

**ANNEX 5**  
**ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY**

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## 1 INTRODUCTION

The identification, analysis and valuation of environmental impacts take into account Project information and scopes.

Such assessments are carried out by identifying the project activities or actions that are likely to cause environmental impacts and the environmental components and elements in each medium that may be impacted by those actions or activities. The potential positive effects that the project may have on its environment are also considered.

The valuation of impacts makes it possible to determine their magnitude and significance, which enables the preparation of an environmental management plan oriented to eliminating, mitigating or compensating for negative effects and leveraging the project's positive effects. It also facilitates the design of environmental monitoring and follow up plans to verify the fulfillment and effectiveness of the proposed management measures.

## 2 DESCRIPTION OF THE METHODOLOGY

In methodology for assessing impacts, the project and its environmental context were analyzed in several stages:

- Definition of Checklists
- Preparation of Impact Matrices
- Valuation of the Impacts
- Determination of Significant Impacts

### 2.1 *Checklists*

In conducting the impact assessment, the first step was to develop checklists for the project's activities and actions that were likely to cause an environmental impact at one or more stage of the Project, and checklists of environmental components and elements that could be affected by those impacts.

- Checklist of Environmental Factors: identifies different environmental components and elements that could be affected by project activities.
- Checklist of Project Activities: identifies the activities or actions likely to produce environmental impacts, based on a detailed analysis of the project engineering (Chapter 1 of the Environmental Impact Study, EIS).

### 2.2 *Preparation of Impact Identification Matrices*

Matrices were prepared for each component and project stage using the following format:

**Table 1 Format of impact valuation matrix**

MEDIUM		COMPONENT					
ACTIVITY AND/ OR ACTION	IMPACT	LOCATION	VALUATION				
			Ca	Re	Te	Ti	Mg
Project activity/action generating the impact	Net change caused by the activity/action on the component analyzed	Geographic location of the impact (segment, sector, locality or coordinates)	Value of the impact as per predefined criteria (*)				

\* VALUATION CRITERIA: Ca= Character [+ , -]; Re= Reversibility [Reversible (Rev), Recoverable (Rec), Unrecoverable (Irr)]; Te= Timeframe [Temporary (Te), Permanent (Per)]; Ti=Type [Direct (Dir), Indirect (Ind), Synergistic (Sin), Cumulative (Acu)]; Mg= Magnitude [High (Al), Medium (Me), Low (Ba)].<sup>1</sup>

Source: Prepared by the authors.

Table 2 displays the classification scheme for all impacts with a code for each, which allows them to be easily identified in the document.

**Table 2 Impact identification codes for each environmental component**

Medium	Environmental Component	Code
Physical environment	Air Quality	ICA
	Noise	IR
	Geology and Geomorphology	IGG
	Land Use and Soil Quality	IHH
	Hydrology and Hydrogeology	IS
Biotic environment	Flora and Vegetation	IFV
	Vertebrate Fauna	IF
Human environment	Social Environment	IMS
	Cultural and Archeological Heritage	IPAC
	Landscape	IP
	Tourism	IT
Built environment	Energy Infrastructure	IE
	Roads	IV

Source: Prepared by the authors.

### 2.3 Valuation of impacts

The impacts identified will be valued on the impact matrix itself. This valuation allows the identification of positive and negative impacts and the assignment of criteria for subsequent ranking.

The criteria used to value the impacts are displayed in the following table and correspond to those defined in the Environmental Impact Assessment Methodology for Ministry of Public Works projects, enhanced with aspects of methodologies used in Spain, Canada and the USA.

<sup>1</sup> Translator's note: All abbreviations and classification codes have been left in their original Spanish format. EMG Ambiental S.A.

