

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

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Pulp Mill, River Port, Transmission Line and Electrical Substation in Concepción – Paraguay

VOLUME III - ENVIRONMENTAL IMPACT ASSESSMENT, MITIGATION MEASURES AND CONCLUSION

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10 IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

10.1 Methodological procedures for environmental impact assessment

This document consists of the Environmental and Social Impact Assessment for the implementation of a PARACEL pulp mill, with a production capacity of 1.5 million tons per year of bleached paper pulp, in Concepción, Department of Concepción, Paraguay.

It should be noted that PARACEL's pulp mill, despite being designed to produce 1,500,000 tons per year, it will be able to produce up to 1,800,000 tons per year of bleached pulp as a result of greater overall efficiency of the plant, as well as higher equipment performance without the need to increase the constructed area or include new additional equipment. In addition, no modifications will be required to the main environmental control equipment, nor will there be any loss in performance, which can guarantee the same liquid effluent and atmospheric emissions considered in this ESIA. Therefore, it can be said that in the event of an increase in pulp production to 1,800,000 tons per year, there will be no changes in the environmental impacts identified and evaluated in this ESIA.

According to Article 1 of Law # 294/93:

“Environmental impact, for legal purposes, shall be understood as any modification of the environment caused by human works or activities that have as a positive or negative consequence, directly or indirectly, to affect life in general, biodiversity, the quality or a significant quantity of natural or environmental resources and their use, welfare, health, personal safety, habits and customs, cultural heritage, legitimate livelihoods.”

The methods and criteria used for the evaluation of impacts consist of the analysis of the impacts derived from the company's actions in each environmental component (physical, biological and anthropic), being detailed according to the minimum content established in article 3 from Law n° 294/93.

Other than that, this document is in line with what established by the Performance Standards (PS) of the IFC:

- IFC PS 1 on "Evaluation and management of environmental and social risks and impacts";
- IFC PS 2 on “Labor and working conditions”;
- IFC PS 3, on “Resource Efficiency and Pollution Prevention”;
- IFC PS 4 on “Community Health and Safety”;
- IFC PS 5 on “Land Acquisition and Involuntary Resettlement”;
- IFC PS 6 on “Biodiversity Conservation and Sustainable Management of Living Natural resources”;
- IFC PS 7 regarding the Indigenous People;
- IFC PS 8 on Cultural Heritage.

Therefore, the diagnosis of the area of influence provided greater knowledge of the region, allowing a prognosis related to its future development. Having said this, the knowledge of the characteristics of the project and the environmental aspects of its area of influence made it possible to identify and evaluate the possible consequences for the natural or anthropic environment based on an appropriate methodology. For the analysis of these consequences, the structure of the document was based on the following procedures:

- Identification of impact generating activities;
- Methodology for environmental impacts assessment;
- Identification of environmental impacts;
- Environmental impact assessment;
- Evaluation summary tables.

The conclusions obtained in the impact assessment phase allowed us to propose mitigation measures, when negative impacts are involved, as well as ways to maximize impacts, when positive impacts are involved, thus optimizing the benefits generated by PARACEL's company.

10.1.1 Identification of impact-generating activities

In order to identify the activities that generate environmental impact, a survey was carried out of the actions to be carried out in the different stages of the project: design, construction, deactivation of works and operation. At each of these stages, due to the actions taken, there may be changes in the environment, which must be recorded and evaluated.

The main impact generating activities (generating factor) identified for each phase of the company's implementation were

Design phase

- Dissemination of the company;
- Elaborate environmental studies;
- Non-implementation of the project.

Construction phase

- Hiring of labor;
- Hiring of outsourced services;
- Installation of the workshop;
- Installation of accommodation and housing rentals;
- Cleaning of the land;
- Embankment services;
- Vegetation removal;
- Water consumption;
- Generation of sanitary sewage;
- Generation of solid waste;
- Vehicle traffic;

- Vehicle maintenance;
- Acquisition of materials, equipment and services;
- Soil waterproofing;
- Opening of accesses and roads;
- Construction and assembly of buildings and equipment;
- Implementation of water and effluent pipes and river port.

Phase of works deactivation

- Demobilization of the construction site;
- Demobilization of labor.

Operation phase

- Land occupation;
- Hiring of labor;
- Hiring of outsourced services;
- Water consumption;
- Discharge of treated effluents;
- Generation of atmospheric emissions;
- Generation of solid waste;
- Vehicle traffic;
- Transport of chemical products;
- Vehicle maintenance;
- Marketing of the final product;
- Transmission line and substation;
- Port operation

10.1.2 Methodology for environmental impacts assessment

Currently, there are several methodological lines developed for environmental impact assessment: spontaneous methodologies (Ad hoc), checklists, interaction matrices, interaction networks, quantitative methodologies, simulation models, overlay maps, scenario projection, among others.

PÖYRY has a multidisciplinary team with extensive experience and has conducted numerous environmental studies in various segments, and especially in the paper and pulp sector. Thus, over the years, through the accumulation of experience and the increase in the repertoire of technical and scientific works, PÖYRY has developed its own methodology for the identification and evaluation of impacts.

This methodology is based on the development of a checklist (which in turn already includes interaction matrices), in which the factors generating impacts (activities) and the aspects leading to impacts on the environmental components are listed in the various project phases.

The impact assessment methodology was also based on legal provisions such as Law no. 294/93 and therefore presupposes temporal and spatial scales of impacts. In this study, the design, construction, deactivation and operation phases were used as the temporal scales, and for the spatial scales the area directly affected, the area of direct

influence and the area of indirect influence were used. The evaluation was consolidated through discussion among the members of the multidisciplinary technical team.

Thus, impacts were evaluated, qualifying them according to their specificities and indicating their spatial magnitude (qualitative measure) and degree of importance depending on how long they remain in the environment. According to these criteria, the main impacts were characterized by the following attributes:

- The **nature**: indicates whether the impact has beneficial/positive (P) or adverse/negative (N) effects;
- The **form of incidence**: indicates if the impact affects the environmental factor direct (D) or indirect (I);
- The **area of spatial coverage**: can be local (L), when the impact is spread in the directly affected area of the company and/or in the area of direct influence; regional (R), when the impact is spread in the municipality of Concepción and/or spreads to the Department of Concepción; or strategic (E), when the impact is interconnected with local and/or regional development strategies;
- The **probability of occurrence**: whether the impact is a certain event (C) to occur, or possible (P);
- The **moment of occurrence**: if the impact occurs after the start of the generating activities in an immediate way (I) / short term – one year (CP); medium term – 2-5 years (MP) and long term – 5+ years (LP);
- The **temporality or duration**: refers to the duration of the impact on the environment, which can be temporary (T), when it occurs in a determined period, permanent (P), when it occurs throughout the life of the company, and cyclical (C), when the effect is manifested in certain intervals of time;
- The **degree of reversibility**: reversible (R), when the affected environmental factor tends to return to the original conditions, or partially reversible (PR) and irreversible (I), when the factor does not return to the original conditions;
- With respect to **accumulation**: when the impact is established as simple (S), accumulation Type I (I), accumulation Type II (II), and accumulation Type III (III);
 - Simple (S): is not characterized by bioaccumulation or biomagnification processes; does not accumulate in time or space; does not induce or enhance any other impact; does not interact in any way with other impact(s); and does not increase in past and present actions (European Commission, 2001);
 - Type I (I) accumulation: accumulation by bioaccumulation;
 - Type II (II) accumulation: accumulation by repetition or overlap, accumulating in time and/or space;
 - Type III (III) accumulation: accumulation by interactivity or synergy.

- The **magnitude**: refers to the degree of impact on the studied element, which can be low (B), medium (M) or high (A), depending on the area of spatial coverage reached;
- In relation to the **possibilities of mitigation**: possible impact to be mitigated (M), partially mitigated (PM) and not mitigated (NM)
- Regarding **importance**: it establishes as small (P), medium (M) or large (G), taking into account the magnitude and possibilities of mitigation of the environmental factors affected by the impact. In order to establish a combined rule for the attributes of magnitude and mitigation for the definition of importance, the following Table was drawn up

Table 1 – Criteria for environment impact assessment

Importance	Criteria
Small	<ul style="list-style-type: none"> - Low and mitigated magnitude (or low degree of enhancement for positive impacts) - Low and partially mitigated magnitude (or medium degree of enhancement for positive impacts) - Medium magnitude and mitigated (or low degree of enhancement for positive impacts)
Medium	<ul style="list-style-type: none"> - Low and unmitigated magnitude (or a high degree of enhancement for positive impacts) - Medium and partially mitigated magnitude (or medium degree of enhancement for positive impacts) - High and mitigated magnitude (or low degree of enhancement for positive impacts)
Large	<ul style="list-style-type: none"> - Medium and unmitigated magnitude (or high degree of enhancement for positive impacts) - High and partially mitigated magnitude (or medium degree of enhancement for positive impacts) - High and unmitigated magnitude (or high degree of enhancement for positive impacts)

* Except when the impact, despite being small or medium and mitigable, is of extreme environmental and/or social importance.

