

**Environmental Feasibility Study  
Railway Bridge over Arroyo Canelón  
Grande**

**August 2017**



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## 1. Introduction

### 1.1. Objective and scope

The objective of this report is to determine the environmental feasibility of the new railway bridge over the stream called arroyo Canelón Grande.

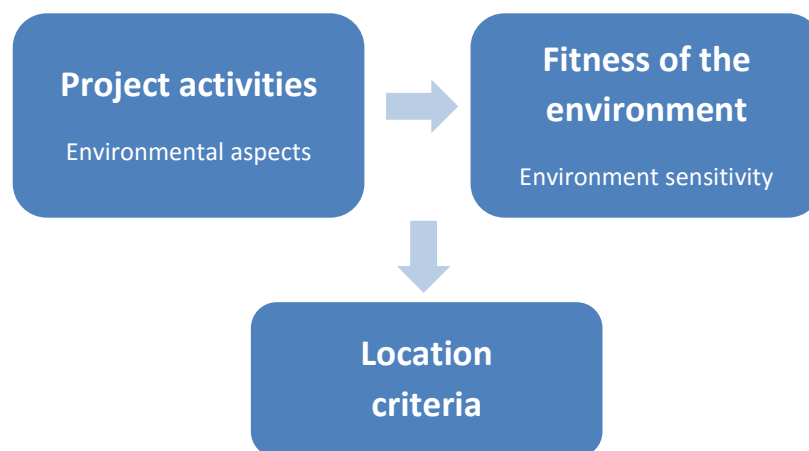
This report focuses on the evaluation of the legal restrictions (protected areas, land use planning, emission standards, etc.) and the restrictions imposed by the biotic environment: flora, fauna and existing watercourses, among others.

The conceptual framework is the analysis of restrictions to the location and requirements related to environmental permits as well as primary studies required for the accurate assessment of environmental quality and vulnerability.

### 1.2. Methodology

Environmental criteria for location will be established considering the interaction of the environmental aspects of the activity to be assessed and the aptitude of the surrounding environment, not from the point of view of the project requirements, but from the point of view of the environment. This seeks to answer two questions: “What is possible?” and “To what extent is it possible?”

**Figure 1–1 Definition of location criteria to be assessed**



In order to assess environmental criteria, it is necessary to know the activities generating impact, and therefore the environmental aspects arising from them, and the environmental quality and vulnerability, among other issues.

The information on environmental quality and vulnerability will be collected from secondary sources suggesting the environmental factors that should be assessed with primary information. The activities generating impact and environmental aspects arising from them will be assessed from the experience of the consultant team in similar projects.

On the basis of the assessment of these criteria, the restrictions imposed by the regulations in force and the sensitivity of the environment will be established. Sensitivity will be classified as low, medium-low, medium, medium-high and high, based on the deviation from the project objective in its different stages, thus reaching a conclusion about the environmental feasibility of the project at the proposed site.

Below is a set of environmental criteria to be assessed, indicating the objective to be achieved by the project in order to be considered feasible with no need for specific mitigation measures from an environmental point of view.

**Chart 1–1 Environmental criteria and objectives to be achieved**

	<b>Criteria</b>	<b>Objective</b>
<b>Legal</b>	Protected areas in the National System of Protected Areas (SNAP)	Located outside
	Management plans for adjoining protected areas within the SNAP	That the development of the project is consistent with the provisions of these plans
	Potential of entering the SNAP in the period 2015-2020	Low Class 3 or higher
	Other protected areas proposed	Outside protected areas proposed
	Environmental permits	Category A for DINAMA
<b>Sensitivity of the environment</b>	Sensitivity of the biotic environment (flora and fauna)	Low sensitivity and that the project does not significantly affect the biotic environment
	Sensitivity of the human environment	Low sensitivity and that the project does not significantly affect the archaeological heritage

## 2. Environmental feasibility

### 2.1. Project to be assessed

The project to be assessed is the replacement of a suspended metal railway bridge by a concrete bridge that will have three spans with two pillars of 1 m in diameter separated from 20 to 30 cm, in this case requiring the intervention in the watercourse for foundations.

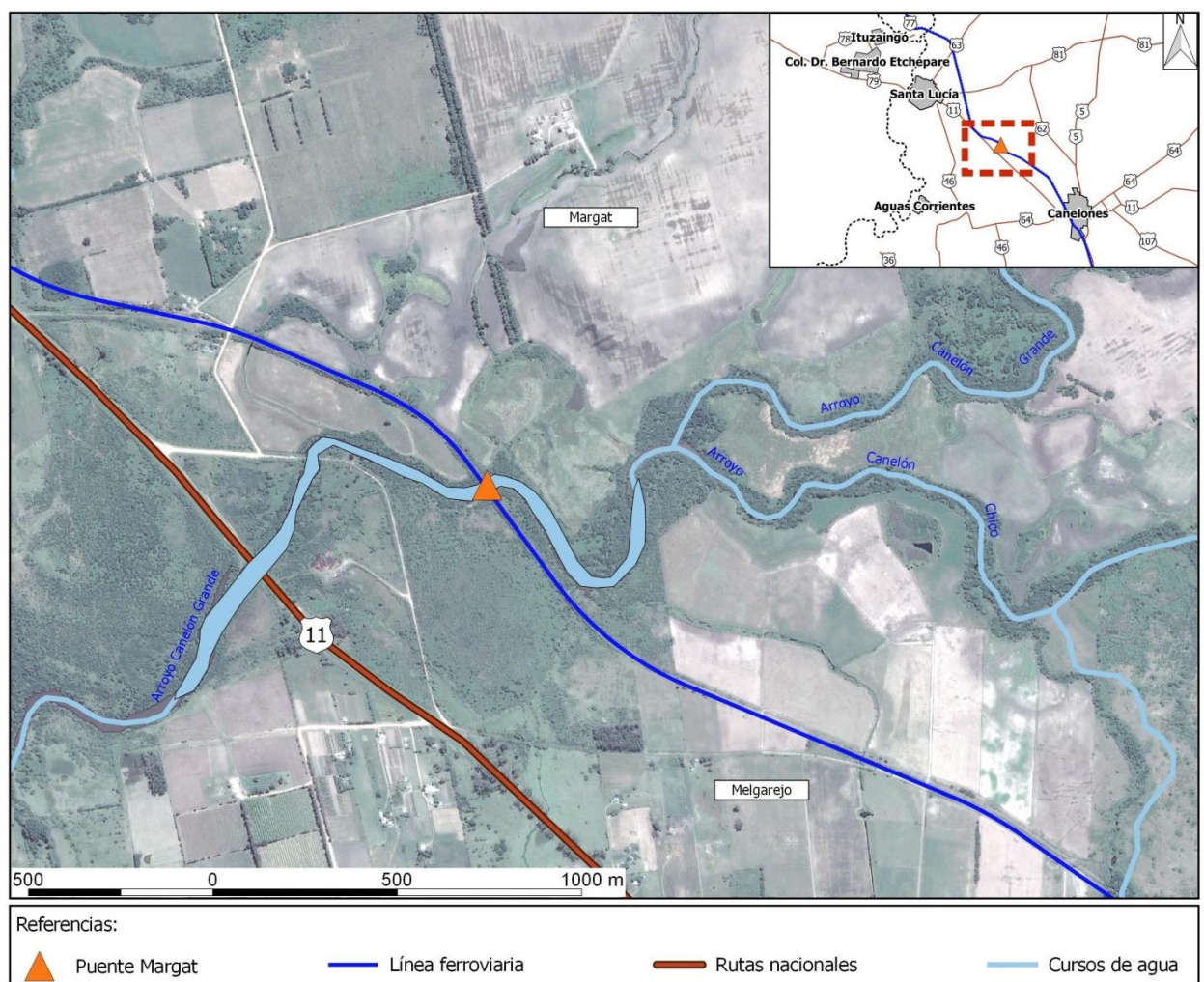
The project activities that will be taken into account to assess the environmental feasibility will be:

- Removal of vegetation and felling of native forest for the construction of the bridge.
- Interventions in the watercourse (cofferdams, foundations, etc.).
- Soil movement.