**Table 3 Criteria for the Valuation of Environmental Impacts**

CRITERIA		DESCRIPTION	CLASSIFICATION	
Ca	Character	Define whether the action is beneficial / positive, or detrimental / negative	Negative	-
			Positive	+
Re	Reversibility	Possibility, difficulty or impossibility of returning to the state prior to the intervention and recovery measures  This criterion is not applicable to positive impacts	Reversible: Returns naturally to its original state	Rev
			Recoverable: Requires human intervention to return to its original state	Rec
			Irrecoverable: Cannot be returned to its original state, naturally or artificially	Irr
Te	Timeframe	Define the duration of the change to the original state associated with different project phases	Temporary: Change remains only during construction	Tem
			Permanent: Change remains for the project's useful life	Per
Ti	Type	Way in which the environmental change is produced	Direct: Change affects the environment directly	Dir
			Indirect: Change affects the environment indirectly	Ind
			Synergistic: Change is compounded by other effects	Sin
			Cumulative: Effects increase over time	Acu
Mg	Magnitude	Rates the dimension of the environmental change produced relative to the total value of the resource affected	High	Al
			Medium	Me
			Low	Ba

Source: Prepared by the authors.

## 2.4 Impact ratings

To rate the impacts the following criteria affecting an environmental element are considered in combination. First, the positive and negative impacts are defined individually and then they are categorized as major, minor or mitigable. The abovementioned criteria are defined in the table below:

**Table 4 Criteria used for rating impacts**

<b>IMPACT RATINGS</b>	<b>DESCRIPTION</b>
MAJOR POSITIVE	Positive impacts of high or medium magnitude
MINOR POSITIVE	Positive impacts of low magnitude
MAJOR NEGATIVE	Negative impacts with high impact, or negative impacts of medium magnitude that are Permanent, Irrecoverable and/or Cumulative
MITIGATABLE NEGATIVE	Negative impacts that do not meet the above conditions and are subject to an environmental management measure
MINOR NEGATIVE	Negative impacts of low magnitude

Source: Prepared by the authors.

Through the Management Plan and the Compliance Plan for Applicable Environmental Provisions, each major negative impact and mitigable negative impact identified was assigned one or more management measures as required and, where applicable, the way in which compliance with the environmental provision would be assured was defined.

This combined information provides a general idea of the project's intervention in the environmental system in which it will be implemented, the magnitude of its overall effect, and the relation of these to potential environmental benefits.

### **3 PROJECT IMPACT MATRIX**

The matrix identifying the impacts associated with the Project is presented below.

Table 5 Matrix identifying Environmental Impacts associated with the Project

PARAMETER			CONSTRUCTION PHASE												OPERATIONAL PHASE							
MEDIUM	ENVIRONMENTAL COMPONENTS	IMPACT	Contraction of labor force	Transport of people or supplies to and from work sites and waste from work sites	Operation of equipment, machines and trucks	Circulation of personnel around work sites	Redefinition of line structures and S/S foundations	Clearing of construction sites for structures	Earth moving	Construction of foundations.	Piling of waste earth/rock	Assembly of structures and equipment for S/S	Preparing the restricted zone including tree removal and pruning in corresponding areas only	Stringing and tensioning of conductors.	Testing and entry into service	Demobilization and cleanup of work sites	Equipment and machine maintenance	Maintenance activities for lines and S/Ss (basic preventive, scheduled corrective, failures and emergencies).	Maintaining the restricted zone with forestry methods	Energizing the lines	Existence of lines	
Physical	Air Quality	ICA1: Local, temporary and intermittent deterioration of air quality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Noise	IR1 and IR2: Noise generation on receivers close to the Project	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Land use and soil quality	IS1: Removal and loss of soil surface in areas where installations are sited	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biotic	Flora and vegetation	IFV1: Reduction in tree foliage coverage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Terrestrial vertebrate fauna	IF1: Alteration of habitat quality	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		IF2: Probable collisions of birds with new lines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Human	Social Environment	IMS1: Generation of direct employment	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Landscape	IP1: Alteration of visual quality of the landscape	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			IP2: Alteration of views of unique areas and/or areas of landscape interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: (-) negative impact; (+) positive impact

Source: Prepared by the authors.