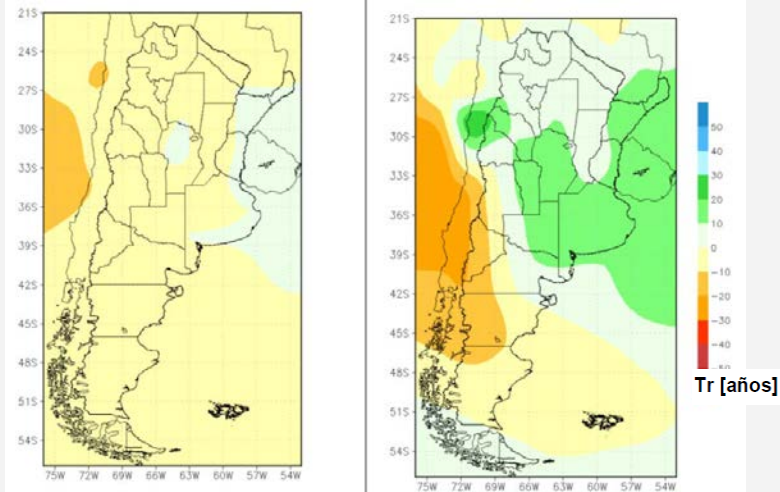
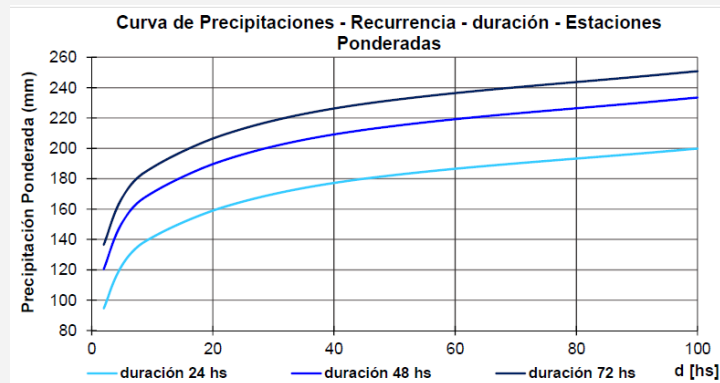


Figure N°5  
Precipitations-Recurrences-duration curve for the weighted seasons in the Lujan River Basin with climate change effects.



The indices calculated indicate that there will be a tendency for extreme precipitations to increase over time and in a more pronounced manner with the RCP8.5 scenario. For the near future, although there may also be a general tendency toward greater extreme precipitations in almost all the models and scenarios, in some cases the differences with respect to the present are almost null.

Finally, the regional warming observed between 1960 and 2010 would accelerate in the 21st century and the increase in precipitation registered in that period would not revert and on the contrary there would be a tendency toward greater extreme precipitations, although still with a certain vagueness as to the magnitude of the change; it can be concluded that the probability of flooding increases.

### **Environmental Biotic Factors**

#### **Flora**

The riverbank flora is described below, native to the Lujan River Basin, comprised of diverse vegetal communities, each very different in physiognomic terms: marginal jungle, forests, grasslands, scrubland

and vegetation on the edge of lagoons, rivers and streams.

#### **Plant communities along gullies**

In this environment, the surface drainage of rainwater is facilitated by the slope of the terrain, for which reason it constitutes the best drained environment in the area. These are forests more or less parallel to the coast, whose arboreal layer is formed by *talas* (*Celtis tala*), *coronillos* (*Scutia buxifolia*), *molles* o *inciensos* (*Schinus longifolius*), *sombras de toro* or *quebracho* (*Jodina rhombifolia*) and broad-leaf privets (*Ligustrum lucidum* y *L. sinense*), among other species. There is an abundance of climbing plants, such as angel's hair (*Clematis denticulata*), the blue passionflower o *mburucuyá* (*Passiflora coerulea*) and the epiphytes, such as the air carnation (*Tillandsia aëranthos*). The herbaceous layer is dense and continuous, and is composed by species such as basket grass (*Oplismenus hirtellus*), pellitory (*Parietaria debilis*), and *la pichoga* (*Euphorbia caespitosa*), among many others.

Also along the bottom of the gullies it is possible to find formations of Roman Cassie or *espinillos* (*Acacia caven*), also called *aromas*, that form groups within a plot of grassland.

#### **Plant communities along embankments**

The *ceibales* are forest whose arboreal layer is dominated by the cockspur coral tree of *ceibo* (*Erythrina crista-galli*), that can grow to a height of 12 m. Given that it grows in swampy areas, it tends to develop various trunks. In these forests, some bushes also grow such as the scarlet sesban or *sesbania* (*Sesbania punicea*) and climbing plants such as the bugle vine or *suspiro rosado* (*Calystegia sepium*), the Japanese honeysuckle or *madreselva* (*Lonicera japonica*), morning glory or *la campanilla* (*Ipomoea cairica*) and the Devil's Grape or *la uva del diablo* (*Cissus palmata*).