### 2.2. Location

The bridge is located at km 50,283 on the railway Montevideo - Rivera, on Arroyo Canelón Grande, in the department of Canelones.

Figure 2–1 Project location



### 2.3. Assessment of legal criteria

In this point we will consider the environmental laws referring to the study area analyzing their contents to evaluate any restrictions that may be imposed on the project.

Following is a summary of the regulations related to the project.

**Chart 2–1 Summary of legal restrictions on the area of the Margat bridge**

Reference	Comment
Decree 55/015	Entry of the Santa Lucía River Wetlands to the National System of Protected Areas
Protected Area François Margat	Protected area proposed in the framework of the Land Use Management Plan and the Departmental System of Protected Areas
IBA UY 012	The protected area Santa Lucía River Wetlands is also part of an important bird area (IBA) designated by Bird Life International in 2008.
Strategic Plan for 2015-2020 for the National System of Protected Areas	Grid K27, where the project is located, is Class 2, priority to be entered in the SNAP in the period of the plan.
Plan of Water Resources for the Santa Lucía River Basin	Arroyo Canelón Grande is part of the Santa Lucía river basin, to which Measure 8 is applied.
Ministerial Resolution 229/2015 of the Ministry of Housing, Land Use Planning and Environment (MVOTMA)	It defines the buffer strip for Arroyo Canelón Grande at 35 m on both sides. It states that the modification of the forest floor, tilling of the land and the application of agrochemicals directly in the riverbed, both in the public and private domain, as well as in the buffer strip, are included in the prohibition set for in article 144 of the Code of Waters.
Regulations concerning the protection of the native forest	These are developed in the specific point

#### 2.3.1. Protected area Santa Lucía River Wetlands

Upon the assessment of the potential flora and fauna wealth of these wetlands, and of the ecosystems present in grid K27 of the Military Geographic System (SGM), it is possible to appreciate a large biological diversity with the presence of priority species for conservation, in addition to the environmental importance of the Santa Lucía river basin (which is the source of drinking water for almost half of the population of Uruguay) and the great diversity of ecosystem services that the basin offers, as a buffer to flooding, maintenance of the hydrological cycle, provision of food, fiber, clays, sand, potential for tourism and recreational use, natural filtering of contaminants and suspended solids, retention of nutrients in the system for a more efficient cycling and lower losses, or, in the long-term, the generation of peatlands. This led to the proposal for incorporation of the Santa Lucía River Wetlands to the National System of Protected Areas in 2008.



In 2015, Decree 55/015 established the incorporation of the Santa Lucía River Wetlands into the National System of Protected Areas under the category of Managed Protected Area Resource established by article 4 of Decree No. 52/005, which regulates the creation of the National System of Protected Areas. This area is defined as an area containing predominantly unmodified natural systems, which is subject to management activities to ensure the protection and maintenance of biological diversity in the long term, while providing a sustainable flow of natural products and services to meet the needs of the community.

The designation as a protected area establishes the following protective measures for the entire area: (a) The promotion of good agricultural practices, good practices on extractive activities and sustainable tourism, ensuring the generation of development opportunities for the local population, and the outstanding compliance with national and departmental standards regarding environmental protection and sustainable development; (b) The prohibition of new developments, except those expressly provided for in territorial organization instruments that, in accordance with Law 18,308 of 2008, have been approved to the date of this Decree, or in the management plan for the area; and (c) The prohibition of hunting, except for management or control of invasive alien species, as specified in the management plan for the area.

The Margat railway bridge is located just 860 m upstream of the limit of the protected area Santa Lucía River Wetlands, over Arroyo Canelón Grande.

**Figure 2–2 Santa Lucía River Wetlands - Managed Protected Area Resource**



Source: <https://www.dinama.gub.uy/visualizador>

Although the project execution area is not within the protected area or within any other area under the SNAP, precautionary measures shall be taken so that the activities developed during the project do not affect the protected area.

There are other regulatory references to the entire basin that detail the environmental restrictions arising from the presence of this protected area.

### 2.3.2. Protected area François Margat

The Departmental System of Protected Areas (SDAPA) is one of the land planning instruments (land use management plan - POT) that are being designed by the Municipality of Canelones. Its main objective is the protection and conservation of the significant biodiversity and the sustainable use of associated natural and cultural resources of the Department of Canelones.

It is within this framework that the project is presented regarding this protected area whose priority ecosystem for conservation are the typical Uruguay riverside savannah forests called “*monte de parque*” and watercourses. Below are the threats it poses, and the ecosystem goods and services it offers detailed for each ecosystem.

**Chart 2–2 Threats, ecosystem goods and services of “*monte de parque*” forests**

Ecosystem	Threats	Ecosystem goods and services
2. <i>Bosque parque</i> (typical Uruguay riverside savannah forests) Algarrobal ( <i>Prosopis sp.</i> ), Talar ( <i>Celtis tala</i> ), Espinillar ( <i>Acacia caven</i> )	<ul style="list-style-type: none"> <li>* Clear felling</li> <li>* Use of the soil that does not allow regeneration (e.g.: intensive agricultural activity)</li> </ul>	<ul style="list-style-type: none"> <li>* Habitat of priority species</li> <li>* Biological corridor for resident and migratory species (e.g. birds)</li> <li>* Sheltered and shaded natural areas for livestock use</li> <li>* <b>Algarrobal formation constitutes the southernmost population, for which reason it is of interest at the level of population genetic diversity</b></li> <li>* Species of interest for their timber value</li> </ul>

Source: Strategic Environmental Report. Departmental System of Protected Areas of Canelones. 2017.

