

			ENVIRONMENTAL IMPACT ASSESSMENT FOR THE RUMICHACA – PASTO DIVIDED HIGHWAY PROJECT, SAN JUAN – PEDREGAL SEGMENT, CONCESSION CONTRACT UNDER THE ARRANGEMENT APP NO. 15 OF 2015	
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## GLOSSARY

### 1. CIVIL WORKS COMPONENT

**Surface sewer:** A type of cross drainage work that has the purpose of quickly moving the water that, since it cannot be otherwise diverted, has to cross from one side of the road to the other.

**BENCH:** The horizontal distance, usually measured to the centerline from the outside edge of the drainage ditch or the lateral edge.

**Bay:** Transition zone between the traveled way and the sidewalk, for temporary vehicle parking.

**Shoulders:** The strips that run between the edge of the traveled way and the drainage ditches. They serve as lateral confinement of the road surface, and control humidity and possible erosion of the traveled way.

**Camber:** Cross slope on the horizontal intertangencies of the road, which has the purpose of facilitating surface runoff of water. The slope is generally from the centerline toward the sides of the road.

**Caissons:** Deep foundations that have the function of transferring loads to layers that have good load bearing capacity by means of their ends. The cross-section of these structures is considerable with respect to other types of deep foundations such as piles.

**Traveled way:** The part of the road used for the circulation of vehicles. Generally paved or conditioned with some type of road surfacing.

**Lane:** The part of the traveled way for the circulation of a single file of vehicles.

**Flow rate:** The volume of a water current that passes per unit time.

**Crown:** Made up of the traveled way plus the shoulders.

**Drainage ditches:** Ditches, either lined or not, that are built parallel to the shoulders, with the purpose of surface drainage along the length of the highway. Their geometry can vary depending on the conditions of the road and the area it drains.

**Right of way:** The strip of land intended for the construction of the road and its future expansions.

**Design Plan View:** A projection on a horizontal plane of the real or spatial layout. The horizontal layout is made up of a series of straight sections called tangents, connected by curved trajectories.

**Design Profile View:** A projection of the real or spatial center-line axis of the road on a vertical surface parallel to the same.

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**Design of the Cross Sections:** Definition of the location and dimensions of the elements making up the highway and their relationship to the natural terrain, at each point of the highway on a section that is normal in terms of horizontal alignment.

**Drain:** Excavation in the form of a ditch, filled with permeable materials, whose function is the catchment of groundwater or seepage water.

**Drainage:** Natural or artificial removal of surface and underground water from a determined area.

**Runoff:** Water that runs across the terrain of a hydrographic basin on the surface (surface runoff) or underground (subsurface runoff).

**Geodrain:** A device for subsurface drainage, consisting of a planar geonet, encapsulated within a non-woven geotextile, which is connected to elements that permit removing water from the pavement structure.

**Roundabout:** An intersection where there are no direct crossings, but rather maneuvering within the crossings and movements around an island or central plaza.

**Precipitation Histogram:** The relationship between rain and time in a bar diagram.

**Intersection:** A traffic mechanism at the junction of two or more roads at-grade or on different levels, producing crossings and changes in the trajectories of the vehicles that circulate on them.

**Bed:** The bottom of a watercourse bounded by the banks.

**Chamfer lines:** Lines that join consecutive chamfer stakes, which indicate how far the earth movements for cuts or embankments extend laterally.

**Level of Service:** Reflects the operating conditions of vehicle circulation relative to variables such as speed and travel time, freedom to maneuver, comfort, the desires of the user, and highway safety.

**Drainage works:** Works done with the purpose of eliminating excess surface water from the road and restoring the natural drainage network, which can be affected by the layout of the road.

**Subdrainage works:** Works done to eliminate excess water from the soil in order to guarantee the stability of the bench and the embankments of the highway. This is attained by intercepting underground flows, and taking them down to the level of the water table.

**At-grade Crossing:** An intersection at the same level between a road and a railway.

**Pavement:** The superimposed layers, relatively horizontal, that are designed and built technically with appropriate materials, and properly compacted. These stratified structures are supported on the subgrade of a road and must properly resist the forces that the repeated traffic loads transmit during the period for which the structure was designed and resist weathering effects.

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**Flexible Pavement:** A type of pavement constructed with a bituminous surface layer, generally on top of layers of unbound material.