#### **Scrublands**

The scrublands tend to be dominated by one species, such as the breaks of white *sarandí* shrubs (*Phyllanthus sellowianus*), of red *sarandí* shrubs (*Cephalanthus glabratus*) or black *sarandí* shrubs (*Sebastiania schottiana*). In some cases they are mixed, such is the case of the scarlet sesbans (*Sesbania virgata* y *S. punicea*), striped hibiscus (*Hibiscus striatus*), the Argentina senna (*Senna corymbosa*), the giant sensitive tree (*Mimosa pigra*), the *espinillo manso* (*Mimosa pilulifera*) and the jointvetch or *algodonillo* (*Aeschynomene montevidensis*).

Among the bushes very often grows a profuse cover of sedges, grasses and other herbaceous plants such as the white cup or *chucho* (*Nierenbergia repens*) and the white windflower or *azukenita del campo* (*Zephyranthes candida*).

#### **Fauna**

The characteristics of the landscape shape the habitats available to the fauna and condition the use of the land. The riverbanks, which are characterized by their high biological diversity, have suffered, in the main, high levels of deterioration due to the intensive use of the river and its banks and to the exploitation of neighboring lands. In the Lujan River Basin, the expansion of urbanization and productive activities have caused a notable transformation of the natural environs, for which reason the native fauna is, in general, modified in terms of its diversity and reduced with respect to the number of individuals.



With regard to aquatic life, various species can be found along the basin, such as: suckermouth catfish, *dientudos*, catfish, silversides or *pejerreyes lacustres*, shad, chameleon cichlid or *chanchita*, mojarras, wolf fish or *tarariras*, eels, and one-sided livebearer or *madrecitas*. The amphibians are one of the most damaged groups by the alterations in the environment, however diverse species of frogs and toads can be found, representing the group. Among the reptiles there are river and lagoon turtles, the green lizards and black and white tegu and various species of lizards and snakes. The mammals are represented by the cavies, the nutria or *coipo*, the red and the black and white weasel, the ferret, the skunk and various species of voles or *lauchas*.

Finally in the area of study more than 180 bird species have been recognized, with the majority common species that inhabit urbanized areas, but also many of the aquatic environments and open grassland areas.

### Threatened species

Among the principal species that present some degree of threat, are found:

- *Brycon orbignyanus* (Pirá pitá, or river salmon) - Species categorized as Endangered.
- *Zungaro jahu* (*Manguruyu*) - Species categorized as Vulnerable.
- *Tomodon ocellatus* - Species categorized as Vulnerable.
- *Ceratophrys ornata* - Species categorized as Vulnerable.
- *Porzana spiloptera* - Chilean flamingo.
- Marsh seedeater - In danger of extinction.

### Natural Reserves:

in the area of influence of the Lujan River Basin 12 natural reserves were identified, however, the project does not propose any structural intervention in these. In Table N°1 the reserves located in the area of influence are listed.

Table N°1

Basin Section	Name
High Basin	1. Natural Reserve Arroyo Balta
	2. Urban Reserve Quinta Cigordia
Cuenca Baja	3. National Reserve Otamendi
	4. Natural Reserve Del Pilar (urban)
	5. Private Reserve Náutico Escobar Country Club
	6. Private Reserve El Talar de Belén
	7. Private Reserve Lalo Mandojana
	8. Reserve Guillermo Gibelli
	9. Municipal Reserve of the Biosphere
	10. Multiuse Prov. Reserve of the Lujan River
	11. Biosphere Reserve (BR)
	12. Delta of the Paraná

In the Master Plan the creation of the Protected Areas Network was defined as a non-structural measure of territorial and environmental management measure at the basin level, an action that would permit strengthening links with the civil society, for whose organizations the conservation of biological diversity occupies a leading place in their management. The existence of reserves in the basin, some closely related to the river, is a value to be elevated with the goal of enriching the environmental value of the basin, facilitating spaces for environmental education and recreational activities, as well as also ensuring its biological diversity.

The project's area of influence is found in a zone with altered habitats due to the change in soil use, principally due to urban expansion in the areas neighboring the basin, agricultural, industrial and residential activities, for which reason the biological diversity in the zone has been affected. It is worth noting that in the area of influence there are 12 natural reserves, where the majority of the biodiversity in the Lujan river Basin is found. With respect to the project, part of the nearby plant cover will be affected, principally where the structural components are to be established (channel expansion, bridges, among other). Within the reserves no structural activities are planned.