**Chart 2–3 Threats, goods and services of watercourses**

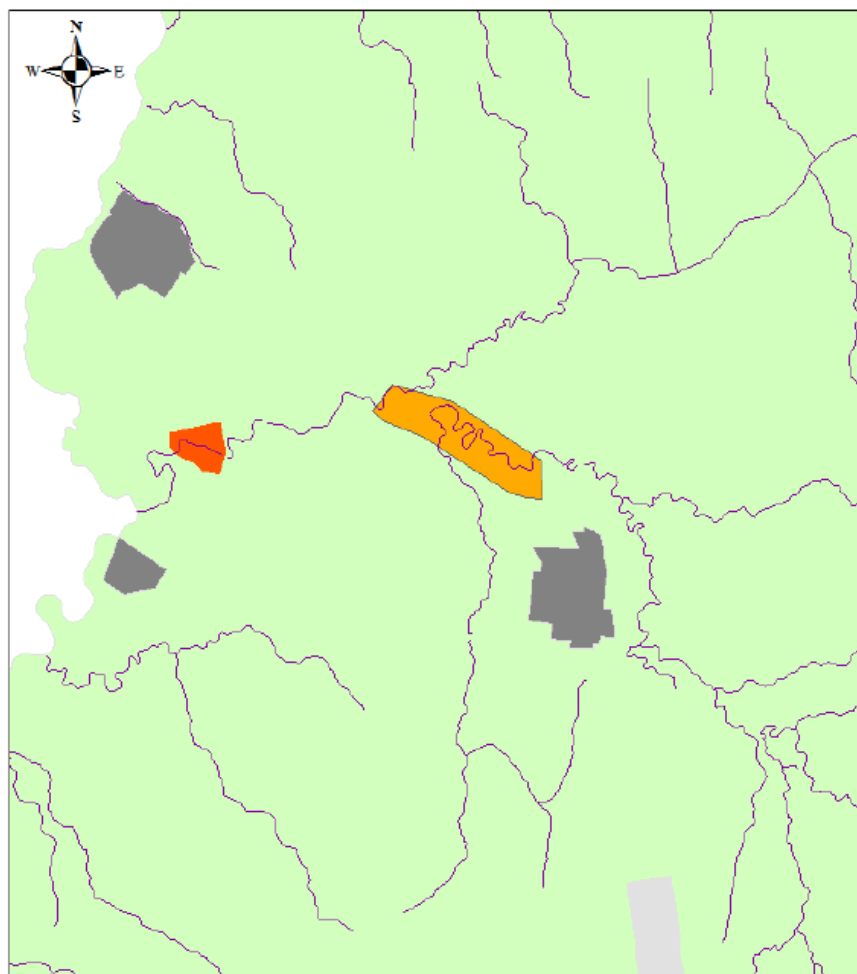
Ecosystem	Threats	Ecosystem goods and services
2. Watercourses 2.1. Riverine forest 2.2. Associated wetlands 2.3. Riverbed and river system	<ul style="list-style-type: none"> <li>* Clear felling</li> <li>* Urbanization on riverbanks</li> <li>* Works of canalization and/or filling or dams that alter the hydrology of the system, both in riverbed and flood plains</li> <li>* Biological pollution by invasive alien species</li> <li>* Indiscriminate hunting and fishing for recreation and tourism</li> <li>* Organic pollution from specific and diffuse sources (eutrophication)</li> <li>* Possible chemical contamination from industry effluents (e.g.: tanneries, chemical industries)</li> </ul>	<ul style="list-style-type: none"> <li>* Habitat of priority species, migratory species and wetlands species of interest for restoration and conservation</li> <li>* Biological corridor for a large number of resident and migratory species</li> <li>* Sites of paleontological and archaeological interest (for example coast of Santa Lucia river, Vizcaíno creek), with great tourist potential.</li> <li>* Recreational and tourist activities</li> <li>* Prevention and control of erosion on riverbanks and urban areas (forest and wetlands associated with the watercourse)</li> <li>* Buffering of extreme climate events (floods) and local microclimate</li> <li>* Water purification</li> <li>* According to recent results (Soutullo et al. 2012), riverine forests and wetlands and/or flood plains are the ecosystems that contribute most</li> </ul>

Ecosystem	Threats	Ecosystem goods and services
	* Possible noise pollution from motorboats	to ecosystem functions that provide services such as regulation (of climate, water, soil, retention of nutrients and pollutants, biological control), support (wildlife habitat) and provision of various resources (food, raw materials, water, genetic resources).

Source: Strategic Environmental Report. Departmental System of Protected Areas of Canelones. 2017.

The following Figure shows the zoning of the protected area which develops on Arroyo Canelón Chico up to its mouth in Arroyo Canelón Grande, very close to the project area.

**Figure 2–3 Location of proposed protected area François Margat (Departmental System)**



**Leyenda**

- Ríos y Arroyos
- Bosque parque Prosopis
- AP\_Margat
- suelo\_rural
- suelo urbano
- direct

10,50 1 Km

Source: Strategic Environmental Report. Departmental System of Protected Areas of Canelones. 2017.

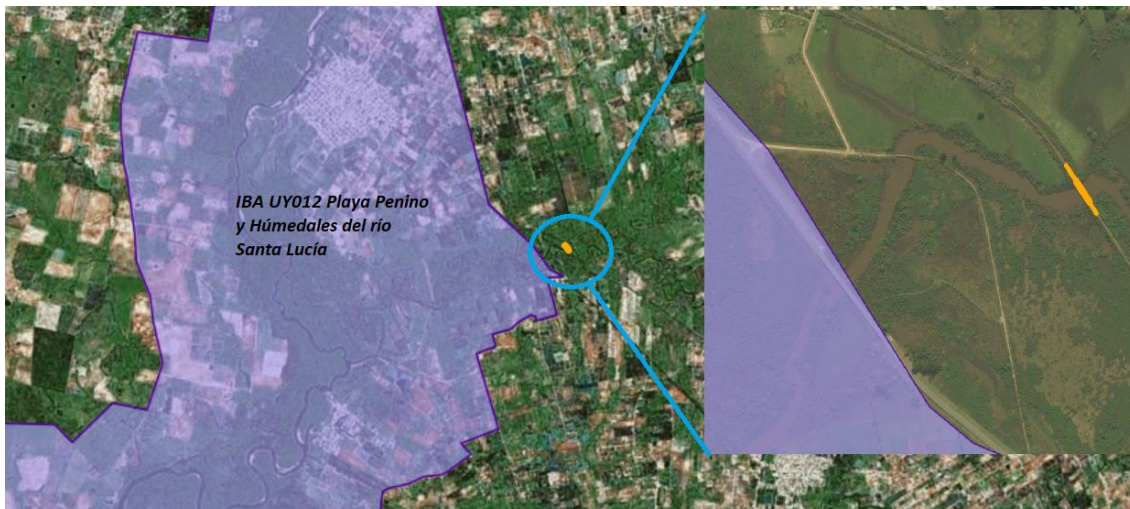
No delimitation by plots has been agreed to present, and there is no management plan for this area, except those inferred from the threats presented by the ecosystems to be protected.

Thus, this proposal creates restrictions on the activities of the project regarding the felling of native forest, noise pollution and the movement of soils that can generate a barrier effect by embankments and elimination of wetland ecosystems.

### 2.3.3. Important Bird and Biodiversity Area

The above-mentioned protected area also includes an Important Bird and Biodiversity Area (IBA) defined by Bird Life International in 2008.

Figure 2–4 Important Bird and Biodiversity Area IBAUY012



Source: <https://www.dinama.gub.uy/visualizador>, <http://datazone.birdlife.org>

Penino beach and the Santa Lucía River Wetlands are an estuarine coastal area with large areas of wetlands associated with the Santa Lucía river. This area comprises diverse environments with a high biological diversity. The IBA is located in an urban and suburban region just 25 km far from Montevideo, the capital of Uruguay. The area is shared by the departments of San José and Montevideo.