Source: Pöyry, 2018.

Degree of resolution of the measures proposed to reduce or enhance a given impact: low (B), medium (M) or high (A).

In this methodology, the mitigation measures, in the case of negative impacts, or the strengthening of positive impacts are already predicted and related, and their degree of resolution (high, medium or low) is evaluated after implementation.

From the measurement of the impact and the resolution of the proposed measure it was possible to define the degree of importance of the impact, taking into account the environmental situation before the implementation of the company.

In the case of positive (beneficial) impacts, measures must be taken to make the most of the benefits generated; these are the so-called enhancing or compatible measures.

And in the case of impacts that are partially mitigated or not possible to mitigate, compensatory measures are proposed.

Having said that, the qualitative evaluation of each impact was carried out according to the Table below, which explains the attributes that were characterized during the analysis

Table 2 – Basic procedure for the assessment of potential environmental impacts and their mitigation measures

Potential environmental impact	
Impacts that can cause changes in the environment.	
Environmental aspect	
Elements of a company's activities, products or services that can interact with the environment, causing or likely to cause environmental impacts, positive or negative.	
Potential impact factor	
Any form of matter or energy resulting from human activities that directly or indirectly affect the health, safety, well-being of populations, social, economic activities and infrastructure, and/or biota.	
Technical justification	
Impact analysis, with the technical-scientific basis for evaluation.	
Characterization of the impact	
The characterization of environmental impacts is carried out in accordance with the environmental legislation in force and is indicated according to the following specificities and attributes:	
Nature:	positive/beneficial or negative/adverse
Form of incidence:	direct or indirect
Area of spatial coverage:	local, regional, strategic
Probability of occurrence:	certain, possible
Time of occurrence:	short term, medium term or long term
Timing or duration:	temporary, permanent or cyclical
Degree of reversibility:	reversible, partially reversible or irreversible
Accumulation:	simple, type I accumulation, type II accumulation and type III accumulation

Magnitude:	high, medium or low
Mitigation possibilities:	mitigated, partially mitigated or unmitigated
Importance:	large, medium or small
Potential for enhancement:	high, medium or low
Degree of resolution of measures:	low, medium or high

Mitigation or enhancement measures

Actions that will reduce or minimize negative impacts or enhance positive impacts.

Responsibility for the implementation of the measures

Indicates the person responsible for the implementation of the measures.

Forecast after implementation of measures

Impact analysis after the implementation of measures

The quantitative evaluation of the impacts was carried out through analyses of the magnitude associated with the area of spatial coverage, probability of occurrence and duration of the actions and the importance of the impacts on the environmental factors associated with the action, temporality/duration and degree of reversibility of the action. Therefore, the greater the impact, the higher the assessment. The assessment uses 1 to 3 following the methodology of Leopold et. (1971) so that even the least significant impact is considered in the assessment.

The following Table shows the values of each impact characterization attribute:

Table 3 – Values for each attribute of impact characterization

Spatial coverage area		
Local	Regional	Strategic
1	2	3
Occurrence probability		
Possible		Certain
1	2	
Occurrence moment		
Short term	Medium term	Long term
1	2	3
Timing/Length		
Transitory	Cyclical	Permanent
1	2	3
Reversibility degree		
Reversible		Irreversible
1	2	
Magnitude		
Small	medium	Large

1	2	3
Importance		
Low	Medium	High
1	2	3

Individually, each impact will have a sum corresponding to the criteria presented above. For positive impacts the values are positive (+), for negative impacts the values are negative (-) and for positive and negative impacts the values are cancelled.

After this individual stage, the results obtained for all impacts are added up, obtaining the total sum of the impact assessment.

The total sum of the quantitative impact assessment is compared with the maximum achievable score (number of impacts x maximum impact score) corresponding to 100%.

The result of the comparison with the maximum score, in %, was assessed according to the following criteria:

- Up to 50%: company is viable;
- Between 50 and 80%: the company is viable with the implementation of new mitigation measures, which have not been contemplated in the evaluation;
- Between 80 and 100%: company is not viable

10.1.3 Identification of environmental impacts

Based on the characterization of the project and based on the environmental diagnosis in the area of influence, the identification of environmental impacts generated in the physical, biotic and socioeconomic environments for the different phases of the project was initiated: design, construction, deactivation of the works and operation.

For the identification of impacts, the environmental components studied in the environmental diagnosis were considered, listed in the following Table.

Table 4 – Environmental components subject to impact

PHYSICAL ENVIRONMENT	Soil
	Water
	Air
BIOTIC ENVIRONMENT	Flora
	Terrestrial Fauna
	Aquatic fauna
SOCIO-ECONOMIC ENVIRONMENT	Urban and rural structure
	Production and economic structure
	Social structure
	Road Infrastructure

	Public finance
	Cultural Heritage

As mentioned, the main mechanism used to identify the impacts was the use of the Interaction Matrix along with the checklist, which contains the list of the main actions associated with the phases of the project that can generate environmental impacts.

The analysis between the impacting actions and their interactions with the environmental components, for the different phases of the project, allowed through the Interaction Matrix the identification of environmental impacts, as described in the methodology.

With the use of this Matrix it was possible to identify 44 environmental impacts on the environmental components (physical, biotic and socioeconomic aspects) in the project's areas of influence, as follows

Design Phase

- A.1 - Generation of expectations in the population;
- A.2 - Generation of direct and indirect temporary jobs;
- A.3 - Hypothesis of non-realization of the project.

Installation Phase

- B.1 - Generation of erosive processes and sedimentation of the river;
- B.2 - Water use conflict;
- B.3 - Change in surface water quality;
- B.4 - Change in air quality;
- B.5 - Disturbances related to noise;
- B.6 - Change in soil and/or water quality due to improper waste disposal;
- B.7 - Impacts generated by the construction of the river port;
- B.8 - Vegetation and land habitat loss;
- B.9 - Higher risk of running over animals
- B.10 - Change in aquatic ecosystems;
- B.11 - Generation of direct and indirect temporary jobs;
- B.12 - Interference on infrastructure;
- B.13 - Higher risk of accidents;
- B.14 - Impact on morphology;
- B.15 - Interference with cultural heritage;
- B.16 - Increasing tax collection and Boosting the local economy;
- B.18 - Worker influx Increase;
- B.19 - Dust generation due suppression of local vegetation;
- B.20 - Risk of harassment to flora and fauna by workers.

Phase of works deactivation

- C.1 – Reduction in the number of jobs.

Operation Phase

- D.1 - Noise-related disturbances;
- D.2 - Change in soil and/or water quality due to improper waste disposal;
- D.3 - Change in soil and/or water quality due to leaks and chemical spills;
- D.4 - Conflicting use of water;
- D.5 - Change in river quality;
- D.6 - Change in air quality;
- D.7 - Fugitive emissions increase;
- D.8 - Higher risk of running over animals
- D.9 - Change in aquatic ecosystems
- D.11 - Impact to Natural and modified habitat;
- D.12 - Generation of direct and indirect jobs;
- D.13 - Higher risk of accidents;
- D.15 - Increasing tax collection and Boosting the economy;
- D.16 - Road transportation increase;
- D.17 - Impacts from Transmission line and substation;
- D.18 - River transportation increase;
- D.19 - Visual impact;
- D.20 - Port operation;
- D.21 - Increase communication with local Stakeholders;
- D.22 - Injury or death to fauna and flora due to improper waste disposal, and spills;
- D.23 - Noise-related disturbances on fauna.

In the Interaction Matrix, the potential impacts identified are distributed by environmental component (physical, biotic and socioeconomic aspects). The Interaction Matrix and the list of identified impacts, due to project actions, are found in the following tables.

Table 5 – Interaction Matrix between the project activities that generate impacts and the environmental components (physical, biotic and socioeconomic aspects).