**Rigid Pavement:** This is pavement basically made up of a slab of hydraulic cement concrete, supported on the subgrade or on a layer of selected material, which is called the subbase of the rigid pavement.

**Transverse Slope of the Terrain:** This corresponds to the natural slope of the terrain, measured across the centerline of the road.

**Banking:** The slope given to the transverse slope of a highway on sections with horizontal curves to counteract the effect of centrifugal force that acts on a vehicle in movement. It also helps remove rain water.

**Piles:** Deep foundations that have the function of transferring loads to competent strata by means of friction or the end, or a combination of the two. These are thin elements with diverse shapes in the cross-section.

**Box Culvert:** A drainage structure whose span measured parallel to the highway's centerline is less than or equal to ten meters (10 m).

**Post:** Vertical support that has the purpose of positioning the panel of a traffic sign at a determined height.

**Bridge Culvert:** A drainage structure whose larger span, measured parallel to the highway centerline, is greater than ten meters (10 m).

**Grade:** The vertical projection of the development of the centerline of the road surface.

**Stake-out:** Topographic activities with the purpose of marking a highway project on the ground for subsequent construction. It is supported by the plan view design sheets and the topographic baseline used previously in the survey of the highway corridor.

**Section in Cut:** A cross section corresponding to an explanation situated under the natural line of the earth.

**Section in Fill:** A cross section corresponding to an explanation situated completely above the natural line of the earth.

**Mixed Section:** A cross section in which the explanation cuts through the natural line of the earth. Also known as a sidehill section.

**Cross Section:** A section obtained by cutting the highway on a normal vertical plane to the horizontal projection of the length of the centerline, at any point on the highway.

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**Road Signs:** Signs fixed to posts or structures installed over the road or adjacent to it that, using determined symbols or words, fulfill the function of warning users about dangers and their nature, regulating prohibitions or restrictions regarding use of the road, and providing the information necessary to guide road users.

**Median Strip:** Green areas or concrete curbs placed parallel to the centerline of the highway, to separate opposing directions of traffic (central traffic islands or median) or to separate travel ways heading in the same direction (side roads).

**Extra Widening:** Increase in the cross section of the traveled way on the curves, with the purpose of maintaining the lateral distance between moving vehicles.

**Scouring:** Erosion of a river bed or banks by water currents; frequently it is only local.

**Subgrade:** The specially conditioned surface on which the pavement structure is supported.

**Embankment:** A sloped wall or surface that is the lateral edge of a cut or a fill.

**Road:** Zone for public or private use open to the public for the purpose of the circulation of the public.

## 2. ABIOTIC COMPONENT

**Aquifer:** A permeable geological formation capable of storing, transmitting, and providing usable quantities of water.

**Hanging Aquifer:** A region in the non-saturated zone in which conditions of saturation may occur locally when there is an underlying layer of low permeability.

**Groundwater:** Water that occupies the saturated zone of the subsoil.

**Groundwater Depletion:** 1) Continuous extraction of the water from an aquifer or reservoir at a higher rate than it is replenished. 2) Reduction of the groundwater stored in an aquifer or of the flow of a water current or spring caused by discharges at a faster rate than the natural replenishment.

**Air:** The fluid that forms the Earth's atmosphere, made up of a blend of gases whose normal composition is at least 20% oxygen, 77% Nitrogen and variable portions of inert gases and water vapor in a volumetric ratio. (Ras 2000 title F).

**Visual Range:** The distance at which the details can be observed of a landscape as a whole or of a specific landscape unit, from a determined point of view, being able to identify aspects such as shapes, color, texture, line, and chromatic contrast.

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**Sand:** The term sand is a textural term and serves to designate materials or particles produced by the natural or artificial disintegration of preexisting rocks, whose size varies from 0.0625 to 2 mm in diameter.

**Clay:** The word clay is used to refer to a fine-grained earth that becomes plastic when blended with a limited quantity of water. Clays always have a very fine grain. The upper limit of the grain size is, in general, a diameter of 0.004 mm.

**Groundwater Water Balance** An evaluation, during a period of time, of the recharge of an aquifer system (due to seepage and entry from adjacent aquifers), the corresponding discharge (natural outlets and extractions) and of the variation in the volume stored.

**Soil Sampling:** An observation made with a Dutch auger. It consists of a group of samples extracted with an auger and ordered in sequence. Also called confirmation sampling.