This area is a very important site in Uruguay for several waterfowl species and some Passeriformes. Some of the most prominent as regards their conservation problems at the global level with regular presence in the area are *Larus atlanticus*, *Spartonoica maluroides* and *Limnoctites rectirostris*. The latter two species also show restricted distribution. Information has been published about the presence of several species with conservation problems, for example, *Xolmis dominicanus*, *Phoenicopterus chilensis*, *Macronectes giganteus*, *Polystictus pectoralis* and *Alectrurus risora*. In addition, several migratory species, such as *Calidris canutus*, *Limosa haemastica*, *Pluvialis dominica* and *Buteo swainsoni* arrive in this area, and there are historical records of *Tryngites subruficollis*.

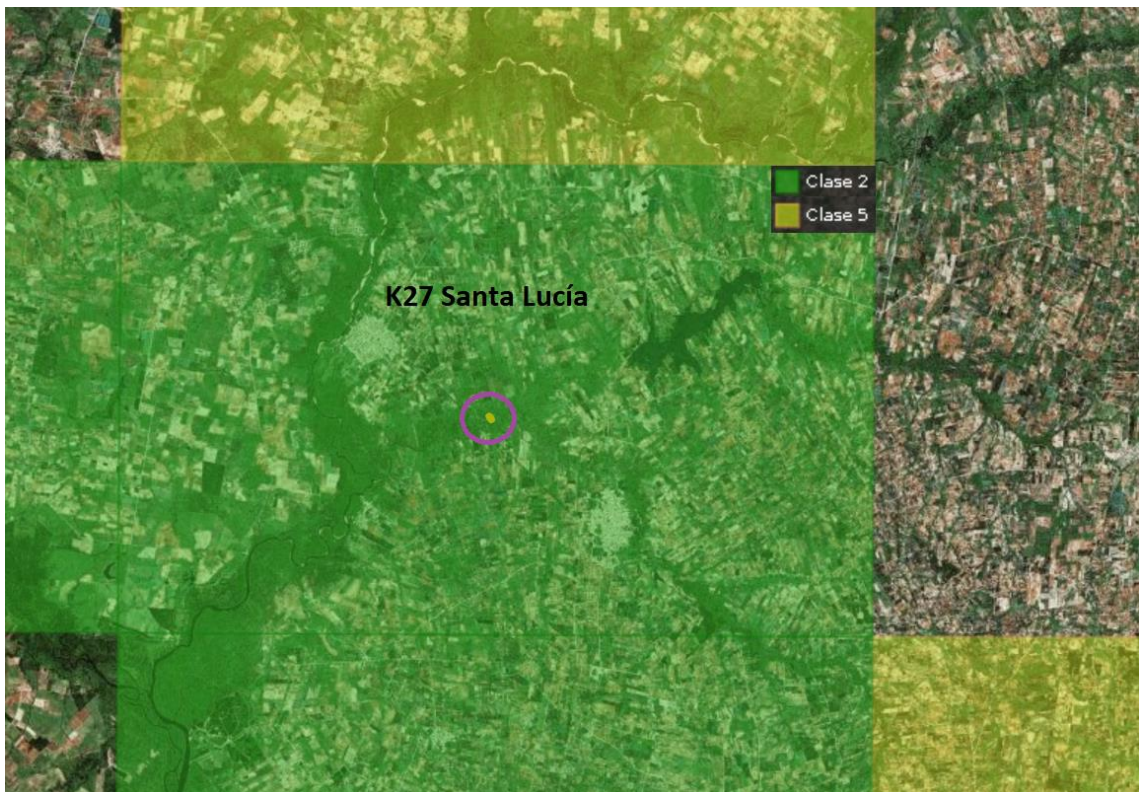
*A priori*, it is estimated that this priority conservation area will not be a limiting factor for the implementation of the project as it develops outside the project limits defined.

### 2.3.4. SNAP Strategic Plan for 2015 - 2020

In 2014, the MVOTMA presented the Strategic Plan 2015-2020 for the National System of Protected Areas<sup>1</sup>. This Plan sets up the strategic guidelines for the consolidation of the National System of Protected Areas in the period 2015-2020, seeking to identify the areas of the country where to focus efforts in order to advance efficiently in the implementation of the conservation objectives of the System.

Priority sites to be incorporated into the System were designated and five categories or classes were defined according to their priority. Grid K27 was classified within Class 2: Priority for Incorporation 2015-2020 - A site of interest for incorporation into the SNAP in the period 2015-2020 on which there is sufficient information to identify it as a high-priority site. The actions on this site are focused on ensuring its incorporation to the SNAP during the timeframe established, complying with the elaboration of projects for selection, delimitation and incorporation of protected areas to the system, according to the Guidelines on Planning of Protected Areas of Uruguay.

**Figure 2–5 Priority of incorporation into SNAP**



Source: <https://www.dinama.gub.uy/visualizador>

<sup>1</sup> Soutullo A., Bartesaghi L., Ríos M., Szephegyi M.N., and Di Minin E. 2014 Spatial Priorities for Expansion and Consolidation of the SNAP in the Period 2015-2020. Document prepared in the framework of the project "Strengthening the Process of Implementation of the National System of Protected Areas of Uruguay" MVOTMA/DINAMA - UNDP/GEF Project (URU/06/G34). 27 pp.

This plan determines potential restrictions if the project is executed within the set period. At the time of project execution, it is important to consider updating the protected areas incorporated into the SNAP and checking the management measures for the corresponding designated grid.

### **2.3.5. Plan of Water Resources for the Santa Lucía River Basin**

The Commission for the Santa Lucía River Basin was created in 2013 under Decree 106/013 to address the loss in drinking water quality and for the development and implementation of the Plan of Water Resources for the Santa Lucía River Basin. The main objective of the plan was to formulate and implement the actions required for the control of the process of deterioration of the Santa Lucía river basin, ensuring the quality and quantity of water resources for sustainable use as drinking water.

To determine the measures required to achieve the objective, the Santa Lucía river basin was divided into two zones according to the proposed use. The Arroyo Canelón Grande is located in a Zone designated for predominant use as “Drinking Water Source”, which comprises the Santa Lucía river (upstream of the confluence with the San José river), the Santa Lucía Chico river, the creek Arroyo de La Virgen, the San José river, and the creeks Arroyo Canelón Grande and Arroyo Canelón Chico.

The Plan sets out 11 measures aimed at the protection of the quality of water in the Santa Lucía river basin:

- Measure 1: Implementation of a Sectoral Program to improve the environmental compliance of industrial dumping throughout the Santa Lucía river basin and demand the reduction of the level of nitrogen, phosphorous and COD. This applies to Zone A and Zone B, and its objective is to reduce the impact of liquid emissions from industrial dumping.
- Measure 2: Implementation of a Sectoral Program to improve the environmental compliance of domestic dumping (sewage) throughout the Santa Lucía river basin and demand the reduction of the level of nitrogen and phosphorous. Priority is assigned to the cities of Fray Marcos, San Ramón and Santa Lucía. This applies to Zone A and Zone B, and its objective is to reduce the impact of domestic liquid emissions (sewage).
- Measure 3: Declaring the Zone A hydrographic basin as a sensitive priority area and enforcing compliance of all rural owners located in such area with the corresponding regulations, monitoring the application of nutrients and pesticides and presenting Soil Use, Management and Conservation Plans to the Ministry of Livestock, Agriculture and Fisheries (MGAP). Land owners will be required to fertilize soils based on soil testing in order to achieve and maintain the Bray P<sub>1</sub> concentration below 31 ppm. The objective of this measure is to control the excessive use of agrochemicals in fertilization.
- Measure 4: Suspending the installation of new feedlot cattle farming operations or other cattle feeding operations with animal confinement, as well as the expansion of existing operations of this kind. The suspension will be in force until a new regulation on the activity is established. The objective is to control the supply of nutrients in high-impact activities.
- Measure 5: Executing the mandatory treatment and management of effluents from all dairies located throughout the Santa Lucía river basin. The objective is to control the supply of nutrients in high-impact activities.