INTERACTION MATRIX	COMPONENTES AMBIENTALES													
	Physical Environment				Biotic environment				Socio-economic environment					
	Soil	Surface water resources	Groundwater resources	Air	Flora terrestrial	Flora aquatic	Fauna terrestrial	Fauna aquatic	Urban and rural structure	Production and economic structure	Social structure	Infrastructure	Quality life	Public finance
ACTIONS GENERATING PROJECT IMPACTS														
Design														
Company diffusion									A.1	A.1, A.2	A.1	A.1	A.1, A.2	A.1
To elaborate environmental studies										A.2		A.2	A.2	A.2
Non-implementation of the project									A.3	A.3	A.3	A.3	A.3	A.3
Construction														
Hiring of man power;									B.12, B.18	B.12, B.16, B.18	B.11	B.12	B.11, B.18	B.11
Hiring of outsourced services									B.12, B.18	B.12, B.16, B.18	B.11	B.12	B.11, B.18	B.11
Installation of the construction site	B.1	B.3		B.4	B.8								B.5	
Accommodation facilities and home rentals									B.14	B.12, B.17	B.14			B.11
Cleaning the land	B.1				B.8		B.8		B.5					
Embankment services	B.1			B.4	B.8		B.8		B.5					
Water consumption		B.2	B.2							B.2				
Vegetation removal					B.8		B.8, B.9		B.5					
Generation of sanitary wastewater		B.3												
Generation of solid waste	B.6	B.6	B.6											
Vehicle Transit				B.4			B.9		B.5	B.13		B.13	B.5	
Vehicle maintenance				B.4									B.5	
Acquisition of materials, equipment and services										B.11, B.17	B.11		B.11	B.11
Soil waterproofing									B.14			B.14		
Opening of access and roads				B.4					B.5, B.12, B.14	B.13		B.13, B.14		
Construction and assembly of buildings and equipment									B.5, B.14			B.14		
Implementation of water and effluent pipes and river port	B.1, B.7, B.10	B.10		B.4		B.7, B.8, B.10		B.7, B.10	B.7	B.7	B.7			
Deactivation of works														
Deactivation of work site													B.5	
Workforce Downsizing									C.1	C.1	C.1		C.1	
Operation														
Hiring of labor										D.14		D.12	D.14	D.14
Hiring of outsourced services;										D.14		D.12	D.14	D.14
Water consumption		D.4								D.4				
Discharge of treated effluents		D.5				D.9		D.9						
Generation of atmospheric emissions				D.6, D.7										
Generation of solid waste	D.2	D.2	D.2											
Vehicle Transit				D.6			D.8, D.13			D.13			D.16	
Transport of chemicals	D.3	D.3, D.5	D.3				D.8, D.13			D.13			D.16	
Vehicle maintenance	D.3	D.3	D.3											
Marketing of the final product							D.8			D.13			D.16	D.16
Infrastructure operation	D.10	D.10	D.10	D.10	D.10, D.11		D.10, D.11		D.16, D.19	D.17, D.18		D.16, D.17, D.18, D.20	D.21, D.22	D.21, D.22

That said, the impacts identified from the project's actions are listed in the Table below.

Table 6 – Check list of identified impacts

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact
Design	Socioeconomic	Information about the implementation of the company	Generation of Jobs	Generation of expectations in the population
		Studies for the generation of scientific knowledge of the project region	Hiring of services for the preparation of environmental studies	Generation of direct and indirect temporary jobs
		Non-implementation of the project	Stopping or non-execution of the project	Hypothesis of non-realization of the project
Installation	Physical	Earthworks and water intake services, emissary	Earth movement and interventions in land areas near the river	Generation of erosion processes and river sedimentation
		Water consumption during the construction phase	Availability of groundwater	Water use conflict
		Installation of the pulp mill	Inadequate generation and disposal of effluents and sanitary wastewater	Change in surface water quality
		Movement of vehicles and machines	Dust generation	Change in air quality
		Movement of vehicles and machines	Noise generation	Disturbances related to noise
		Implementation of the pulp mill	Inappropriate generation and disposal of solid waste	Change in soil and/or surface water and groundwater quality

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact	
Installation	Physical	Civil works for the construction of the port infrastructure	Impacts on the physical, biotic and socio-economic environment due to the port works	Impacts generated by the construction of the river port	
		Biotic	Earth moving activities	Suppression of vegetation	Vegetation and land habitat loss
	Dust generation due to earth movements		Removal of vegetation and alteration of associated habitats	Dust generation due suppression of local vegetation	
	Implementation of water collection and effluent discharge		Interventions in the riverbed and land areas near the river	Change in aquatic ecosystems	
	Movement of vehicles		Increased vehicle traffic	Higher risk of running over animals	
	Opening accesses and roads, and workers pass increase		Hunting risk	Risk of harassment to flora and fauna by workers	
	Pulp mill construction		Replacement of Habitat with pulp mill and its infrastructure	Impact to Natural and modified habitat	
	Socioeconomic		Mobilization of workforce	Hiring of temporary man power	Generation of direct and indirect temporary jobs
			Mobilization of workforce	Pressure on infrastructure due to the increase in the population represented by the workforce in the construction phase	Interference on infrastructure

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact
		Movement of vehicles	Increase in vehicle traffic	Higher risk of accidents
Construction	Socioeconomic	Implementation of the mill, which consists of buildings, towers, chimneys, etc.	Change of landscape and land use	Impact on morphology
		Earth moving activities	Possibility of affecting cultural heritage sites	Interference with cultural heritage
		Demand for products and services by the company and the workforce	Growth in the production of goods and services	Increasing tax collection and Boosting the local economy
		Mobilization of workforce	Demand for workforce	Worker influx increase
		Mobilization of workforce	Pressure on infrastructure due to the increase in the population	Impacts to community health and safety
		Mobilization of workforce	Pressure on infrastructure due to the increase in the population	Impacts to vulnerable groups
Works Deactivation	Socioeconomic	Demobilization of temporary man power	Termination of the construction works of the PARACEL pulp mill	Reduction in the number of jobs
Operation	Physical	Operational activities for the manufacture of pulp	Noise generation by the pulp mill	Noise related disturbances
		Pulp mill operation	Inadequate generation and disposal of solid waste	Change in soil and/or surface water and groundwater quality

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact
		Use of chemicals	Improper storage and handling causing chemical leaks or spills	Change in air, soil and/or surface water and groundwater quality
Operation	Physical	Water consumption	Paraguay River Water Availability	Conflicting water usage
		Pulp mill operation	Launching of liquid effluents generated without or with inadequate treatment	Change in river quality
		Operational activities for the pulp mill	Generation of atmospheric emissions	Change in air quality
		Operational activities for the pulp mill	Generation of atmospheric emissions	Fugitive emissions increase
	Biotic	Movement of vehicles	Increasing vehicle traffic	Higher risk of running over animals
		Operation of the pulp mill	Inappropriate generation and disposal of solid waste and spills	Injury or death to fauna and flora due to improper waste disposal, including spills
		Pulp mill operation	Liquid effluents disposal in Paraguay river	Change in aquatic ecosystems
		Pulp mill operation	Replacement of Habitats with pulp mill	Noise related disturbances on fauna

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact
		Accidental oil leakage or spill	Change in the physical-chemical conditions of soil, water and/or air	Impact of oil spills in river due to river transportation
Operation	Socioeconomic	Movement of vehicles	- Increasing vehicle traffic - Increasing running over animals	Road transportation increase
		Maneuver, loading and unloading	Risk of accidents	Port operation
		Pulp mill operation	Risk of accidents and electromagnetic field	Impacts from the Transmission line and substation
		Manpower demand for the operation of the pulp mill	Hiring of manpower for operation of the pulp mill	Generation of direct and indirect jobs
		Pulp mill operation	Risk of accidents in the pulp mill	Higher risk of accidents
		Product and service demand	Growth in the production of goods and services	Increasing tax collection and Boosting the economy
		Mill operation, which consists of buildings, towers, chimneys, etc.	Change of landscape and land use	Visual impacts
		Pulp mill operation	- Risk of accidents - Electromagnetic field	Impacts from Transmission line and substation

Phases	Component	Activity (Generating factor)	Environmental Aspect	Impact
Operation	Socioeconomic	Pulp mill operation	<ul style="list-style-type: none"> - Affected elements from the mill - Communities consultation due to impacts 	Increase communication with local Stakeholders

10.1.4 Environmental Impact Assessment

Once the generating activities, the environmental impacts and the methodology of their evaluation had been identified, a qualitative and quantitative evaluation of the environmental impacts was carried out.

Qualitative Assessment

In the qualitative evaluation, the impacts were considered in the different phases of the project: design, construction, deactivation of the works and operation; and mitigation or enhancement measures were proposed according to the degree of alteration that occurred in the physical, biotic and anthropic environments, described in the technical base, as follows.

10.1.4.1 Design Phase

10.1.4.1.1 Socioeconomic Environment

10.1.4.1.1.1 Generation of expectations in the population

Environmental aspect

Generation of expectations of the population in relation to the opening of work fronts resulting from the implementation of the company.

Impact-Generating Factor

Dissemination of information about the company's implementation

Technical justification

As soon as the implementation of the pulp mill is publicized, it is expected that there will be a creation of expectation in the population of the region. Expectations can be positive or negative.

The results of the study of "Social Perception" allowed to have in pre-project stage the opinion/perception of the communities about the socioeconomic characteristics of the area and also about the construction of the industrial plant. This information was obtained from approximately 316 people from DAA and DIA by using various techniques such as a census of families located in the immediate surroundings of the

project implementation area, interviews with key institutional and community actors, and as a complement, community focus groups and a participatory workshop were carried out in the city of Concepción, the capital of the department, as well as surveys at strategic points in the districts involved.

In order to understand the above, the people consulted have expressed as the main concern in relation to the problems of the area, both of the ADA and of the DIA, the lack of employment, which in turn leads to the migration/emigration of people (they migrate to the Chaco or other regions of the country and emigrate to Argentina and Spain). This is related to the response that the communities give to what they expect from the venture, where most have responded that they expect "Generation of sources of work", that the project would bring "Progress and development", as well as "Promoting the development of the department and support the growth of the communities in the area".

Having made that point, the project is a significant source of new jobs for the population, since it will need both direct jobs for the implementation of the company and subcontracted labor.