**Trial Trench:** A square excavation in the ground to observe the morphological characteristics of the first horizons. In its three dimensions (length, height, and width) it is similar to a small one.

**Trial Pit:** A big, rectangular excavation in the ground to expose the profile, its set of horizons or layers, to determine the morphological characteristics, the degree of evolution, development, and taxonomic classification. It is important for describing, classifying, and sampling the soil.

**Visual Quality:** This refers to the proportion and state of elements that contribute scenic beauty or singularity to a landscape, such as the presence of bodies of water, morphology, vegetation, color, scenic background, rarity, and degree of human action.

**Spray Field:** System for disposing of treated wastewater in which it is discharged via sprayers with the purpose of taking advantage of the soil's capacity to filter it and the evapotranspiration in the zone.

**Assimilation and Dilution Capacity:** The capacity of a body of water to accept and degrade substances, elements, or forms of energy, through natural, physio—chemical, or biological processes without affecting the criteria for quality or hindering the assigned uses. (Decree 3930 of 2010).

**Infiltration Capacity:** The soil's capacity to allow water to flow through it. Infiltration depends on several factors such as the porosity of soil, its saturation, the materials that make it up, and the characteristics of the flow to be infiltrated.

**Environmental Flow:** The volume of water necessary in terms of quality, quantity, duration, and seasonality to sustain the aquatic ecosystems and for the development of the socioeconomic activities of the users downstream from the source on which the ecosystems depend. (Decree 3930 of 2010).

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**Baseflow:** The flow incorporated into the water current, coming mainly from subsurface flow although also from lakes and glaciers, during long periods in which there is no precipitation.

**Low Flow:** A river's flow in the dry season when it is fed exclusively by subsurface flows.

**Ecological Flow:** The minimum flow a watercourse must maintain when a dam is built, or water is used or branched off, in such a way as to not alter the natural conditions of the biotope and to guarantee the development of the same river life, or at least similar to what existed previously on the river.<sup>1</sup>

**Soil Texture Classification:** Soil textures depend on the proportion of materials making it up (sand, silt, and clay).

**Climate:** The climate describes the meteorological phenomena that characterize the mean state of the atmosphere, due to variations in altitude and geographic accidents, thus creating some characteristic conditions for a specific region during a relatively long space of time, and defining local, regional, or national climates.

**Hydrographic Basin:** A hydrographic basin or watershed area is understood to be the surface or underground water that drains into a natural network with one or several natural watercourses, with either continuous or intermittent flow, that then flow into a larger watercourse that, in turn, can flow into a main river, a natural deposit of water, a marsh, or directly into the sea. (Decree 1640 of 2012).

**Body of Water:** A system of natural or artificial origin, located on the surface of the earth, made up of physical and biotic elements, and masses or volumes of water, either contained or in movement. (Resolution 1514 of 2012.)

**Groundwater Discharge:** The sum of the natural or artificial outlets of the groundwater of an aquifer.

**Drawdown:** The lowering of the water table or the potentiometric surface due to the extraction of groundwater through pumping, artesian flow of a borehole or the discharge of the spring.

**Groundwater Divide:** The surface line of the water table or the potentiometric surface to each side of which the flow of groundwater diverges.

**Landscape Ecology:** The branch of ecology that studies a set of ecosystems delimited in space and time, identifying, among other things, the formatting factors of the landscape, the patterns of transformation, and its cultural dimension from a territorial perspective.

<sup>1</sup> Ibid.

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**Discordant Element:** An artificial object that is foreign to the landscape analyzed, produced by anthropogenic activity. It includes infrastructure of diverse types such as roads, electric networks, billboards, communication towers, industrial infrastructure, and buildings.

**Landscape Features:** This refers to the homogeneous spatial units that make up the landscape in functional and structural terms, and that express the flows that occur in that array. The elements are grouped into three categories that correspond to the Matrix (dominant pattern of the landscape in which other features are differentiated), Patches (remnant non-linear and homogeneous elements differentiated from their surroundings) and Corridors (linear elements in the form of long strips that cross the matrix and are different from it).

**Emissions:** Discharge of a substance or element into the air, in a solid, liquid, or gaseous state, or in some combination of those states, coming from a stationary or mobile source. (Ras 2000 title F).

**Noise emissions:** This is the sound pressure generated under any conditions that transcends the environment or public spaces. (Resolution 627 of 2006.)

**Erosion:** This is defined as the removal of particles of soil due to the action of weather phenomena such as rain, wind, waves, and anthropogenic activities.