- Measure 6: Implementing the final solution to sludge management and disposal in the drinking water treatment plant of the Uruguayan public water supply and sanitation company (OSE) in Aguas Corrientes town. The objective is to control the hydromorphological condition of the deterioration of the channel.
- Measure 7: Restricting the direct access of cattle to watering in the watercourses comprised in the Zone A basin. Building a perimeter of restriction in the environment of the reservoirs of Paso Severino, Canelón Grande and San Francisco. Access to water shall be provided indirectly through water intakes. The purpose is to control the supply of nutrients directly on the source of drinking water.
- Measure 8: Establishing a buffer zone in the Zone A basin with no tillage of the land and no use of agrochemicals (for conservation and restoration of the river forest as a way to restore the hydromorphological river conditions) in a strip of 40 meters on both sides of the main courses (Santa Lucía river and San José river), 20 meters along the main tributaries (for example, Arroyo Canelón Grande) and 100 m in the surroundings of reservoirs. The purpose of this measure is to avoid the superficial runoff of nutrients and the erosion, restoring the margins of watercourses.
- Measure 9: Notifying those in charge of surface and groundwater extraction in the Zone A basin who do not have the respective permit to request such permit within a maximum term of 6 months. The objective is to avoid exceeding the supply of water resources and water self-purification capacity in order to achieve an integrated balance (water and pollutant loads) to determine the remaining capacity.
- Measure 10: Declaring the basin of the Casupá creek as “drinking water”. The objective of this measure is to increase the reserve of water for the drinking water system of Montevideo and the Metropolitan Area.
- Measure 11: Collecting opinions within the Commission for the Santa Lucía River Basin regarding the measures that make up this Plan, ensuring the effective participation of its diverse stakeholders. The objective of this measure is to promote the responsible use of water resources and encourage the participation of the different stakeholders in resource management and environmental protection of the basin.

Measure number 8 is the one that directly refers to the area of the Margat bridge over Arroyo Canelón Grande. In 2015, the Ministerial Resolution 229/2015 of the MVOTMA established buffer zones for major watercourses in the Santa Lucía river basin. With regard to Arroyo Canelón Grande, the buffer strip borders the watercourses on both sides of their margins, measured from the property line of the neighboring lots or the riverbed axis, toward the interior of the neighboring lots or the lots where such courses are located (Article 2, Paragraph c), extending 35 m on each side.

In this regard, Article 1 of Ministerial Resolution 229/2015 states that the modification of the forest floor, tilling of the land and the application of agrochemicals directly in the riverbed, both in the public and private domain, as well as in the buffer strip, are included in the prohibition set for in article 144 of the Code of Waters:

*"Article 144: Introducing any substances, materials or energy-related items that may endanger human or animal health, deteriorate the environment or cause any damages in watercourses or in any place from where these may reach watercourses is forbidden."*

This plan and the resolution of the National Directorate of Environment (DINAMA) cause constraints regarding the execution of the project, as no felling activities may be carried out without a permit of the General Directorate of Forestry (DGF) under the Ministry of Livestock, Agriculture and Fisheries, and the plan to present shall contain the mitigation measures so that the felling activities do not affect the purposes of protection of Measure 8.

### 2.3.6. Native forest protection

Following is a summary of native forest protection regulations.

This legal framework restricts native forest felling, as a felling permit must be obtained from the DGF.

**Chart 2–4 Native forest protection regulations**

Regulations	Aspects and contents relevant to the project
Law 15,939/1987 Forestry Law	This Law defines the concept of forest as a plant association where trees of any size are dominant, whether exploited or not, and that may produce wood or other forest products or exert some influence in the conservation of soil, in the hydrological system or in the climate, or provide shelter or other benefits of national interest. Article 24 - Any operation that threatens the survival of the native forest is forbidden, with the exception that the product of the exploitation be destined for domestic use and wiring of the rural establishment to which it belongs, or if there is a prior authorization of the General Directorate of Forestry.
Law 16,170/1990	This Law designates the National Directorate of Renewable Resources (RENARE) as the office in charge of the management and conservation of the Forest Heritage of the State.
Decree 452/1988	Concept of forest - This decree expands the definition of forest, establishing that the minimum area shall be 2,500 m <sup>2</sup> .
Decree 22/993	This decree establishes the responsibilities of the RENARE regarding the protection of native forests.

### 2.3.7. Environmental permits

#### 2.3.7.1. Permits for native forest felling

A native forest felling permit must be obtained from the DGF under the MGAP in order to fell a native forest, either during the project preliminary study phase or during the construction phase. It is pertinent to highlight that in this type of infrastructure projects, the project holder is the MTOP, and the contractor must request a native forest felling permit from the DGF through the MTOP.

This permit is requested through the presentation of a report prepared by an accredited Agronomist identifying the species existing in the forest to cut down, the density and area intended to cut down and the destination of the wood cut. In this case, according to Ministerial Resolution No. 229/2015, the mitigation measures to comply with Measure 8 of the Plan of Water Resources for the Santa Lucía River Basin must be specified.



Based on this information, the DGF grants the permit and assigns a number of forest products transportation forms if the wood obtained is to be sold. The transportation of this wood must always be carried out with the corresponding form.

Upon receipt of the report, the DGF has a 15 day-term to assess the information.

### 2.3.7.2. Prior Environmental Permit

Decree No. 349 of 2005 governs the national Environmental Impact Assessment System at the national level. Paragraph 3 of Article 2 thereof establishes the type of projects that require a Prior Environmental Permit (AAP): "*Construction of new bridges or modification of existing ones, when this involves building new foundations*".

This procedure begins with the Project Communication (CdP) to the National Directorate of Environment (DINAMA) to obtain the Project Classification Certificate. The report to be presented at the CdP contains a description of the project, the characteristics of the environment and the preliminary environmental impact assessment, so that the project may be classified as Category A, B or C.

#### Chart 2–5 Project categories

**Category A:** The execution of this type of projects has insignificant adverse environmental impacts, within the impacts tolerated and provided for by the regulations in force.

**Category B:** The execution of this type of projects may have moderately significant environmental impacts, whose adverse effects can be eliminated or minimized through the adoption of well-known and easily applicable measures.

**Category C:** The execution of this type of projects may produce significantly adverse environmental impacts, whether prevention or mitigation measures are provided for or not.

It is expected that this project may be a Category B project, as it consists in the modification of an existing bridge. However, primary studies on the following subjects must be submitted, among others:

- Terrestrial and aquatic flora and fauna
- Hydrological behavior of the stream and how the presence of the bridge will affect it.
- Archaeological survey of the area, if the desk study should determine the potentiality of archaeological findings.