According to what has happened in similar companies in Brazil, job creation will benefit the local and regional population.

For the population's expectations to remain positive, it is important to carry out presentations of the project through the Dissemination and Communication Program to the main community representatives in order to create a good image and transparency of the company with the population of the municipality from the planning phase.

Characterization of impact

	Qualitative	Quantitative
Nature:	Positive / Negative	+ -
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Possible	1
Moment of occurrence:	Immediate	1
Temporality or duration:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Simple Accumulation	
Magnitude:	High	3
Importance:	Large	3

	Qualitative	Quantitative
Mitigation possibilities:	Mitigated	
Possibilities of enhancement:	High	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Enhancing and mitigating measures

- Disseminate the project, informing the data of jobs that will be generated, as well as the strategy to prioritize the local workforce, in addition to the capacity data, the technology to be used, the environmental control systems, the information on the negative and positive impacts of the company, among others, through meetings with the community and also through other means, in the Dissemination and Communication Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that the dissemination of the project with all interested parties (community, employees, suppliers, government, customers, etc.) and the clarification of doubts that may arise in the sector, will bring confidence and satisfaction to the population regarding the implementation of the project, contributing to the good image and transparency of the company.

10.1.4.1.1.2 Generation of direct and indirect temporary jobs

Environmental aspect

Hiring of services for the preparation of environmental studies.

Impact-Generating Factor

Environmental studies for the generation of technical and scientific knowledge of the project region

Technical justification

The preparation of the Preliminary Environmental Impact Assessment provided a survey of information about the project's area of influence, which resulted in an even greater contribution of knowledge about the region studied - Municipality and Department of Concepción.

In this sense, for the ESIA, campaigns were carried out for noise measurements, analysis of the water quality of the Paraguay River, analysis of air quality, study of information on the biotic environment, and socio-economic data were considered.

For all these works it was necessary to hire labor for the preparation of environmental studies. Several services were supported by the local population, in addition to outsiders moving the hotel chain and restaurants in Concepción and the region.

It is important and fundamental to deal with the social problems that a company of this size can generate, and they are essential for the success of its implementation and regional insertion. In this sense, PARACEL must take the necessary steps to make the region aware of the type and consequences of this project, including ensuring that the population is able to follow the environmental licensing process, in accordance with the law, and have access to the jobs to be generated.

Characterization of impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2
Time of occurrence:	Short term	1
Temporality or length:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Simple	
Magnitude:	Medium	2
Importance:	High	3
Possibilities of potentiation:	High	
Degree of measurement resolution:	High	
Degree of potentiation:	High	
Area of influence:	DIA and IIA	

Potential measures

Disseminate the project, informing data such as: the company's impacts and future monitoring programs, which may require labor through the Dissemination and Communication Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the "Health, Safety, Environment and Social Management System Manual" report.

Forecast after implementation of measures

The dissemination of the environmental monitoring programs to be implemented at the time of construction and later in the operation phase of the project can be considered to generate new data and jobs, which will contribute to clear expectations of the jobs that will be generated.

10.1.4.1.1.3 Hypothesis of non-realization of the project

Environmental aspect

Stopping or non-execution of the project

Impact-Generating Factor

Non-implementation of the project.

Technical justification

The entire infrastructure needed to implement a pulp mill brings numerous socio-economic benefits to the region. Among these benefits are: direct and indirect job generation, service contracting, tax collection, among others.

With current high unemployment rates, the need for labor to build and assemble PARACEL's pulp mill sector will be a major factor in the generation of direct and indirect jobs. Thus, during the implementation period, thousands of employees will work in the construction of the project.

It is worth adding the influence of the work on tax collection, taking into account that priority will be given to the municipality of Concepción, for the acquisition of construction materials and services demanded.

There will be a strong impact on the local economy, boosting the industry and services sector. This process is called the multiplier effect and is based on economic theories to estimate the economic impact of the main initiatives.

There will be a strong addition of hundreds of permanent homes in new hotels and lodges in the region.

The economic development of Concepción will also have an impact on the industrial GDP.

There will be a significant increase in the municipal per capita values of health and education.

Therefore, the implementation of a new pulp mill in Concepción should change the GDP of the municipality, possibly reflecting positively also in the region and the Department.

The suitability of this project with government policies, plans and programs (in the planning and execution phases) shows that the company is in harmony with the government's intentions, favoring growth and promoting growth, in an organized and sustainable way.

The hypothesis of not carrying out the project will have an impact on the economic aspects in the municipality of Concepción since its construction will include a new vector in the economic process of the region.

In addition, the non- installation of the project will create the frustration of the expectation of development that is being created in the municipalities and the region.

Under operating conditions, the PARACEL pulp mill will be self-sufficient in power generation, this factor is important for it to be able to attract other companies to the site due to the greater availability of energy in the region.

As for the environmental impacts on the physical and biotic environment, the non-installation of the project will be reflected in the absence of direct environmental impacts resulting from construction and operation. This can be considered a positive factor in these environments, as they would tend to maintain their current qualities. However, PARACEL will implement the Environmental Management Plan to mitigate all impacts on the physical, biotic and socioeconomic environments.

Impact characterization

	Qualitative	Quantitative
Nature:	Positive/Negative	+ -
Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local, Regional and Strategic	3
Probability of occurrence:	Possible	1
Moment of occurrence:	Long term	3
Timescale or length of time:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Simple	
Magnitude:	High	3
Importance:	Large	3
Mitigation possibilities:	Mitigated	
Degree of resolution of	High	
Area of influence	DIA and IIA	

Enhancing and mitigating measures

Implement the pulp mill in a sustainable manner, reinforcing the company's commitment to the preservation of natural resources and the reduction of environmental impacts through the Environmental Management Plan.

Responsibility for the implementation of the measures

Forecast after implementation of measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Responsibility for the implementation of the measures

Forecast after implementation of measures

Paracel intends to implement the company in a sustainable manner, committed to the preservation of natural resources and the reduction of environmental impacts, and in accordance with current legislation. The hypothesis of not carrying out the project will have an impact on the economic aspects in the municipality of Concepción and will create frustration in the expectations of the population of the municipality and the region.

10.1.4.2 Construction Phase

10.1.4.2.1 Physical Environment

10.1.4.2.1.1 Generation of erosion processes and river sedimentation

Environmental aspect

Earthworks and interventions in land areas near the river

Impact-Generating Factor

Services of earthwork and works of water intake and emissary.

Technical justification

Earth movement is predicted due to earth-moving services, with a balance between cutting and planned sanitary landfill, in order to minimize the areas needed for disposal and borrowing of material from outside the site.

The removed surface soil can be reused as a substrate for any area receiving landscaping treatment.

The areas of influence of the PARACEL pulp mill have basically two types of soil: sandy and clay.

Sandy soils are suitable for forestry. Normally, this type of soil has little capacity to retain water, although it can improve depending on the concentration of organic matter it possesses. Water erosion has devastating effects on sandy soil.

Clay soils are harder and heavier, dark red in color, and when wet they become extremely slippery precisely because of their ability to retain water. Clay soils are excellent for agricultural production, as they are less favorable to erosion, and clay loam soils - a mixture of sand and clay - are also suitable for agriculture. The most outstanding feature of this type of soil is the layering of sandy sediments and white and granular marl. The igneous rocks come from the depths of the earth and have melted to the surface. The sedimentary rocks were formed from clay thanks to the pressure of the earth's layers.

The equipment to be used during the execution of the embankment and cleaning of the land will correspond to blade tractors, loaders, excavators, trucks, dumpers and trailers, among others.

In addition to earthmoving in the project's industrial area, interventions in land areas near the Paraguay River bed for the construction of the raw water intake and effluent disposal system may increase turbidity and the concentration of suspended material in the river.

The layout of the intake pipeline and the land-based emissary of treated effluents, starting from the industrial site to the Paraguay River, prioritizes passage through existing access points and areas used for activities in the region.

With regard to the work to be carried out on the land side of the water intake and the emissary, the project provides for preventive soil protection measures to prevent the transport of sediments into the Paraguay River.

Earthworks are being planned, preferably in non-rainy periods, to reduce the possibility of erosion processes due to the susceptibility of the soil. Some of the measures to be adopted during construction of the project to prevent impacts include building temporary drainage structures to prevent sedimentation in the water body, structures to contain materials, minimizing the exposure time of areas without plant cover and with friable characteristics, and environmental monitoring and supervision of the works. In addition, rainwater will be conducted superficially, through an adequate modification and drainage of soil, being naturally drained in the area.

Impact characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
timing or length of time:	Temporary	1

Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence	ADA	

Mitigation measures

- To implement the Erosive Process Control and Monitoring, which aims to:
 - Plan the implementation of earth-moving and land-preparation works preferably outside the rainy season, in order to reduce the possibility of erosion phenomena due to the susceptibility of the land;
 - Minimize the exposure time of uncovered areas in the construction phase;
 - Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, in gardening within the pulp mill;
 - Build temporary drains and sedimentation boxes around the embankment service works, to retain the solids, avoiding sedimentation in the water body.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that there will be no change in water quality since the execution of earthmoving works and land preparation will be planned preferably outside the rainy periods and minimizing the exposure time of the areas without vegetation cover. In addition, the project includes solids retention cells, as well as drainage channels provided around the earthmoving area in order to retain sediments and avoid sedimentation in the local water bodies.