### ***Social, economic and cultural factors***

#### **Population status**

The total population of the districts involved in the Lujan River Basin is 2,407,449 personas, which represents 15.4% of the provincial population (15,625,084 inhabitants). The largest number of inhabitants is concentrated in the urban areas of the municipalities in the lower basin and the downriver section. The population density of the districts involved in the basin is 227.4 inhab/km<sup>2</sup>, which represents a value approximately 4 times higher than the population density of the Province of Buenos Aires (50.8 inhab/km<sup>2</sup>).

#### **Housing situation**

in Table N°2 , the percentage of urban and rural dwellings is presented (grouped and disperse). Within the Basin, it can be observed that the extremes are represented by the High Basin and the Downriver Section under R9, where 18% of the dwellings are rural in the first case and only 0.5% in the second case.

Table N°2

<b>Partido</b>	<b>Urbano (%)</b>	<b>Rural (%)</b>	<b>Total</b>
Cuenca Alta	81,9	18,1	100%
Cuenca Media	94,8	5,2	100%
Cuenca Baja	94,6	5,4	100%
Aguas Debajo de R9	99,5	0,5	100%
Total	97,2	2,8	100%

#### **Poverty levels**

In the first measure, the Unmet Basic Needs (UBN) indicator is considered in the households in the basin. A

household is considered as having UBN if at least one of the following indicators is present:

- Critical overcrowding. Homes housing more than three persons per room.
- Housing. Homes occupying an unsuitable type of residence (rented rooms, precarious housing or other kind).
- Sanitary Conditions. Homes occupying housing that do not have indoor plumbing or have a latrine.
- School attendance. Homes that have a school age child that does not attend school.
- Capacity for subsistence. Homes that have 4 or more persons per member employed and in which the head of household has a low level of education (only attended at least two years of primary school).

11.4% of the households in the basin have at least one of the UBN indicators. This is a proportion greater than that of the Province of Buenos Aires, which is 8.2%. The districts that possess a greater proportion of households with UBN in relation to the totality of households in each district are: Moreno (16.6%), Campana (15.6%), Pilar (13.0%), Malvinas Argentinas (12.8%) and José C. Paz (12.4%). Notwithstanding, this, the districts that contribute the greater proportion of households with UBN in the Basin (in relation to the total households with UBN in the Basin), in order, are: Pilar (23.6%), Malvinas Argentinas (19.6%), Escobar and José C. Paz (both at 15.3%). When taking into account the distribution of households with UBN according to the section of the Basin, it is observable that approximately 82% of the households with UBN in the Basin are found in the Downriver section. This is due to the fact that in this section where the majority of the population is found.

#### **Soil Uses**

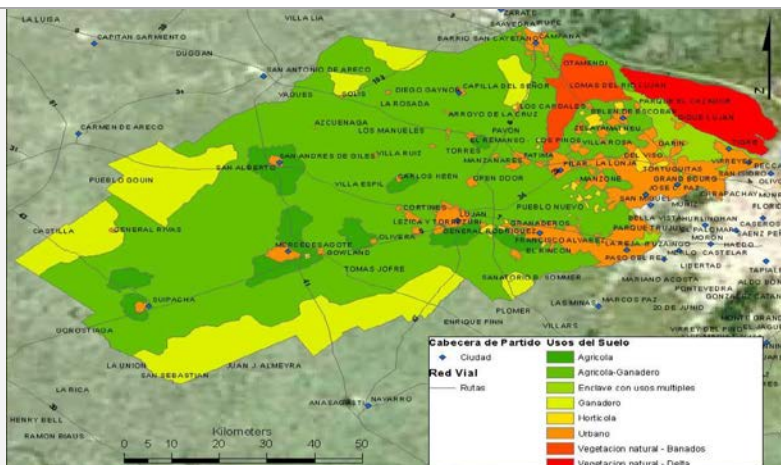
The districts of the Lower and Mid Basin, such as Luján, Pilar, General Rodríguez and Campana present a mixed composition between farm and industrial activities and an urban dynamic. Especially in the municipal seats of Pilar, Luján and Campana where the majority of the population is concentrated.

On the other hand, the districts in the Downriver section under R9, such as Escobar, Tigre Moreno, Malvinas Argentinas and José C. Paz have an eminently urban dynamic. They possess greater population density and a socioeconomic dynamic more closely associated with the Metropolitan Region of Buenos Aires (Greater Buenos Aires and its Urban Agglomeration). Below is presented a regional characterization of the territorial aspects and land uses at the Basin level as a whole. Among the uses to be considered are:

- Housing developments (exclusive, gated and suburban)
- Farm and industrial uses
- Roadways

The principal activity that is developed within the Lujan River Basin is agriculture. As can be observed in Figure N°6, the most extensive category of land use is mixed use for farming and livestock. The next in importance livestock raising, and then farm use. Horticultural, urban and natural vegetation are also identified, principally in the zone of the Paraná Delta islands in the mouth of the river.