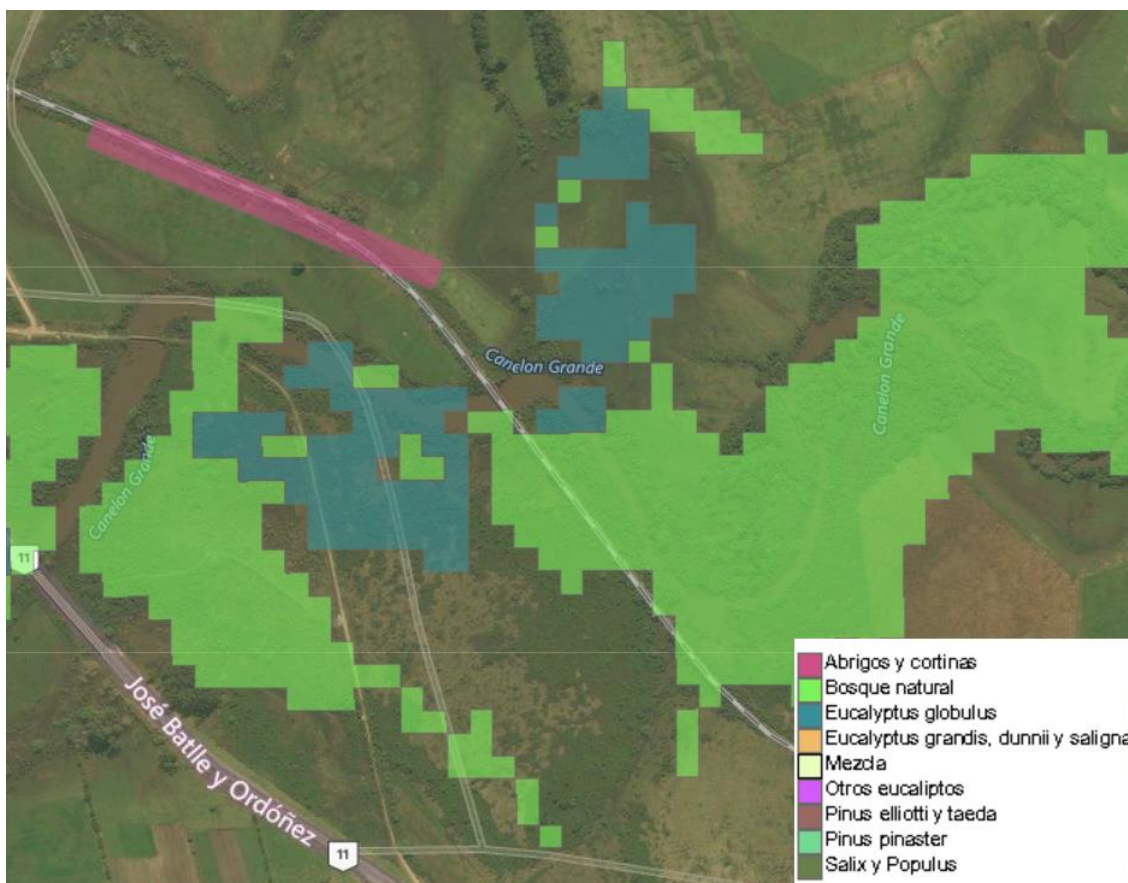
## 2.4. Assessment of sensitivity of the environment

### 2.4.1. Biotic environment

The Margat railway bridge is located approximately 10 km upstream from the mouth of Arroyo Canelón Grande on the Santa Lucía river.

According to a review of the available information, the bridge would be in a region that combines two highly valuable environments. Arroyo Canelón Grande presents a woody flora composed of natural forest, riparian forest and alien species formed by patches of *Eucalyptus globulus*, shelter forest and shade forest in the proximity of the railway track.

**Figure 2–6 Woody vegetation around the Margat railway bridge over Arroyo Canelón Grande**



Source: <http://ide.uy/visor/>

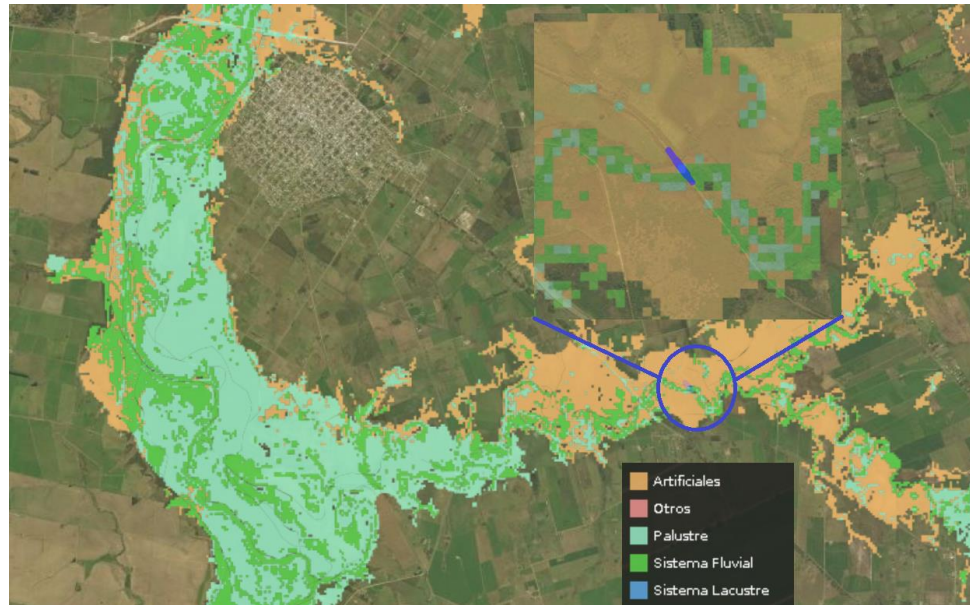
In addition, the area also holds artificial wetlands described as riparian forest and the typical Uruguay riverside savannah forests called “*monte de parque*”. Even if they are of artificial origin, wetlands are recognized by the various ecosystem services that they offer, among them is the fact that they function as aquatic pollution scrubbers, and are recognized by sustaining an important biotic diversity.

According to Brazeiro *et al.* (2012)<sup>2</sup>, between tetrapod fauna, fish and woody vascular plants, the species wealth of Uruguay would reach 1,175 species, 219 fish, 50 amphibians, 65 reptiles, 453 birds, 74 mammals and 314 woody plants.

<sup>2</sup> Brazeiro A, Achkar M, Bartesaghi L, Ceroni M, Aldabe J, Carreira S, Duarte A, González E, Haretche F, Loureiro M, Martínez JA, Maneyro R, Serra S and Zarucki M (2012): Potential distribution of species of Uruguay: vertebrates and vascular woody plants Technical Report. Agreement MGAP/PPR – School of Sciences/Vida Silvestre/Zoological Society of Uruguay/CIEDUR. 47pp.

The Margat bridge over Arroyo Canelón Grande is located in grid K27 - Santa Lucía of the Military Geographic System.

**Figure 2–7 Wetlands around the Margat railway bridge over Arroyo Canelón Grande**



Source: <https://www.dinama.gub.uy/visualizador>

According to DINAMA<sup>3</sup>, and based on Brazeiro *et al.* (2008)<sup>4</sup>, grid K27 has a potential wealth of 498 species, 42% of those described for Uruguay by Brazeiro *et al.* (2012). This grid would contain up to 32 amphibians (64%), 250 birds (55%), 39 mammals (53%), 68 fish (31%), 32 reptiles (49%) and 77 vascular woody plants (25%).