10.1.4.2.1.2 Water use conflict

Environmental aspect

Groundwater availability.

Impact-Generating Factor

Water consumption during the construction phase.

Technical justification

As reported in Volume I, the water supply for the workshop will be provided by the Paraguay River or, eventually, by an artesian well. That said, the groundwater can be used for water supply for workers and concrete preparation only during the construction phase.

The expected period for the construction of the PARACEL pulp mill is 24 to 30 months. However, the period of time in which the groundwater would be used will be shorter than this, as it would only be used while the Paraguay River water intake works were in progress.

The raw water will be subjected to a conventional treatment consisting of coagulation and flocculation processes using aluminum sulphate, caustic soda and polyelectrolyte, followed by decantation, filtration and chlorination, which will be carried out in a compact station. The filtered water must be chlorinated, followed by storage in a tank, for subsequent distribution to users.

In principle, this system should provide a flow rate of the order of 150 m³/h, which should serve the maximum population of 8,000 workers (peak of the works) and also for the preparation of concrete.

The quality required for the water must comply with the parameters established in Annex III of Law 1,614/2000 - Law of the Regulatory Framework and Tariff of the Drinking Water and Sanitary Sewerage Service.

According to GODOY and PAREDES (1995), practically all of the potential aquifers in the Eastern region of Paraguay have water that is suitable for human consumption, irrigation, and industrial use. In the Western or Chaco region, the chemical quality of the waters of the Yrendá Aquifer System is a limiting factor for domestic, cattle, agricultural, and industrial use. The presence in most of the area of waters with high salt content is due to the fact that, among the sediments that fill the basin, there are evaporite salts (mainly gypsum), which due to their solubility, give rise to brackish or salty waters.

According to the hydrogeological map, the areas of direct influence (DIA) and directly affected (DAA) of the PARACEL pulp mill are located in the Aquidauana - Aquidaban Aquifer System.

According to PMCIC (2015), the Aquidauana-Aquidaban Transboundary Aquifer System is located in the Paraná River Basin, with an area of approximately 27,000 km², of which 14,600 km² are in Brazil and 12,300 km² in Paraguay, extending in a NE-SW direction, and is used for human and animal supply both in Brazil and Paraguay.

The aquifer is of the semi-confined type, made up of glassy-marine sediments with intense variations in facies, presenting flows that are also quite dispersed, with average values oscillating between 10-20 m³/h-well.

From the chemical point of view, it also presents waters with quite variable characteristics. Its use in the short term has become essential for human supply and to allow the economic development of the region, with agricultural and livestock characteristics.

Although the majority of the population of the Department, according to the permanent survey of households, have had access to drinking water service between 2017 and 2018 via SENASA and/or the local Sanitation Board, the homes in the Piquete Cue community (located approximately 0.4 km to 1.5 km from the PARACEL industrial site) do not have a drinking water network and the main source of water for the members of the household is the well; practically no families carry out any treatment, with the exception of one (applies product - bleach - after the rains). The distance from where it is drawn is less than 10 blocks in all cases.

Therefore, if it is necessary to drill wells for water supply, PARACEL will previously send to MADES a schematic design of the place where it is intended to drill, in which possible points of interference will be presented, such as: other wells installed, existence of springs, water courses, possible sources of contamination, etc., all within a radius of 500 m from the point of interest, as well as their relative distances to the future well. It will also send the results of the groundwater quality monitoring, as well as a hydrogeological study before the implementation of the wells.

The well will be circular with a reduced diameter, drilled with specialized equipment, forming a well designed and constructed hydraulic structure, which will allow the economic extraction of water from deep underground layers in the aquifer. The well will be jacketed with pipes in order to prevent unwanted water from entering and not to allow the collapse of the layers of soil that have been crossed, interspersed with filters through which the water can flow.

At the end of the works, the wells will be duly closed to prevent any contamination of the aquifer.

Accommodation

In addition to the use on the construction site, workers coming from outside the region will be duly accommodated in 6 (six) temporary accommodations, in addition to hotels and private properties located mainly in Concepción and Loreto, during the implementation phase of the PARACEL mill.

The temporary housing will consist of a fenced area with a guard, surveillance, first aid system, bedrooms, bathrooms, cafeterias, leisure area, internal roads, electricity and drinking water supply, trash collection system, treatment (type of modular station), and disposal of sanitary effluents and firefighting system.

These accommodations will have a total capacity of up to 3,000 workers.

The location of these accommodations is shown in the following Figure.



Figure 1 – Map of accommodation/village areas (CAMP 1, 3, 6, 7, 9 Y 11)

The clean water supply in the accommodations will come from the public network but may also come from artesian wells if the network is not available.

In both the Department of Concepción and San Pedro, in 2017, the largest percentage of water in homes came from SENASA or the local Sanitation Board, while in Amambay most homes obtained water from a community network.

Based on the field survey process of 18 micro territories in the project's DIA, most of the interviewees mentioned that all micro territories have a water system from the local Sanitation Board, as already mentioned in the socioeconomic characterization of the Department. Many times, communities are left without water due to permanent power cuts in the area, since without it, pumping cannot be started. To alleviate or prevent these shortages, cases were observed such as those of the USF in Callejón San Antonio, which has its own water reservoir (tank) that is used when there is a shortage; but it is supplied from the same community water source. There are only two residents who have a well. Others, like the communities of San Luis, must move to neighboring communities; or have water tanks; but it is not applicable to all cases.

Given that some CAMPs are located in the city of Concepción, the probability that there is a public water supply is great, so it will probably not be necessary to drill wells.

It should be noted that if it is necessary to drill wells for the accommodations, PARACEL will communicate beforehand with the MADES and the same precautions will be taken as for drilling the wells within the mill site.

Nevertheless, it is not expected that there will be a conflicting use of the groundwater as the information collected shows that there is availability of the aquifer. In addition, if it is necessary to drill wells, PARACEL will communicate in advance with MADES,

conduct a hydrogeological study and care will be taken to avoid any contamination of the aquifer, since the drilling until final closure of the wells.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Moment of occurrence:	Immediate	1
Time or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

- Send to MADES a diagram of the place where the well is to be drilled, in which possible points of interference will be presented, such as: other wells installed, existence of springs, water courses, possible sources of contamination, etc., all within a radius of 500 m from the point of interest, as well as their relative distances to the future well;
- Carry out a hydrogeological study before the installation of the wells;
- Carry out Groundwater Quality Monitoring;
- Coat the well with pipes to prevent the entry of unwanted water and not allow the collapse of the soil layers;

- Properly close the wells to avoid any contamination of the aquifer, at the end of the works;
- If it is necessary to drill wells for housing, PARACEL will inform the MADES beforehand and take the same care to avoid any contamination of the aquifer, from drilling to closing the wells.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be affirmed that there will be no change in the quality or availability of the groundwater since the execution of the wells will be done in an environmentally correct way, according to a hydrogeological study before the drilling, and the captured flow will be little and temporary, in addition, at the end of the works the wells will be properly closed to avoid any contamination to the aquifer.

10.1.4.2.1.3 Change in Surface Water Quality

Environmental aspect

Inadequate generation and disposal of sanitary wastewater.

Impact-Generating Factor

Construction works of pulp mill.

Technical justification

At the beginning of the work, the liquid waste from the chemical toilets will be removed by clean trucks, transported and disposed of by accredited companies in authorized landfills. Once the construction site installation is completed, the chemical toilets will be deactivated and returned to the leasing company.

After the construction of the infrastructure, the sanitary wastewater generated during the construction of the PARACEL pulp mill will be collected and treated in a treatment system consisting of a flow meter, an aerated pond and a polishing pond, and then sent to the Paraguay River.

This system is a biological treatment, which works with microorganisms that will degrade the organic matter present in the wastewater (expressed in terms of BOD - Biochemical Oxygen Demand) through an aerobic process.

The choice of this system is due to the fact that this type of treatment has a good performance in terms of BOD removal, in addition to be a robust system, capable of withstanding the variations in load and flow to which the system will be subject (due to variations in the contingent peaks of employees who will work on the site).

The treated wastewater must comply with the emission standards for the parameters established by SEAM Resolution No. 222/2002 (Water Quality Standards for the Entire National Territory).

The flow of wastewater generated during the construction of the project will be approximately 70 m³/h taking into account the maximum population of 8,000 workers (peak during construction work).

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local and Regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Duration or length of time:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Type II Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence	DIA	

Mitigation measures

- Certify that the company hired to collect the wastewater from the chemical baths is properly regulated, and that the wastewater is disposed of in an environmentally sound manner;
- Implement and operate a sanitary wastewater treatment plant to treat the wastewater generated during the construction phase after the chemical baths have been deactivated;
- Perform Water and Effluent Management Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that there will be no change in the quality of surface waters, since the sanitary wastewater generated during the works will be duly treated and disposed of in an environmentally appropriate manner and in accordance with the legislation in force.