Figure N°6



### Cultural Heritage

The Lujan River Basin presents a notable historical cultural, archaeological and paleontological wealth, which is threatened by human pressures in general and the expansion of the urban ventures in particular (given that they tend to be placed in spaces unmodified by prior human activity).

Two protected areas have been identified which register archaeological and paleontological heritage sites.

- In the Estricta Otamendi Nature Reserve, located in Campana, seven archaeological sites have been detected: Canal Grande, Otamendi 1, Otamendi 2, Otamendi 3, Otamendi 4, Río Luján 1 and Río Luján 2 (Loponte, 2008).
- In the Arroyo Balta Nature Reserve, in the district of Mercedes, abundant fossil remains have been recovered (Bonaparte et al 2011).

The greatest environmental sensitivity, with respect to the cultural milieu, is represented by the historical, archaeological and paleontological heritage wealth in the Lujan River Basin. In this sense, any work that contemplates or has as a consequence the alteration of the sedimentary matrix of the gullies and/or bed of the principal channel or of the tributary streams, as well as of the geforms associated with the fluvial action (ravines, levees), presents, a priori, an elevated potential for impact on the cultural heritage.

Likewise, the population neighboring the basin, where the structural works will be done, will become more vulnerable to impacts generated by the project, principally due to dust, noise, temporary roadblocks, among others.

### Institutional and Organizational Aspects

The Executive Entity will be the Ministry of Economy of the Province of Buenos Aires, through the Subsecretary of Finance. The Ministry of Infrastructure of the Province of Buenos Aires, will be the entity responsible for the implementation and tracking of the Project. It is worth noting that the Province of Buenos Aires (PBA) has ample experience in the execution of projects and programs financed with resources from multilateral organizations.

An important actor in the management of the Basin, is the Lujan River Basin Committee (LRBC), that has

been implemented with file PE/1/16-17, May 19th, 2016, whose principal functions are: formulate policies, strategic guidelines, plans, programs and projects, in matters of sustainable development of economic and social activities that involve natural resources and health within the scope of the Basin. In this sense, the project contemplates the strengthening of the LRBC, as an important part of the development of the project.

#### ***Assessment of environmental and social impacts and risks***

In accord with the environmental assessment of the Project, negative impacts are seen principally in the construction stage, which are related to earthmoving and infrastructure works, which will generate an important reduction of vegetation neighboring the basin and effects in land along the riverbanks, which serve as habitats for some bird species. Likewise, due to noise and dust and roadblocks in some routes for infrastructure works, there may be inconvenience and annoyances for the population located in the project's area of influence.

In the Operation Stage, the final impact is principally positive, considering that the planned interventions in the Integrated Plan will avoid and/or minimize the effects of flooding on the affected human settlements, the very ones that will suppose a positive impact of greater magnitude on the quality of life of the populations affected by the flooding, as well as on the goods, services and urban infrastructure and architectural and historical heritage of the sector potentially affected by floods.

An important risk to consider are the effects of climate change, which can affect the project and its environs. In this sense, the project has elaborated climate scenarios, through mathematical models, including the same ones within design of the components of the project, with the goal of preventing, mitigating and controlling the effects of climate change.

#### ***Impacts of the project on the physical component***

##### **Soil:**

The actions which will be carried out during the construction stage for the execution of this project consist principally of initial earthmoving, excavation and removal of plant cover. The impacts that can be foreseen are related to effects on the flora and the fauna of the areas neighboring the basin, inconveniences for the population due to particulate matter and/or noise and generation of solid waste and waste material, as a result of the excavations.

The principal activities that generate effects on soil resources are:

- Earth extraction
- Self and contracted transport to the work site
- Washing of machinery
- Potential fuel spills

A potential source of effects on soil could be caused by the management and disposal of liquid and solid waste, to which must be added accidental fuel spills.

**Air:**

Among the environmental aspects that will cause effects on air quality, can be found: emission of exhaust fumes, generation of particulate matter and noise. These changes will be of a temporary nature and due principally to exhaust fumes from vehicles and equipment, vehicular traffic, earthmoving, transport, loading and unloading of materials.

These activities will result in a temporary change in air quality in the project sector and its surroundings, and the roads used for transportation.

**Water:**

The impact on water resources is registered in a concentrated manner due to diverse tasks consistent with the construction stage, arising principally from dust and earth as a result of the movement of vehicles and equipment, which would lead to an increase in suspended solids and turbidity in shallow waters. Likewise, due to effluents caused by washing machinery and vehicles and the solid waste generated in the work.