**Runoff:** The precipitation that flows over the surface of the earth toward a water course (surface runoff) or inside the soil (subsurface runoff or hypodermic flow).

**Landscape Fragility:** This refers to the degree of vulnerability and resilience of a landscape in response to natural or anthropogenic changes or disturbances that occur in the landscape. In this sense, the greater the heterogeneity and diversity of the natural elements in the landscape, the less its fragility in response to changes that occur in it.

**Emission Source:** An activity, process, or operation undertaken by human beings or with their intervention, which can deliver pollution into the air. (Ras 2000 title F).

**Stationary Source:** An emissions source located at a determined and immovable site, even when the pollution is discharged in a scattered manner. (Ras 2000 title F).

**Mobile Source:** An emissions source that, by reason of its use or purpose, moves about, such as automobiles or engine-driven transportation vehicles of any type. (Resolution 610 of 2010.)

**Groundwater Flow:** Movement of the water in an aquifer.

**Horizon:** Each of the layers of the soil, arranged more or less horizontally to the surface of the earth, arranged by soil formation processes.

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**Scenic Integrity:** The degree of harmony between landscape attributes, as well as the maintenance of typical characteristics of a landscape, such as its form, color, and beauty. It is measured based on the presence and dominance of discordant or natural elements.

**Silt:** Fragments or particles of rocks or minerals whose dimensions are from 0.02 to 0.002.

**Rain:** According to the official definition of the World Meteorological Organization and the IDEAM (Colombia), rain is the precipitation of liquid particles of water with a diameter greater than 0.5 mm, or of smaller drops, but very disperse. If it does not reach the surface of the earth, it is not rain but virga, and if the diameter is smaller it is called drizzle. Rainfall is measured in millimeters per year. Less than 200 mm is little rain, between 200 and 500 is light, from 500 to 1000 is normal, from 1000 to 2000 is abundant, and more than 2000 is **much**.

**Periodic, seasonal, or intermittent spring:** A spring that flows irregularly as a function of the hydrological regime of the groundwater.

**Grab Sample:** An individual sample representative of a determined moment. (Decree 3930 of 2010).

**Integrated Sample:** An integrated sample is formed by compositing different grab samples taken simultaneously from different points, as close as possible together. One example of this type of sample occurs in a river or current that varies in composition based on width and depth. (Decree 3930 of 2010).

**Groundwater Level:** The height of the water table or the potentiometric surface of an aquifer at a given place and time.

**Level of Interest:** This refers to an observer's degree of appreciation of a landscape, feature, or unit of the landscape. It is related to the direct and indirect uses of the landscape, including both a valuation of the elements that represent economic and subsistence activities, as well as a valuation of tangible and intangible elements that have a non-use value or intrinsic value to communities.

**Water Supply:** This consists of the volume of water available both spatially and temporally in a hydrographic area.<sup>2</sup>

**Landscape:** A spatially heterogeneous area whose physical and functional expression comes from the relationships between the elements that make it up (lithology, hydrology, soil, vegetation, fauna, climate, anthropogenic presence, and others), more than the sum of all of these.

**Parameter:** A variable that, in a family of elements, serves to identify each one of them by means of a numeric value. (Decree 3930 of 2010).

**Soil Profile:** a set of soil horizons that can be identified in a vertical section of the soil.

<sup>2</sup> Available at: <http://institucional.ideam.gov.co/jsp/loader.jsf?lServicio=Glosario&lTipo=user&lFuncion=main&>

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**Discharge Point:** The site or place where a discharge is made to a body of water, a sewage system, or the ground. (Decree 3930 of 2010).

**Aquifer Recharge:** The natural or artificial addition of water to the saturated zone of an aquifer.

**Groundwater Resource:** The volume of water stored in an aquifer available for use.

**Water Resource:** Surface, subsurface, meteoric, and marine water. (Decree 3930 of 2010).

**Visual Sensitivity:** This refers to the degree of exposure a permanent or occasional observer has of changes that occur in the landscape. It is related to three main factors: population density (represents the presence of human settlements), facility of access (proximity to roads and paths), and the flow of current and prospective passengers and tourists.

**Landscape Site of Interest:** Includes places of historical, cultural, environmental, and ecological importance in the landscape of interest, determined by both tangible and intangible cultural references in the territory (based on economic importance, ecosystem services, use and usufruct of resources, aesthetic value and historical-cultural importance), and based on functional and structural aspects of the landscape (supply of habitat, flow of matter, energy and information, and maintenance of the biodiversity).