10.1.4.2.1.4 Change in air quality

Environmental aspect

Movement of vehicles and machines for the implementation of the project.

Impact-Generating Factor

Generation of dust due to the movement of machinery and vehicles

Technical justification

It is expected that during the construction of the project, heavy vehicle traffic, such as machinery and trucks, will increase significantly on the access routes to the site, as the work will require a quantity of material, equipment, machinery and various inputs.

Vehicle traffic can generate dust, related to traffic on unpaved roads, which can carry dust depending on the wind conditions in the region. An important point is that the new internal roads and the construction yard will be wetted during the execution of the works.

In addition, trucks transporting soil, rocks and all dusty material must have their cargo covered, preventing the release of particles and dust.

In the air quality assessment, as presented in the environmental assessment, two monitoring campaigns were carried out at three sampling points in the area near the project area.

In these campaigns it was possible to verify that, with regard to the particulate pollutants sampled: total suspended particles - TSP and inhalable particles - IP (PM10), they were presented in accordance with the current legislation on air quality standards. However, the parameter respirable particles - PR (PM2.5) presented concentrations above the standards, possibly due to the material associated with the suspension of particles originating from unpaved roads and the emission of diesel vehicles.

The parameters NO₂ - Nitrogen Dioxide, O₃ - Ozone, CO - Carbon Monoxide and SO₂ - Sulphur Dioxide were also below the limit set by the regulations.

It should be noted that the area surrounding the company's site is dominated by agricultural and livestock activities. The closest presence of population agglomeration is the Piquete Cue community, so near this area dust control will be more rigorous, with more humidification on the access routes to the community, and more frequently. It should be noteworthy to mention that no people or economic displacement will occur.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Moment of occurrence:	Immediate	1
Time or duration:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Type II Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA, DIA	

Mitigation measures

- Follow the guidelines of the Vehicular Emissions and Dust Control Program, to minimize the generation of dust, such as:
 - Humidify the internal circulation routes and the work yard during the execution of services, when necessary;
 - Cover the trucks transporting earth, rocks and all powdery material with tarpaulins.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that, through the implementation of mitigation measures, air quality will not be changed.

10.1.4.2.1.5 Disturbances related to noise

Environmental aspect

Movement of vehicles and machines for the establishment of the company.

Impact-Generating Factor

Noise generation due to the company's construction work.

Technical justification

It is expected that during the construction of the project, the traffic of light and heavy vehicles, such as machines, trucks and buses on the access roads will increase significantly, as the work will require an amount of material, equipment, machinery, various supplies and transportation of hired personnel.

One impact of the increased vehicle traffic on the roads relates to noise generation.

Regular maintenance of equipment and vehicles plays a key role in noise control and safety, as well as increasing the life span of machinery. The causes of increased noise emissions from machines in use are: wear and tear of gears, bearings, poor lubrication, imbalance of rotating elements, clogging of air pipes, unsharp cutting devices, clogged and damaged silencers, removal of the noise attenuation device, etc. (BISTAFA, 2011).

Therefore, PARACEL will require the maintenance of machinery engines, trucks and vehicles.

Noise is an important factor to be observed for the integration of the company with the neighboring communities.

Noise, both day and night, must be in accordance with Law 1,100/1997.

By prioritizing activities with heavy vehicles and crushers during the day, potential disturbances will be reduced.

It should be noted that the area surrounding the company's site is dominated by agricultural and farming activities. The closest population center is the Piquete Cue community, so priority should be given to daytime activities near this area.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Moment of occurrence:	Immediate	1

Timing or duration:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Type II Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA, DIA	

Mitigation measures

- Follow the guidelines of the Noise Monitoring Program, such as:
 - Carry out maintenance on machine, truck and vehicle engines;
 - Carry out activities in the area predominantly in the daytime period;
 - Carry out noise monitoring during the construction phase.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that, through the implementation of mitigation measures, there will be no noise disturbance.

10.1.4.2.1.6 Changes in Soil and/or Surface Water and Groundwater Quality

Environmental aspect

Inappropriate generation and disposal of solid waste.

Impact-Generating Factor

The pulp mill's construction work.

Technical justification

In the construction phase of the project, several types of solid waste will be generated such as: construction debris (block, concrete, brick, wood), scrap metal, paper/cardboard, plastics, rubber/tires, glass, fluorescent lamps, batteries, health

services waste, maintenance equipment waste (lubricating oil) and organic waste (leftover food).

In earthmoving activities, earthmoving of approximately 8,000,000 m³ is forecast, with a balance between cutting and the planned sanitary landfill, in order to minimize the areas needed for disposal and the borrowing of material from sites outside the company. It should be noted that, if necessary, delivery areas will be defined and licensed prior to project implementation, as most areas are owned by third parties.

Solid waste generated in the construction phase will have an environmentally appropriate final destination, i.e. it will be destined for reuse, recycling, incineration, co-processing, etc. There will be a system of selective collection that aims to pre-separate materials with similar characteristics at the source.

Adequate control of solid waste will be carried out through collection, packaging, transport and disposal in accordance with the nature of the waste, which will minimize possible environmental impacts. In addition, the process of reusing the material through selective collection can significantly reduce this impact.

In the construction phase, there will be a Temporary Solid Waste Storage Centre that will be managed by a company specialized in this service. This company will be responsible for receiving, temporarily storing and allocating all the solid waste generated in this phase.

All contractors for the construction of the different parts of the process, as well as all other companies contracted to perform any other service during the construction phase, will be responsible for the collection, segregation, storage and disposal of their solid waste in the Temporary Solid Waste Storage Center.

The solid waste generated in the common areas and in the accommodation will also be collected, segregated, conditioned and transported to the temporary storage plant. The collection of this waste will be carried out by a company specialized in this service.

Lack of control and inadequate solid waste disposal can compromise the environmental quality of the area.

The debris generated will be disposed of in a specific landfill for the final disposal of this debris. Therefore, a Debris Landfill will be implemented in the project area for the disposal of solid construction waste, with a capacity of 75,000 m³. Lower drains will be built to collect rainwater, which will be installed in the longitudinal axis of the landfill, in order to prevent the dragging of solids. A filter will be installed in the last drainage pipe, before it is sent to the receiving water body. The slopes will have the ratio 1:2 (V:H) and will be properly compacted. The outer sides of the slopes will have grass, in order to avoid erosion. There will be ramps to provide access to the interior for landfill trucks.

The organic solid waste generated in the construction phase will basically come from the kitchen and cafeteria (food processing waste, leftover food, napkins and similar) and toilets. During the pulp mill's construction phase (24 months to 30 months), 6,800 m³ of organic waste is expected to be generated. The construction of a sanitary landfill (organic) in the mill area is planned, which will have a useful life to comply with the construction phase of the implementation and the first two years of operation of the PARACEL mill. The capacity of this landfill will be 20,000 m³.

The construction of the Debris and Sanitary Landfill (organic) will be carried out in an environmentally appropriate manner that minimizes possible impacts on the quality of soil and/or surface and ground water due to the disposal of solid waste generated in the construction phase of the project.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Medium term	2
Timing or duration:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Type III Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA, DIA	

Mitigation measures

- Follow the guidelines of the Waste Management and Monitoring Program, among which:
 - Manage the solid waste generated in the construction of the PARACEL pulp mill with the best practices, in accordance with Law # 3,956/2009 and Decree # 7,391/ 2017 (Integral Management of Solid Waste in the Republic of Paraguay), among which are:
 - Minimize waste generation through the 3R principle (Reduce, Reuse, Recycle);
 - Segregation of solid waste according to color standard;

- Collection, packaging, storage and transport of solid waste in accordance with current legislation;
- Environmentally appropriate final destination (reuse, recycling, composting, energy use, etc.) and/or environmentally appropriate final disposal of solid waste generated in the company:
 - Arrange the materials (excavation soil), if necessary, in duly authorized external areas.
 - Implement a Temporary Solid Waste Storage Center that will be managed by a company specialized in this service.
 - Implement a Debris Landfill and a Sanitary Landfill (organic).

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

After the implementation of the measures, it can be said that there will be no changes in the quality of soil and/or water due to the generation and disposal of waste, without compromising the environmental quality of the area.

10.1.4.2.1.7 Impacts generated by the construction of the river port

Environmental aspect

Impacts on the physical, biotic and socioeconomic environment due to the port construction.

Impact-Generating Factor

Civil works for the implementation of the port infrastructure.

Technical justification

The river port of the pulp mill will be a terminal-type construction on the left bank of the Paraguay River, built as an elevated platform on a structure composed of: an operating platform, an access bridge on pillars for vehicles and people, and a shed structure for the pulp transport and loading area. All the structures will be made of reinforced concrete and the loading roof will be made of a metal structure. It will be implemented from the shore through the sustainable methodology of the Cantitraveller type with prefabricated elements.