In accordance with its environmental characteristics, this region has been defined as high-priority conservation area, due to the presence of significant ecological areas for the conservation of biodiversity.

The presence of nearby vulnerable environments determines its priority level, which must be related to the presence of natural forests, which has a history of anthropogenic modifications, due to which the original extension has been reduced significantly, being them vestigial or remnant today.

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<sup>3</sup> [http://www.snap.gub.uy/especies/especies\\_en\\_ambiente](http://www.snap.gub.uy/especies/especies_en_ambiente)

<sup>4</sup> Brazeiro A, Achkar M, Canavero A, Fagúndez C, Gonzalez E, Grela I, Lezama F, Maneyro R, Barthesagi L, Camargo A, Carreira S, Costa B, Nuñez D, da Rosa I, Toranza C. 2008. Geographical priorities for the conservation of the terrestrial biodiversity of Uruguay. Executive Summary. Project PDT 32-26. 48 pp.

**Figure 2–8 Conservation priority for the region of the Margat railway bridge over Arroyo Canelón Grande**



Source: <https://www.dinamo.qub.uy/visualizador>

**Figure 2–9 Degree of threat of ecosystems in the region of the Margat railway bridge over Arroyo Canelón Grande**



Source: <https://www.dinamo.qub.uy/visualizador>

According to the description of the ecosystems present in this high conservation priority site, ecosystems with no defined category and lotic ecosystems are dominant. Details about the ecosystems within these areas make reference to ecosystems of anthropic origin. Rice crops, other crops, forestry, suburban, urban and bare soil ecosystems are present.

Grid K27, which includes the location of the bridge, comprises plant formations developed in a flat surface with deep soils of medium texture, slow drainage, intermittently flooded, alkaline pH and low or no rockiness, PaPPMLIAN type of environment<sup>5</sup>.

**Figure 2–10 Ecosystems in priority sites for the Margat bridge over Arroyo Canelón Grande**



Source: <https://www.dinama.gub.uy/visualizador>

The main threats include pollution from industry and the use of agrochemicals for agriculture. Other major threats are invasion by exotic species, capture of birds for caging, felling of native forests, uncontrolled urban development and uncontrolled tourism.

The fragmentation of the territory is one of the main threats to biodiversity, since the lack of connectivity between the environments that the species use means the lack of mobility between sites that are relevant to the species, such as reproduction, breeding and feeding areas.

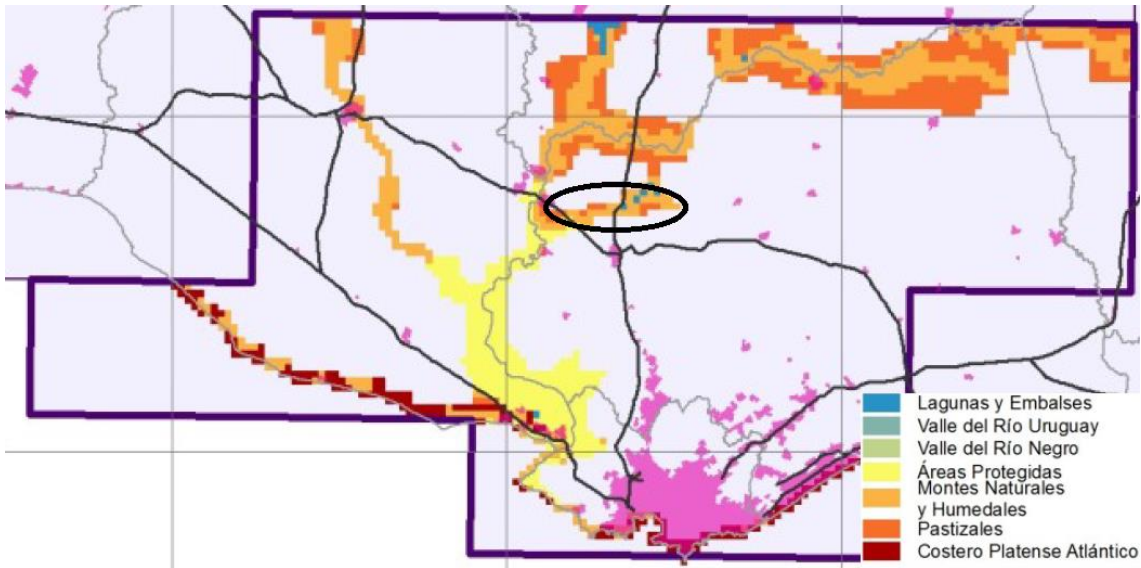
Gutiérrez *et al.* (2012)<sup>6</sup> analyzed the connections between the priority areas of Uruguay as a strategy for maintenance of biological corridors between these sites, which mostly correspond to riparian forests and other related environments, such as the typical Uruguay riverside savannah forests called “*monte de parque*” and wetlands. In this sense, Arroyo Canelón Grande and its natural forests and wetlands constitute a biological corridor that connects different stretches of Santa Lucía river.

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<sup>5</sup> Panario D & Gutiérrez O. 2011. *Product 1. Theoretical Framework for the Hierarchical Classification of Environments of Uruguay - Product 2. Map of Environments: GIS Mapping MGAP/PPR – CIEDUR Agreement - Map of Environments of Uruguay and Potential Distribution of Species.* 149 pp.

<sup>6</sup> Gutiérrez O, Panario D, Achkar M y Brazeiro A. 2012. *Biological Corridors in Uruguay. Technical Report. Agreement MGAP/PPR – School of Sciences/Vida Silvestre Uruguay/Zoological Society of Uruguay/CIEDUR.* 31 pp.

**Figure 2–11 Ecological corridors in the Santa Lucía river basin**



Source: Gutiérrez et al. (2012)

Due to its high species richness, together with the presence of natural environments, Grid K27 Santa Lucía is classified as a priority site to be entered into the National System of Protected Areas.

The region where the Margat railway bridge is located is an area of great importance for biodiversity. Arroyo Canelón Grande is part of the Santa Lucía river basin, the main source of drinking water for the southern region of Uruguay, which has experienced a remarkable decline in water quality.

The trophic state index for the Santa Lucia river shows supereutrophic conditions, while the stretch of Arroyo Canelón Grande between the Margat bridge and its mouth show hypereutrophic conditions. A high nutrient load, the presence of harmful algal blooms and agrochemicals have been the consequence of this loss of quality of the watercourses of the basin.