**Soil:** in geology, soils are produced by the physical and chemical weathering of rocks, and are constituted of a mix of mineral and organic material, air, and water. In agronomy, soils are the natural body resulting from dynamic interactions between organic and inorganic components, which constitute the environment for plant development. In engineering, soil is an aggregate of minerals joined together by weak forces, that can be separated by low-energy mechanical means or by the action of water (UNAL, 2007).

**Landscape Unit:** The minimum unit established for the analysis of a landscape, corresponding to a synthesis between the land cover (as a biotic expression in space) and the geo-form (as a result of the interaction and the change processes of the landscape forming factors), constituting homogeneous units that can be differentiated one from another, with their own ecological functionality and cultural dynamics that can be differentiated.

**User:** All natural or juridical persons under public or private law that use water taken directly from the resource or from a water supply system, or whose activity can produce direct or indirect discharges into the resource. (Decree 1594 of 1984).

**Discharge:** The final discharge into a body of water, a sewage system, or the ground of elements, substances, or compounds contained in a liquid medium. (Resolution 1514 of 2012.)

**Vulnerability (of groundwater):** A measurement of the risk of polluting groundwater.

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### 3. BIOTIC COMPONENT

**ANLA:** The National Authority for Environmental Licenses, the government institution in charge of making sure projects, works, or activities subject to environmental licensing, permits, or procedures meet the environmental laws, in such a way that they contribute to the sustainable environmental development of the country.

**Anthropogenic:** An adjective relating to human activities. **Benthos or Benthic macroinvertebrates:** These are the small organisms that can be observed with the naked eye in a body of water. This category includes aquatic worms, insects, arachnids, crustaceans, and shellfish.

**Biodiversity:** The diversity existing among living organisms that is essential for the function of ecosystems and for them to provide their services.

**Bioindication:** A method for evaluating the environmental or ecological quality of a natural body of water, which uses criteria that take into account the composition and abundance of the organisms and microorganisms that live in it.

**Biotic:** All natural living organisms and their vital processes. This term, in the context of planning land use, is used as a category for classifying resources, which subdivides natural resources and their properties into biotic characteristics and the characteristics of abiotic entities.

**Bromeliads:** Monocot flowering plants that consists of perennial, terrestrial, or epiphyte shrubs or grasses from tropical and temperate regions of America (except for a single species from West Africa). Bromeliads are named after the 17<sup>th</sup> century Swedish botanist Olaf Bromel.

**Hydrobiological Characterization:** The study of the ecological characteristics of the communities of living organisms that live in a determined body of water.

**Near Threatened (NT):** Category of threat or risk established by the IUCN. A taxon is in the “Near Threatened” category when it has been assessed according to the criteria and does not meet the criteria for the categories “Critically Endangered,” “Endangered” or “Vulnerable” but is close to being classified as “Vulnerable,” or could enter that category in the near future (Biodiversity Information System – SIB for the Spanish acronym and Facilitation Mechanisms – CBD, Alexander von Humboldt Institute)

**Near Endemic:** This refers to species that have half or more of their distribution within the political borders of the country, extending toward one or more neighboring countries. (Stiles 1998)

**Global Threat Category:** Refers to whether a species is included in one of the IUCN threat categories at a global level. (IUCN 2016)

**National Threat Category:** Refers to whether a species has an IUCN category reviewed and modified for the country. (Renjifo et al. 2002)

**Threat Categories:** Defines the level of threat for the taxon evaluated according to the criteria of the International Union for Conservation of Nature (IUCN). There are different categories: Extinct

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(EX); Extinct in the Wild (EW); Critically Endangered (CR); Endangered (EN); Vulnerable (VU); Near Threatened (NT); Least Concern (LC); Data Deficient (DD) and Not Evaluated (NE) (IUCN 2016).

**CITES:** Convention on International Trade in Endangered Species of Wild Fauna and Flora. This is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES is an international agreement to which States (countries) adhere voluntarily. CITES subjects the international trade in specimens of selected species to certain controls. All import, export, re-exports, and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. The species covered by CITES are listed in three appendices, according to the degree of protection they need (CITES 2016)

**Natural Land Cover:** This is the land cover that despite transformation processes and the dynamics of change, maintains natural features and elements relative to its composition and the structure of the vegetation, including those that are going through early, transitional, and advanced stages of succession such as secondary vegetation. They include natural grassland, shrubs, forests, and others, and they are classified using the Corine Land Cover methodology adjusted for Colombia (IDEAM, 2010).