Another potential source of contamination in the physical components are possible accidents or accidental spills during the storage and transport of fuels, both on the part of the construction company as well as on the part of subcontractors or contractors.

***Impacts of the project on the biotic component*****Flora**

The loss of plant cover and earth will be produced principally during earthmoving tasks and excavation. The landscape will be modified by the execution of the work, principally due to the installation of equipment, earthmoving, gathering of materials and circulation of heavy machinery.

**Fauna**

Human presence, machinery and noise associated with the construction activities will cause the temporary abandonment by some bird species of the zone. The alteration of habitat produced by the elimination of plant cover will cause changes in the ecosystem that could principally affect the birds.

***Impacts of the project on the socioeconomic component***

The construction stage is where the greatest social impact social of the project will be exercised, principally due to the movement of trucks, machinery, equipment, excavations and earthmoving, which will generate noise, dust and vibrations that may occasion some temporary inconveniences for the populations in the immediate vicinity of the Lujan River Basin.

The project foresees effects on plots located in the areas neighboring the Lujan River Basin, for which reason compensation measures and/or relocation have been considered, within the project's environmental and social management plan.

***Impacts of the project on the institutional and organizational component***

The project will have a positive impact on the strengthening of the Lujan River Basin Committee (LRBC), that

that has been implemented by file PE/1/16-17, May 19th, 2016, whose principal functions are: formulate policies, strategic guidelines, plans, programs and projects, in matters concerning sustainable development of the economic and social activities that involve natural resources and health in the environs of the Basin. In this sense, the project contemplates the strengthening of the LRBC, as an important part of the development of the project.

#### ***Environmental and Social Management of the Operation***

The “Integrated Management Plan for the Lujan River Basin” project does not yet have an approved Environmental License; however, the Province of the Republic of Argentina, through a consultant, has developed a detailed study of the Environmental Diagnosis of the Lujan River Basin, which is found within of the “Integrated Plan and Regulation and Sanitation Construction Project for the Lujan River” Study - File N°2406-2391/11/DIPSOH, dated August, 2015, which serves as a basis for the development of the Environmental Impact Study (EIS). In this sense, the project contemplates the management of an EIS, prior to the start of the works.

#### ***Preventive, mitigating and/or corrective measures***

A brief summary is presented below of the principal environmental measures proposed in the “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River” and in the Project Profile, presented to the CAF:

- Management Program for residues, emissions and effluents
- Emergency Prevention and Contingency Plan Program
- Safety and Hygiene Plan Tracking Program
- Program for the Environmental Control of the Work
- Environmental Monitoring Program
- Community Communications Program
- Measures for the Separation, Conservation and Repositioning of Topsoil
- Measures for the Control of Disposal of Solid and Liquid Effluents
- Measures for the Dust Control
- Measures for the Control of Gas Emissions

#### ***Citizen Participation Mechanisms and communications strategy***

Within the approval process of the Environmental Impact Study (EIS), consultation and citizen participation mechanisms must be included, in accord with the current regulations, principally through the LRBC. Likewise, in the “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River”, it is indicated in a general manner, that a process of citizen participation and consultations will be done with the involved actors in the project’s area of influence, which has as its object maintaining a good relationship with the population of the project’s area of influence and avoid social conflicts.

#### ***Principal Risks and Critical Aspects***

#### ***Principal Risks and Critical Aspects***

The following are considered as aspects and/or risks that can give rise to critical situations:

- In the expansion works of the basin and infrastructure works (establishment of bridges, among others), there will be effects on vegetation and soils, principally in the zone neighboring the basin, which could generate conflicts or inconveniences for the population.
- There will be a reduction in plant cover, principally due to the expansion of the channel, generating a diminishment in the habitats of some species that inhabit the area of influence of the Lujan River Basin.
- In the Lujan River Basin there is an inadequate management of household solid waste on the part of the population located in the area of influence, being observed an accumulation of residues along the basin, in this sense, this accumulation could create the conditions for and contribute to an overflow.
- The project does not yet have an Environmental Impact Study, for which reason the periods required for the elaboration and approval can take more time than planned.
- Although the PRML project has been developed including the current trends related to climate change, it does cease to be a risk the fact that a substantial change in these can cause the adopted hypotheses end up outdated, as well as the provisions that have been taken in the elaboration of the studies.

***Principal environmental and social opportunities***

Among the environmental and social opportunities identified, these can be mentioned:

- Support in the elaboration of a project for the ideal use of the biomass for generating energy.