**Figure 2–12 Trophic status of the Santa Lucía river and Arroyo Canelón Grande (2016)**



Source: <https://www.dinama.gub.uy/visualizador>

The main restrictions imposed by the biotic environment are set by:

- The great biodiversity of the area
- The wetland and native forest ecosystems
- The role of biological corridor of the forest and the Arroyo Canelón Grande
- The deteriorated water quality of Arroyo Canelón Grande

The sensitivity of the biotic environment is thus considered as medium-high, which implies that it will be necessary to provide for prevention and mitigation measures in the design and execution of the project in order to minimize impacts. Some of the most common are:

- Implementing a baseline to determine the richness and abundance of specific flora and fauna species in the area of construction of the bridge.
- Hydrodynamic studies of the watercourse with the new bridge and its impact on the aquatic biota - structural design that considers these aspects
- Minimization of soil movements and elimination of wetland environment
- Minimization of felling of native forest
- Rescue of fauna and flora for their subsequent reintroduction in the environment
- Implementation of fauna passages
- Construction methodology that minimizes the effect on the stream water quality

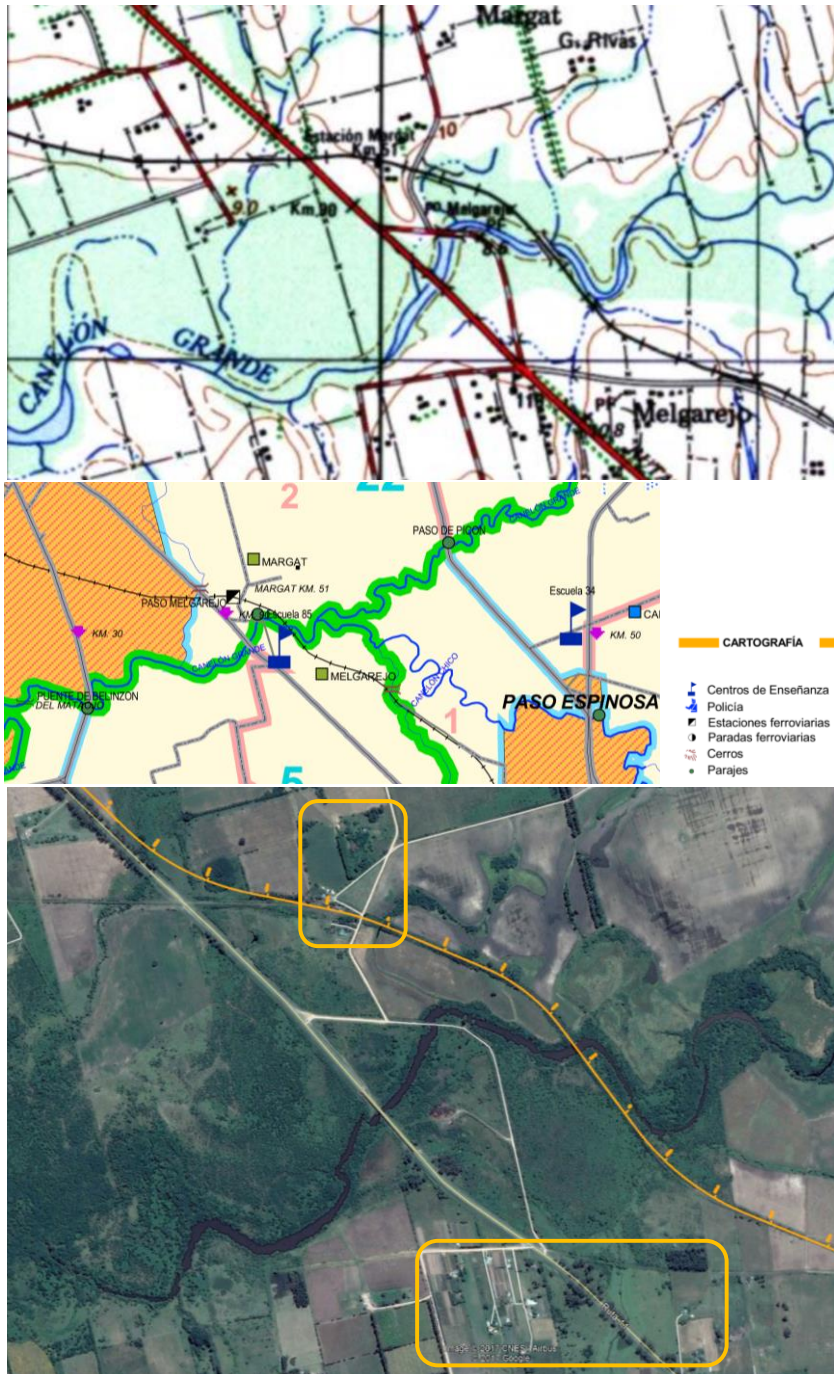
#### **2.4.1.1. Human environment**

The population density by Level 5 basins, considering the Arroyo Canelón Grande basin between Arroyo Canelón Chico and Santa Lucía river, was the basis to determine the population in the bridge area. According to the data available on the geoservices portal of DINAMA, the population density for this area is 15.6 inhabitants per km<sup>2</sup>.

As shown in the following figure, the cluster of houses closest to the area of the bridge is the Melgarejo village, located 670 m to the south of the project site. Margat village is to the north.

The nearest Rural School is No. 118 - School Juan Omar Calandria, located on Route 11, km 91.500. There are two more distant schools: No. 34 - School Dionisio Díaz, located on Route 5, km 50.200, and No. 11, located on Route 81, km 4.

Figure 2–13 Populated areas in the vicinity of the Margat bridge





**Figure 2–14 Rural schools in the project area**



The population density in the project area is low, with small populated localities within a radius of 1 km. Regarding restrictions, the most compromised population will be the inhabitants of Margat, as they are located in a purely rural environment away from the route, and they will see the movement generated by the project in a more direct and evident way, not only during the construction stage but also during the operation stage.

A proper Social Communication Plan will be essential, as well as keeping the population informed about the activities to develop and, if necessary, implementing mitigation and/or compensation measures.



### 3. Conclusions

The following Chart contains a summary of the assessment of criteria, stating the sensitivity of each one and the fulfillment of the objective, as well as a related comment.

**Chart 3–1 Assessment of environmental criteria**

	Criterion	Objective	Sensitivity	Compliance/Comment
<b>Legal</b>	Protected areas in the National System of Protected Areas (SNAP)	Located outside	Medium	Complies, but is located in a protected area under the SNAP and a zone proposed for protection
	Management plans for adjoining protected areas within the SNAP	That the development of the project is consistent with the provisions of these plans	Low	Complies. There is no management plan for the protected area Santa Lucía River Wetlands, and the prohibitions are based on the development of agriculture, tourism, housing and hunting.
	IBA	Located outside; the development of the project does not affect directly the environment to protect	Low	Complies. There is no direct interference between the project and the IBA.
	Protected areas proposed	Located outside; the development of the project does not affect directly the environment to protect	Medium	Complies, but is located in a protected area under the SNAP and a zone proposed for protection. Thus, there are some restrictions to felling activities, the movement of soil and noise emissions associated with the project.
	Potential of entering the SNAP in the period 2015-2020	Low - Class 3 or higher	High	Does not comply, is located in a Class 2 zone
	Environmental Permits	Category A	Medium	Does not comply. The project is expected to classify as Category B because of its location.
<b>Sensitivity of the environment</b>	Sensitivity of the biotic environment (flora and fauna)	Low or that the project does not significantly affect the biotic environment	Medium-high	Does not comply. The project is located in an area of high biodiversity in the Santa Lucía river basin that has importance not only for the biotic environment but also for the human environment. The impact on the environment should be assessed in detail with primary information and the details of the project phases.
	Sensitivity of the human environment	Low; the project will not significantly affect populations, housing or services that use the community	Medium-low	Does not comply. Although the population density is low, there are some dwellings, so the impact of the project works and operation must be assessed in detail.

Therefore, both at the legal level and regarding the sensitivity of the environment, there are restrictions that condition but do not preclude the execution of the project. The environmental aspect and these restrictions must be taken into account for the proper design and provision of the necessary mitigation measures.

Primary studies must be performed and a detailed description of the project must be available in order to assess the potential impacts and design mitigation measures.