**Compensation:** Consists of actions that have the goal of compensating biodiversity due to impacts or negative effects that could not be prevented, corrected, mitigated, or replaced and that lead to a loss of biodiversity in natural terrestrial ecosystems and secondary vegetation. It guarantees the effective conservation of an ecologically equivalent area where a strategy is followed for continuous conservation and/or its ecological restoration, so that, when comparing with the baseline, it guarantees no net loss of biodiversity.

**Hydrobiological Communities or Hydrobiota:** This refers to the different types of living organisms (plants, animals, and microscopic creatures) that inhabit a determined body of water.

**Landscape Context:** “Refers to the connectivity between the fragment of natural ecosystem under study and other fragments of natural land cover. To assess them and spatialize them, the following equation can be used, using a 500 m area around the fragment as the reference baseline. Values for connectivity oscillate between zero and one. Values close to 1 represent a better landscape context. The valuation and spatialization of these two criteria is described in the baseline ecosystem information of environmental studies, according to the requirements contained in the respective terms of reference” (quoted textually from Saenz, et al. (2012))

**Diameter at Breast Height (DBH):** This is the diameter of the shaft or trunk of a tree measured at a height of 1.30 m from the ground.

**Diversity (species diversity):** The wealth and degree of equitable distribution of the species of a community (taxocenoses).

**Alpha Diversity:** The wealth and abundance of species in a determined habitat.

**alpha Diversity:** The number of species or the diversity in a concrete community, sample, point, or site.

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**beta Diversity (mosaic or motive diversity):** the degree of change in the specific composition from one place to another, throughout an environmental gradient.

**Beta Diversity:** The diversity between habitats in a same ecosystem, in other words, the variation in the number of species between one habitat and another.

**Diversity:** The number of different species, that coincide in some point, or under the same condition.

**Ecosystem:** The array of plant, animal, and microscopic organisms in a determined area that interact with each other and with the surrounding environment, through processes such as depredation, parasitism, competition, and symbiosis.

**Edge effect:** In a fragment, the edge effect corresponds to the dynamics in the transition zone between the surrounding matrix and the nucleus (or interior area), which determine, among other attributes, the diversity, wealth, and abundance of species in the fragment, flows and connectivity between fragments, exchange of energy, and availability of habitat.

**EIA:** Environmental Impact Assessment. It is the technical and administrative procedure that serves to identify, prevent, and interpret the environmental impacts that a specific projects will produce on its surroundings if it is executed, all of this so that the competent environmental authority can accept, reject, or modify the assessment.

**Landscape Features:** This refers to the homogeneous spatial units that make up the landscape in functional and structural terms, and that express the flows that occur in that array. The elements are grouped into three categories that correspond to the Matrix (dominant pattern of the landscape in which other features are differentiated), Patches (remnant non-linear and homogeneous elements differentiated from their surroundings) and Corridors (linear elements in the form of long strips, which cross the matrix and are different from it).

**Epiphyte:** An adjective used in botany [vegetation] that grows on the surface of another plant, yet is not a parasite. For example, moss and lichen are epiphytes.

**Species at risk:** A species that has been the object of human actions or activities (tensioners or anthropogenic disturbances) that can generate changes in the structure, composition, and/or functioning of the population.

**Endangered Species (EN):** A threatened species that has a high risk of extinction in the wild in the near future, by virtue of the fact that there is a downward trend in natural populations and deterioration in their area of distribution.

**Critically Endangered Species (CR):** A threatened species that has a very high probability of extinction in the wild in the immediate future, by virtue of the fact that there is a drastic reduction in natural populations and severe deterioration in their area of distribution.

**Endemic Species:** a species with a spatial and population distribution exclusive to a defined sector or area.

**Restricted Species:** A species that is protected in terms of its usufruct (logging, collecting, or hunting) in national or regional laws. The restriction may be temporary or permanent, national or

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regional, depending on the status of the land cover, its distribution, and the size of the population of the species protected.

**Vulnerable Species (VU):** A threatened species that is not in imminent danger of extinction in the near future, but could come to be in danger if its natural populations continue to go down and its distribution area continues to deteriorate.