The port will operate with the following loads:

- The transport of pulp by river barges at an average rate of 1,500,000 t/year;
- Reception of timber in logs with volumes varying between 2 and 5 million m³ s^c/year;
- Reception of inputs for the pulp mill (liquid or bulk) up to 450,000 t/year.

The boats that will operate in the port will be the current models in circulation in the fluvial section of the Paraguay River with the format of convoys according to the official

conditions of navigation. The typical pulp convoy will consist of 12 barges (3 x 4) with a unit capacity of up to 2,500 tons each.

The boats for wood and inputs will be suitable for each of the operations/products and will be regulated by the established navigation conditions.

No dredging actions will be required for the approach channel, the evolution area and the anchorage area of the vessels (barges and pushers). For platform or access bridge construction services, bottom forming services may occasionally be required at the site of underwater structures.

Some impacts of the river port works were not separated from the impacts of the mill because the companies and workers for the construction of the port will be basically the same, in addition the services such as: water supply, energy, will be the same as the industrial area and the generation of effluents and residues of the port will receive the same treatment as the effluents and residues of the PARACEL pulp mill works. The impact of the change in the landscape due to the implementation of the port was also evaluated together with the PARACEL pulp mill since it has a greater scope.

In order to further analyze the impacts of the port, especially during the construction phase, the impacts on the physical, biotic and socio-economic environment due to the port works will be described below.

In the physical environment, the main impacts that may be associated with the implementation of the inland port are:

- Generation of erosive processes and sedimentation of the river
- Disturbances in relation to noise due to the movement of vehicles and machines
- Change in surface water quality.

In the biotic environment, the main impacts that can be associated with the implementation of the river port are:

- Change in aquatic ecosystems,
- Loss of vegetation and land habitat.

In the socio-economic environment, the main impact that may be associated with the implementation of the river port is:

- Interference in the navigation of ships for transport, tourism and fishing

Generation of erosive processes and sedimentation of the river

Interventions in land areas near the Paraguay River bed for the construction of the river port can increase turbidity and the concentration of suspended material in the river.

The layout of the river port, starting from the industrial area to the Paraguay River, prioritizes the passage through existing accesses and areas that have been destined for human activities on the property.

Disturbances in relation to noise due to the movement of vehicles and machines

It is expected that during the construction of the port the traffic of vehicles and machines will increase, since the work will require a quantity of material, equipment and transport of hired personnel.

One impact of increased vehicle and machine traffic relates to noise generation.

By prioritizing activities with heavy vehicles during the day, possible disturbances generated will be reduced. In addition, there are no receptors near the port site that are susceptible to this effect.

Change in surface water quality

During the construction of the port, the sediments to be removed from the river bed will be dumped on land, in the area of implantation. This activity may result in the suspension of bottom sediments, which will cause a plume to form with a higher suspended solid load and turbidity, reducing the penetration of light into the water column. The turbidity in the 3 campaigns of monitoring of the Paraguay river was low, however, in the second campaign carried out in the rainy season, the turbidity at Point FW01 was 61.43 NTU and at Point FW02 was 66.74 NTU, with the maximum limit according to Resolution 222/02 for Class II rivers of 100 NTU.

Therefore, the impact of the sediment suspension due to the port implementation works will be local and immediate, with low importance and temporary effects on ADA.

Change in aquatic ecosystems

Interventions in the riverbed for the construction of the river port may increase turbidity and concentration of suspended material in the Paraguay River, thereby disturbing habitats there, and may affect local aquatic communities during the period of construction of the river port structures.

In relation to the works to be carried out on the land side, the implementation project envisages preventive measures to protect the land to prevent the transport of sediments to the Paraguay River. Earthworks are being planned, preferably in non-rainy periods, to reduce the possibility of solids being carried away due to the susceptibility of the soil.

The construction of temporary structures to contain the material, minimizing the exposure time of areas without vegetation cover, and environmental supervision of the works are some of the measures to be taken during project implementation, especially in the land areas near the river.

Another measure aimed at reducing interference in the riverbed is the implementation of the river port pier with the fewer number of pillars possible.

Loss of vegetation and land habitat

The layout of the access road to the port, starting from the industrial area to the Paraguay River, will prioritize the passage through areas already anthropized; however, it will be equally necessary to carry out interventions in the vegetation.

Therefore, there will be loss of vegetation and associated terrestrial habitat, and construction activities may result in the scaring away of fauna. However, it is known that, as occurred in similar companies in Brazil and Uruguay, fauna tends to move away in the construction phase and return in the operation phase, not significantly interfering with their behavior.

Interference in the navigation of ships for transport, tourism and fishing

The Paraguay River is navigable by vessels of greater draught, in the stretch from the confluence with the Paraná River to Asunción; in the stretch from Asunción to Corumbá (Brazil) and passing through all the ports of the Department of Concepción, medium sized vessels can navigate. It is used to a great extent by boats that transport grains, lime, cement and cattle.

The region has an infinite number of rivers and streams that offer the possibility of water sports, fishing, sailing and beaches. Numerous spas have been installed in the area. In the crystalline Tagatiya stream and in the Aquidabán River, ecotourism services are offered. Some boats offer river tourism services on the Paraguay River, especially for trips and fishing. There are establishments that offer tourism of stay (camping, cavalcades, camping etc.); in addition, of the use of beaches and lagoons in their properties. In Vallemí, tours are offered to visit the characteristic caves of the place, while it is possible to visit the hills of San Luis and Paso Bravo.

During the construction phase of the port, there will be a local restriction for transport, tourism and fishing boats. The port area construction on the Paraguay River should be properly identified to avoid accidents of boats; in addition, it is recommended that meetings are held through the Program of dissemination and communication with local fishermen to inform the period and attention during the construction phase.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Temporality or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	

Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

- To implement the Erosive Process Control and Monitoring Program, which aims to:
 - Plan the implementation of earthworks and land preparation works preferably outside the rainy season, in order to reduce the possibility of erosion phenomena due to the susceptibility of the land;
 - Minimize exposure time for areas without plant cover in the construction phase;
 - Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, in gardens within the mill;
 - Build temporary drains and sedimentation boxes around the earthworks to retain solids, preventing sedimentation in the water body.
- Follow the guidelines of the Noise Monitoring Program of the mill site construction, such as:
 - Carry out maintenance on machine, truck and vehicle engines;
 - Perform activities in the area predominantly in the daytime period;
 - Performing noise monitoring during the construction phase.
- Implementation of the quay in the river port with the least number of pillars possible;
- Supervise the environmental performance of the works during the project period;
- Monitor the quality of surface water in the construction phase;
- Follow the guidelines of the Vegetation Suppression Program on Industrial Site, which are:
 - Conduct picketing to mark the area to be removed;
 - Use a team experienced in this suppression activity;
 - Properly dispose of organic waste and vegetation from the suppression activity;
 - Store the organic layer on top of the soil in an appropriate place for later reuse in the landscape design of the industrial area;
 - Promote, as a compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal or greater than that occupied by the vegetation to be suppressed

- Implement the Biodiversity Monitoring Program on the Industrial Site;
 - Carry out the supervision and environmental control of the suppression;
 - Prohibit the use of fire for vegetation suppression
- Mark the area of implementation of the port on the Paraguay River to avoid accidents with boats;
 - To inform local fishermen about the period and care during the works of the port through the Dissemination and Communication Program;
 - Signal the port implementation area on the Paraguay River to avoid boat accidents.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that, through the application of mitigation measures, the impacts generated by the construction of the river port will be minimal and temporary.

10.1.4.2.2 Biotic Environment

10.1.4.2.2.1 Vegetation and land habitat loss

Environmental aspect

Removal of vegetation and alteration of associated habitats in the project area, including riverine habitat.

Impact-Generating Factor

Earth movements and works in the site and for water intake and effluent discharge pipelines, routes and transmission line construction.

Technical justification

In the earthmoving activities there will be suppression of vegetation in the project area. The suppression will occur in the area where the mill will be located, as well as, in the areas of the routes where the access, port, transmission line, the water intake and the effluents disposal pipelines will be built. The layout of the water intake pipes and the treated effluent emissary from the industrial park to the Paraguay River will give priority to passing through areas that have already been used by man.

Therefore, there will be loss of vegetation and associated terrestrial habitat, and it can drive away wildlife. However, it is known that, as occurred in similar companies in Brazil, the fauna tends to move away in the construction phase and return in the operation phase, not interfering significantly with the local fauna.

It should be noted that the company's areas of influence are already highly anthropized and with low connectivity between the remains of vegetation, intensive use for cattle farming is another of the main pressure factors in these environments.

Regarding vegetation coverage, it is partly affected by anthropogenic occupations and economic activities already well established in the region.

The implementation of the project will require the removal of approximately 182 ha of savannah remains. Specifically, for the implementation of the raw water intake and the treated effluent terrestrial emissary, it will also be necessary to intervene in the Protector Forest of water channels of the Paraguay River, i.e., there will be the removal of approximately 0.31 ha of remaining savanna vegetation and the removal of approximately 3.99 ha of remaining vegetation of the Semideciduous Forest.