***Environmental and Social Measures established by the CAF***

Among the measures established by the CAF are:

- Compensation Plan due to effects of the project (property, vegetation, among others)
- Citizen Participation Plan: this must include citizen participation mechanisms and before during construction (informational workshops or others) for the population located in the project’s area of influence, with an emphasis on the zones where the vegetation will be affected, areas with vehicular transit and/or private plots as applicable. Likewise, it must establish a communications strategy with respect the solid waste management in the basin, that includes the actors involved in this management, principally the population in the area of influence.
- The executive entity must provide a detailed environmental budget, in which all the environmental and social activities included in the Project are shown.

***Environmental and Social Budget***

***STAGE I***

COMPONENTS	SOURCES (USD \$)		TOTAL
	CAF Financing	Local Contribution	



1. Engineering Studies and others	1.665.000	1.665.000	3.330.000	2,10%
2. River flow works - channel expansion	82.820.000	46.900.000	129.720.000	81,91%
3. Replacement works and bridge expansion	11.040.000	6.210.000	17.250.000	10,89%
4. Environmental aspects and regional planning	600.000	600.000	1.200.000	0,76%
5. Early Warning System	1.000.000	1.000.000	2.000.000	1,26%
6. Strengthening, supervision and audit	2.000.000	2.000.000	4.000.000	2,53%
7. Financing Costs	875.000	-	875.000	0,55%
<b>TOTAL</b>	<b>100.000.000</b>	<b>58.375.000</b>	<b>158.375.000</b>	<b>100,00%</b>

## STAGE II

COMPONENTE	DESCRIPCION	TOTAL USD		TOTAL PROGRAMA USD
		Financiamiento	Aporte Local	
1	Obras de Conducción - Ampliación de Cauce	USD 48.048.266	USD 14.174.239	USD 62.222.505
2	Obras ARTEH	USD 37.033.413	USD 10.924.857	USD 47.958.270
3	Obras de Reemplazo , Ampliación y Limpieza de Puentes	USD 4.158.527	USD 1.226.766	USD 5.385.293
4	Obras de Reemplazo de Compuertas	USD 10.347.953	USD 3.052.646	USD 13.400.599
5	Puesta en marcha del COMILU	USD 2.059.202	USD 607.465	USD 2.666.667
6	Aspectos Ambientales y de Ordenamiento del Territorio	USD 17.194.337	USD 5.072.329	USD 22.266.667
7	Gestión, Inspección y Auditoría	USD 1.158.301	USD 341.699	USD 1.500.000
<b>TOTAL USD</b>		<b>USD 120.000.000</b>	<b>USD 35.400.000</b>	<b>USD 155.400.000</b>

### *Environmental and Social Viability of the Operation*

In accord with the assessment done starting with the documentary and field information, carried out from the 9th to the 13th of May, 2016, it is considered that the operation is viable from the environmental and social point of view.

Especialmente si, como es el caso, el LRBC se constituirá, una vez fortalecido, en una entidad de toma de decisiones equitativa para las futuras inversiones en el marco del LRMP. En efecto, dado que el LRMP es un Plan a largo plazo y dado que mientras se construyen las obras y se capacitan a los individuos e instituciones, las prioridades pueden sufrir cambios, es el LRBC el llamado a definir el camino adelante.

En este sentido, con el objetivo de no comprometer la viabilidad ambiental y social del proyecto, debe: (i) Elaborar un Estudio de Impacto Ambiental (EIA) que incluya programas de gestión que permitan prevenir, mitigar y controlar los impactos negativos y promover los positivos; (ii) Implementar el conjunto de condiciones ambientales y sociales establecidas por el CAF en el presente informe; (iii) Implementar la gestión

specific environmental and social plans for the works, including the associated costs; (iii) Comply with the current environmental and social regulations of the Republic of Argentina, as well as with the Environmental and Social Safeguards established by the CAF.

As regards the EIS, it is estimated that given the magnitude of the problem, how onerous the LRMP and the changing needs of the populations which, additionally, will go on acquiring knowledge and developing skills that tend to improve its conditions in the face of floods, perhaps the most practical option is to elaborate an EIS for the LRMP and then, as the LRMP undergoes its implementation, the works can be specified and detailed to the OPDS (Provincial Organization for Sustainable Development) of the Province of Buenos Aires, and this office, after analyzing case by case, may grant, case by case as well, the definitive construction permit.