**Restricted Species:** species of plants or animals whose sale, collection, or hunting have legal restrictions due to their vulnerability.

**Endemic Species:** species of plants and animals whose distribution is restricted to national territory.

**Migratory Species:** The species of animals that travel through long municipalities in a way that is regular and foreseeable.

**Strata:** In silviculture, the group of masses and stands with one or more characteristics in common that are grouped for the purposes of inventory, forest management, etc. In ecology, the mass of plants that occupy a space between lower and upper vertical limits, for example: upper strata (trees), middle strata (bushes), and lower strata (grasses).

**Facultative terrestrial:** a plant that can develop both in an epiphyte habitat -on other plants - and in the terrestrial habitat, directly on the ground.

**Phytoplankton:** This community includes the plants and bacterial organisms that are capable of engaging in photosynthesis as the main process for their vital development (Ramírez, 2000); they live suspended in the water (Ramírez, 2000).

**Wild Flora:** all the species and individual plants in the national territory that have not been planted or improved by man.

**Fragmentation:** a dynamic and gradual process in which a habitat is reduced to fragments of smaller sizes, generating a different matrix than what was found originally. The transformation and fragmentation of habitat create alterations in ecological processes, dynamics, and interrelations.

**Habitat:** the natural conditions that surround a plant or animal species and the place itself in which that species lives in a biotope.

**Marchantiophyta (hepatic):** adjective or name in botany [plant]. Belonging to the marchantiophyta class. A class of bryophyte plants made up of cellular tissue, with a very short stalk or no stalk, relatively underdeveloped leaves, no nerves, and lacking roots.

**Ichthyofauna:** refers to the fish life inhabiting a determined place. Their presence is based on environmental conditions and the supply of food prevailing in the zone (Nelson, 2006).

**Environmental Impact:** any alteration in the biotic, abiotic, or socioeconomic system that is either adverse or beneficial, total or partial, that can be attributed to the development of a project, work, or activity.

**Lentic:** closed bodies of water that remain in the same place without running or flowing, such as lakes, lagoons, estuaries, or marshes.

**Lichen:** (name, plural lichen) The group of organisms made up of algae and fungi that live in a symbiotic association. The fungi provides a structure that can protect the algae from dehydration

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and unfavorable conditions, while the algae synthesizes and excretes a specific carbohydrate that the fungi take and use as food.

**Lotic:** bodies of water that are characterized by having water that is in continual movement, such as creeks, streams, brooks, and rivers.

**Macrophytes:** aquatic plant species that live mainly in continental aquatic systems, growing in the majority of the lentic systems and on the banks of lotic systems (Ramírez and Viña, 1998).

**Benthic Macroinvertebrates or Macrobenthos:** organisms that can be seen with the naked eye. In other words all those organisms that have sizes greater than 0.5 mm in length. These organisms live at the bottom of lakes and rivers, buried in the bed, on rocks and submerged trunks, or adhered to floating or rooted vegetation. Some swim freely in the water and on the surface (McCafferty, 1981)

**Metrics:** mathematical indexes or algorithms developed to determine quantitatively the characteristics of fragments, their types, and the landscape of which they form a part, according to their spatial dimensions.

**Migration:** Seasonal travel by the populations of one or several species over great distances to seek food resources or less drastic habitats.

**Moss:** (*name, plural mosses*) A class of bryophyte plants formed by small, thin stems and leaves, with no vascular tissue. They lack true roots, but have some filament structures that anchor them, and they grow in tight masses with a velvety aspect, forming a layer over the ground, rocks, tree trunks, and in the water.

**Orchid:** *name.* An herbaceous plant with radical, veined leaves that come out of the root, beautiful flowers, capsule fruit and roots with two ellipsoidal-shaped, symmetric tubers. Name comes (nineteenth century) from the Greek *orkhídion* 'plant with two ellipsoidal and symmetric tubers', diminutive of *órkhis* 'testicle,' based on the shape of the tubers.

**Periphyton:** The aquatic communities associated with substrates that are submerged and at the same time exposed to light are colonized by different types of organisms such as bacteria, fungi, phytoplankton protozoa and zooplankton, and benthic organisms. These organisms grow adhered to the substrate and are called periphyton or periphytic (Hutchinson, 1975).

**Plankton:** one of the communities that forms a part of the pelagic environment. This community refers to all types of animals and plants that live suspended in the water at the mercy of the currents (Roldan and Ramírez, 2008).

**Non-vascular Plants:** non-vascular plants are those that do not have a vascular system (xylem and phloem). Although non-vascular plants lack those particular tissues, many have simpler tissues that are specialized for internal transportation of water, for example the bryophytes and lichens.

**Vascular Plants:** Vascular plants have transport tissues (vascular system) where water, nutrients, or different minerals circulate inside the plant. There are two types of transport tissue in plants: Xylem and Phloem. Xylem: conducts water and nutrients from the roots to the rest of the plant.

**Least Concern (LC):** A category of the UICN. A taxon is in the category of "Least Concern" when upon being evaluated it does not meet any of the criteria that define the categories of risk or threat. Equivalent to out of danger. (Biodiversity Information System -SIB and Facilitation Mechanisms, Alexander Von Humboldt Institute).

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**Wealth of Species:** the number of the species in a community, taxocenoses, or area.

**Lithophyte:** Plants that grow on rocks.

**Cultural Service:** This category covers all those non-material and intangible benefits received from ecosystems, either through spiritual enrichment, cognitive development, reflection, cultural identity, or aesthetic experiences. This category also includes recreation, tourism, and visual appreciation for landscapes, as groups of natural elements that provide satisfaction and enjoyment of the surroundings.

**Provisioning Services:** All those services, including goods and products, obtained directly from ecosystems as a provision for some benefit. Provisioning services include, among other things, the use of water resources, of wood, fibers and resins, food coming from agricultural and livestock activities, products coming from hunting and fishing, the use of minerals and energy sources (petroleum, gas, coal) and all those elements that supply human beings for their daily activities.

**Regulating Services:** This corresponds to the services derived from ecosystem processes, in other words, all those products from the flow, interrelations, and interactions between the different components of ecosystems. Regulating services include, then, processes for regulating the climate, maintaining air quality, purifying the water, controlling illnesses and pathogens, fertility of the soil, and control of erosion, among other processes that have an impact on the conditions that affect the well-being of human beings.

**Supporting Services:** Includes all those ecological processes that underlie and sustain the functioning and provision of all the other ecosystem services, and that depend directly on their existence. In this sense, said category groups together processes such as biogeochemical cycles (the water cycle, and the cycle of nutrients such as phosphorus, carbon, nitrogen, and others), soil formation processes, primary production (photosynthesis), and support of habitat, fundamental for maintaining biodiversity, ecosystems, and other services associated with them.

**Ecosystem Service:** All those cultural, economic, and ecological benefits that human beings receive directly and indirectly from biodiversity, and that result from the interaction between the different elements, components, structures, and functions of ecosystems, being the bridge that joins human beings and their surroundings together in a substantial way. Said relationship between human beings and biodiversity generates conditions for well-being, because the services provided contribute in one way or another to the development of all human activities in terms of production, extraction, settlement, and consumption, as well as contributing to quality of life.

**IUCN:** International Union for Conservation of Nature (IUCN). The IUCN is a multicultural and multilingual organization, whose headquarters is located in Gland, Switzerland. This organization has taken on the job of defining the basic guidelines for assigning risk and threat categories for flora and fauna by preparing red lists. These red lists evaluate a group of candidate taxon, according to their risk of extinction or degree of deterioration in the population.

**Forest Sampling Unit (UMF for the acronym in Spanish):** Corresponds to the sampling of tree vegetation (lots) surveyed in the field in which the number of individual trees is recorded for a

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determined area, identifying to which species they belong and their dasometric data (height, DBH, and others).

**Vulnerable Species (VU):** Category of threat or risk established by the IUCN. A taxon is in the “Vulnerable” category when the best evidence available indicates that it faces a moderate risk of extinction or deterioration in its population in the medium run, as defined by the criteria: A) quick destruction of the size of the population; B) Area that is small, fragmented, or continuously decreasing in size; C) small and decreasing population; D) very small population or area; E) population viability analysis (Biodiversity Information System -SIB and Facilitation Mechanisms, Alexander Von Humboldt Institute).

**Zooplankton:** This community is represented by the animal organisms of plankton, which are characterized by being heterotrophic (they receive their food from phytoplankton) and are located on the scale immediately above phytoplankton in the food chain of aquatic ecosystems (Roldán and Ramírez, 2008).

#### 4. SOCIOECONOMIC COMPONENT