<b>Environmental and Social Safeguards</b>				
<b>No.</b>	<b>Aspect</b>	<b>Complies</b>		<b>Observations (*)</b>
		<b>Yes</b>	<b>No</b>	
i.	<i>Legislación nacional</i>	X		<ul style="list-style-type: none"> <li>- Law N° 25.675 and Decree N° 2.413/2002 (General of the Environment) Establishes the minimum budgets for achieving a sustainable and adequate management of the environment, the preservation and protection of biological diversity and the implementation of sustainable development.</li> <li>- Law 25916 and Decree 1158/04 Management of Household Waste</li> <li>- Law 25612 Management of Industrial Waste</li> <li>- Law 24051 and Decree 831/93 Management of Hazardous Waste</li> </ul>
ii.	<i>Assessment of impacts, risks and environmental and social opportunities</i>	X		<p>The "Integrated Management Plan for the Lujan River Basin" project does not yet have an approved Environmental License, however, the Province of Buenos Aires, through a consultant, has developed a detailed study of the Environmental Diagnosis of the Lujan River Basin, which is found within of the "Integrated Plan and Regulation and Sanitation Construction Project for the Lujan River" Study - File N°2406-2391/11/DIPSOH, dated August, 2015, which serves as a basis for the development of the Environmental Impact Study (EIS). In this sense, the project contemplates the elaboration of an EIS, and the attainment of the Environmental License and the establishment of an Environmental and Social Management Plan (ESMP) that takes into account, not only the results of the EIS and the Environmental conditions that are mandatory according to respective License, but also the Environmental and Social Safeguards of the CAF and the results of the consultation of the LRBC; all this prior to the start of construction.</p>
iii.	<i>Management measures and environmental and social budget</i>	X		<p>Include an environmental budget that must adjusted and detailed in function of the activities required for the fulfillment of the Environmental Impact Study (EIS), the regulations and the recommendations of the CAF.</p>
iv.	<i>Institutional strengthening, human resources training and information</i>	X		<p>The Province of Buenos Aires (PBA) has ample experience in the execution of projects and programs financed with resources from multilateral organizations. An important actor in the management of the Basin, is the Lujan River Basin Committee (LRBC), that has been implemented with file PE/1/16-17, May 19th, 2016, whose principal functions are: formulate policies, strategic guidelines, plans, programs</p>

				<i>and projects, in matters of sustainable development of economic and social activities that involve natural resources and health within the scope of the Basin. In this sense, the project contemplates the strengthening of the LRBC, within component N°6, Management of the Project.</i>
v.	<i>Conservation of water resources.</i>	x		<i>General guidelines are established for the prevention, mitigation and control of impacts on water resources, however, the same must be detailed in the Environmental Impact Study in the Environmental and Social Plan of Action (ESPA), of the CAF, prior to the start of the work.</i>
vi.	<i>Nature Parks and protected natural areas</i>	x		<i>In the basin there are nature parks, however, the current project does not plan for structural works in nature parks and/or protected natural areas.</i>
vii.	<i>Prevention of disaster risks</i>	x		<i>Within component N°5 of the project an Early Warning System (EWS) is included, with the goal of monitoring the Lujan River Basin, for early warning in the case of an extreme climate event that may cause a flood.</i>
viii.	<i>Pollution Prevention</i>	x		<i>General guidelines are established for the prevention, mitigation and control of environmental impacts, however, these must be detailed in the Environmental Impact Study and the Environmental and Social Plan of Action (ESPA), of the CAF, prior to the start of the work.</i>
ix.	<i>Cultural Heritage in the region</i>	x		<i>The project has as its principal object avoiding floods, which will aid in the conservation of the architectural and historical heritage in the zones neighboring the Lujan River Basin that at present suffer damage due to the floods. The works do not expect effects on cultural heritage.</i>
x.	<i>Ethnic groups and cultural diversity</i>	x		<i>Effects on ethnic groups and/or cultural diversity have not been identified.</i>
xi.	<i>Community participation and development</i>	x		<i>In the “Integrated Plan and Project of Regulation and Sanitation Works on the Lujan River”, it is indicated, in a general manner, that a consultation and participation process will be carried out with the actors involved in the project’s area of influence. Likewise, in the approval process for the Environmental Impact Study, citizen participation mechanisms must be included, where the characteristics of the projects and their impacts are communicated. Additionally, in the conditions of the CAF, a Citizen Participation Plan is requested, prior to the start of the work, with the goal of ensuring a good relationship with the population in the project’s area of influence.</i>
xii.	<i>Involuntary Resettlement and/or Relocation</i>	x		<i>As a consequence of regional planning and the definitions of riverbanks, together with the flood spots, the need to expropriate and resettle will arise. In this sense, a compensation plan has been requested as conditions by the CAF, prior to the start of the work.</i>
xiii.	<i>Child Protection</i>	x		<i>The legislation concerning work in Argentina prohibits child labor.</i>

xiv.	Gender Equality	x	<p><i>There is no evidence of any risk related to non-compliance with this safeguard.</i></p> <p><i>National Decree 254/98 - Equality of opportunities among men and women in the working world.</i></p> <p><i>Law 26.743 - Law of Gender Identity</i></p> <p><i>Decree 936/2011 - Integrated Protection of Women</i></p> <p><i>Convention on the elimination of all forms of discrimination against women Ratification, or adhesion, by the General Assembly in its resolution 34/180, on the 18th of December, 1979</i></p>
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*Note: (\*) In case of total or partial non-compliance, at the moment of the assessment, one must mark the “NO” column and as such, in the observations column, the measures to revert this situation must be established, measures that must be reflected in Section X. Plan of action. Environmental and social conditions for the financing.*

*When the condition does not present itself, in observations it must be reported that there is no risk and no (YES/NO) column should be marked.*

**Plan of action. Environmental and social conditions for the financing**

With the purpose of guaranteeing an adequate environmental and social management for the project; as well as compliance with the Environmental and Social Safeguards established by the CAF, the Client must, to the satisfaction of the CAF, fulfill the following commitments:

**Prior to the start of the construction bidding processes:**

At least 10 business days before the start of the construction bidding process, the Client will deliver to the CAF:

1. The bidding documents for the contracting of the work, including the general and particular technical specifications as well as the environmental and social ones. Likewise, the specifications related to the environmental and social supervision of the project.
2. Updated environmental and social budget, broken down per item, including provision of amounts for the measures identified by the CAF.

**Prior to the start of the work**

At least 15 business days before the start of works, the Client will deliver to the CAF:

1. The environmental permits or licenses required for the start of work or work stage (approved Environmental Management Instrument, archaeological permits, water use permits, among others).
2. A Environmental and Social Plan of Action (ESPA) or Environmental and Social Management Plan (ESMP) adjusted to the project’s work, in which there must be included: **i)** Environmental Management Plan; **ii)** Prevention, Mitigation and Control Measures; **iii)** Contingencies Plan; **iv)** Plan for the closing of the construction phase; **v)** Compensation Plan for effects of the project; **vi)** Citizen

Participation Plan: must include participation mechanisms under the responsibility of the Province of Buenos Aires, before and during the construction such as information workshops, for the population located in the project's area of influence, with an emphasis on the zones where the vegetation will be affected, vehicle transit areas or private plots, if applicable. Likewise, communications strategy must be established with respect to solid waste management in the basin, that includes the actors involved in the management, principally the population in the area of influence; and **vii)** Industrial Safety and Workplace Health Plan. The ESPA must establish, at a minimum: **a)** schedule and frequency; **b)** detailed environmental and social budgets; and **c)** human resources and those responsible for their execution.

3. Evidence that the environmental and social supervision is operational, with an independent company, national or international, of recognized experience, with the goal of verifying compliance with the environmental and social management measures established in the various environmental studies and administrative writs issued by the competent environmental authority (licenses, concessions, authorizations and other environmental and social permits) and the tracking of mitigation and/or compensation actions.
4. Evidence that the Client has included in the contract with the contractor: **i)** the obligation of assuming with a charge to their general expenses, all those costs that entail environmental, social and industrial safety management during the project development and that is not made explicit in the "Environmental Budget" in line items; and **ii)** the mechanisms for sanctioning non-compliance with all the environmental, social and contractual obligations, that allow the Audit and Supervision Entity to demand the proper compliance with the environmental regulations, including the environmental safeguards of the CAF and that which is established in the studies and other environmental management documents.

#### **During the period of disbursements**

Ensure compliance of:

1. The Environmental and Social Safeguards of the CAF, applicable to the Operation and the environmental regulations in force, which the Client affirms knowing.
2. In the case of any eventuality, present to the CAF a Plan of Corrective Actions in order to repair or remediate damages or attend to other adverse consequences due to any operational failure that may have occurred. This plan must include, at a minimum, the following: (i) the description and magnitude of the damage, environmental effect or failure; (ii) the actions proposed for its investigation, correction, remediation, mitigation of damage and other adverse consequences; (iii) the assignation of responsibilities for the corrective measures to be implemented; (iv) the estimated costs for the application of corrective measures; and (v) the actions proposed for anticipating similar events in the future. The Plan can be updated as many times as necessary, as reportable situations present themselves.
3. Comply with the following requirements as regards reports related to the progress of each one of the projects, in the formats which the CAF has approved to that effect, having received the proposals

from the Executive Entity.

4. Quarterly reports, in electronic format, analyzing the following: (i) the progress in the implementation of the project's Environmental and Social Plan of Action (ESPA); (ii) the execution of the project's environmental and social budget; y (iii) the assignation of human resources to the environmental and social management.
5. Report when there is any significant change in the characteristics of the project or of the natural or social milieu where it will be developed and that may generate new environmental and social impacts unexpected in the assessment originally done in the EIS presented to the CAF or activate those already expected. The Borrower must design and implement the management actions and measures necessary for controlling, mitigating and/or compensating said impacts, in such a way that the integrity of the communities and the ecosystems or natural resources involved are preserved.

All reports must be delivered to the CAF in digital format.