Taking into account the results obtained in the biotic environment diagnosis, it is concluded that the implantation of the industrial plant and the associated structures will have a local impact on the vegetation, however, there will be no impact on the connectivity of the remains of vegetation in the environment; the fragments and isolated tree specimens affected are within the Zapatero Cue.

Therefore, the project foresees the suppression and/or interference in the remaining fragments of vegetation that present the physiognomy of Savannah and Semideciduous Forest located within the DAA and the intervention in Protective Forests of water channels of the Paraguay River, in which the riparian vegetation plays an environmental role, protecting the riverbanks and other water bodies. It should be noted that, despite records of the effects of human activities on the remains of existing native vegetation, those that remain still support the maintenance of native fauna and flora species. Therefore, any removal must be duly authorized and will be compensated in accordance with current environmental legislation.

In order to mitigate this impact, Paracel has committed to compensate the suppression of riverine habitat by increasing the native area in relation to the current situation, specially enlarging the riparian areas, with approximately 250 ha, by converting Grassland/Pasture lands to native forest.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Short term	1
Timing or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Simple Accumulation	

Magnitude:	Medium	2
Importance:	Medium	2
Mitigation possibilities:	Partially Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

- - Follow the guidelines of the Environmental Management Program for Construction - CAP, regarding the criteria and operational controls that will be carried out in the suppression of vegetation, which are:
 - Picking to mark the area to be removed;
 - Use a team experienced in this suppression activity;
 - Properly dispose of organic waste and vegetation from the abatement activity;
 - Store the top organic layer of the soil in an appropriate place for later reuse in the landscape design of the industrial area;
 - Promote, as compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal to or greater than that occupied by the vegetation to be suppressed;
 - Implement the Biodiversity Monitoring Program on the Industrial Site;
 - Carry out the supervision and environmental control of the suppression;
 - Prohibit the use of fire for vegetation suppression.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that by adopting mitigation measures, vegetation removal will be minimum, and any removal of natural vegetation will be adequately compensated with native trees, especially with the vegetation of the region, not interfering significantly with the local biota, since the area already suffers from a high degree of human intervention.

10.1.4.2.2.2 Dust generation due suppression of local vegetation

Environmental aspect

Removal of vegetation and alteration of associated habitats in the project area, including riverine habitat.

Impact-Generating Factor

Dust generation due to earth movements and works in the site and for water intake and effluent discharge pipelines, routes and transmission line construction.

Technical justification

An important factor in terms of machine movement is the increase in noise and dust at this time, and may impact the nearby population as the local fauna, driving it away.

As described in the characterization of the enterprise, the construction of pulp mill requires prior cleaning of the areas. Depending on the type and quality of vegetation, habitat loss for specialized or generalist fauna will occur, imposing its displacement to less disturbed areas.

In the phase of implementation and operation of the mill, there may be increased noise and dust from the movement of people, trucks and equipment, which can enhance the level of disturbance to the local fauna.

Thus, it is recommended to humidify the internal circulation routes and the work yard during the execution of services, when necessary and cover the trucks transporting soil, rocks and all powdery material with tarpaulins. Other than that, for suppression hire biodiversity specialists to rescue small animals in order to avoid or minimize the loss of populations occurrence such as arthropods and other animals with limited mobility in the area and regenerate degraded areas and implement corridors in order to favor the displacement of fauna species.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Moment of occurrence:	Short term	1
Time or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2

Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DAA, DIA	

Mitigation measures

Humidify the internal circulation routes and the work yard during the execution of services, when necessary;

Cover the trucks transporting earth, rocks and all powdery material with tarpaulins;

Perform small animals rescue, before suppression, in order to avoid or minimize the loss of populations occurrence such as arthropods and other animals with limited mobility; and

Regenerate degraded areas and implement corridors in order to favor the displacement of fauna species.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The actions adopted by PARACEL preserve the areas of native vegetation, riparian permanent persevered areas and legal reserve of its own lands, in addition to the legal requirement, minimizes the impact.

10.1.4.2.2.3 Change in aquatic ecosystems

Environmental aspect

Interventions in the riverbed and land areas near the river

Impact-Generating Factor

Water intake and effluent emissary works.

Technical justification

Interventions in the riverbed for the construction of the intake and discharge can increase turbidity and concentration of suspended material in the Paraguay River, thereby disturbing habitats there, and can affect local aquatic communities during the period of construction of the intake and discharge structures.

In relation to the works to be carried out on the land side, the implementation project envisages preventive measures to protect the land to prevent the transport of sediments

to the Paraguay River. The implementation of earth movements is being planned preferably in non-rainy periods in order to reduce the possibility of solids being carried away due to the susceptibility of the soil.

The construction of temporary structures for physical storage, minimizing the exposure time of areas without vegetation cover, and environmental monitoring of the works are some of the measures to be adopted during the project's implementation, especially in the areas of land near the river.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Duration or length of time:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type I	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

- Plan the execution of earthmoving works and land preparation preferably outside of the rainy periods;
- Build a temporary structure for the containment of sediments;
- Supervise the works during the project period;
- Monitoring the quality of surface water in the construction phase.

Responsibility for the implementation of the measures

PARACEL.

Forecast after implementation of measures

Se it can be assumed that, through the implementation of mitigation measures, the water quality of the Paraguay River will not change significantly in relation to turbidity and suspended solids, therefore, that aquatic communities are not expected to be affected. In addition, it should be noted that this activity is temporary.

10.1.4.2.2.4 Higher risk of running over animals

Environmental aspect

Increasing vehicle traffic.

Impact-Generating Factor

Vehicle movements.

Technical justification

During the construction phase there will be a considerable increase in vehicle traffic, especially trucks and trailers on the main access roads to the company's area, which will increase the risk of animals being run over.

According to observations of the existing roads in ADA/DIA, the national routes and branches (such as those connecting Concepción to Belén and Loreto) are paved, have widths of up to 10 meters and two lanes of traffic; other secondary roads are dirt roads (in some cases corrugated) and widths that allow two lanes of traffic; these will be the roads shared by the Project with other users in ADA/DIA.

The determination of the access route to the area under study took the consideration that no people or economic displacement will occur.

Main access is through the area of the town of San Ramón (south-east), passing through the Pyrendá farm, or the San Miguel farm. The access road extends to a certain extent within the private property, so if this alternative is chosen, roads must be opened and the existing one adapted, with the advantage that these roads would not be used by other users except for the owners.

It can be affirmed that accesses are well anthropized, however, in order to avoid accidents, even with local fauna, PARACEL must implement the Road Safety Program so that its own employees and third parties receive information on defensive driving, traffic legislation and local laws.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-

Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Timing or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Simple Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

- Inform and make drivers aware of defensive driving, traffic legislation and local legislation through the Road Safety Program, in order to minimize the risk of accidents, including those involving wildlife.
- Provide speed limit signs.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

There will be no risk of animals being run over due to the movement of vehicles for the construction of the company, as the company's own employees and third parties will receive training on preventive defensive driving, traffic legislation and local legislation through the Road Safety Program.

10.1.4.2.2.5 Risk of harassment to flora and fauna by workers

Environmental aspect

Hunting risk.

Impact-Generating Factor

Opening accesses and roads and workers pass increase.

Technical justification

Due to increased access to the roads openings in the region, to the areas, before preserved, by third parties and surrounding population, can induce the activities of hunting and capturing animals in this region.

The presence of people in the area may result in possible pressure to hunt and capture wild animals, both for the consumption and illegal trade of these animals.

Besides, environmental education work to make population aware of this fact, PARACEL should avoid fragmentation by roads in the cerrado areas because, in addition to facilitate the displacement and entry of hunters, it also increases the risk of animals run over, as well as may influence some small species that considers this road a barrier to displacement. In order to avoid animals hunting PARACEL should consider to carry out inspection on their native and regenerated areas mainly on weekends and holidays.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Moment of occurrence:	Medium term	2
Time or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DAA, DIA	

Mitigation measures

Intensify surveillance activities in partnership with local authorities and neighbors to avoid animals hunt.

Perform environmental education program to give conscious to fauna and flora preservation.

Prohibit fire arms and hunting by workers, add signs prohibiting hunting, ensure workers sign code of conduct.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that the risk on local fauna will be minimized by the implementation of the proposed mitigation measures.

10.1.4.2.2.6 Impact to Natural and modified habitat

Environmental aspect

Replacement of Habitat with pulp mill and its infrastructure.

Impact-Generating Factor

Pulp mill construction.

Technical justification

The figure below shows the satellite image of the mill site property, identifying modified and natural existing areas. These area total approximately 1,206 ha. About 83% of the area is modified and 17% is natural forest and watercourse.



Figure 2 – Natural and Modified Habitat at Mill site.

The implementation of the pulp mill will require the suppression of approximately 3.99 ha of remaining vegetation of the Semideciduous Forest and 0.31 ha of remaining vegetation of the Savannah (African grass) at riparian area for the implantation of the water intake system, the terrestrial emissary of treated effluents and the river port (presented on table below).

Table 7 – Intervention in protective forests for the implementation of raw water and discharge of treated effluents.

Structure	Area (ha) of intervention	Vegetation
Water intake system	0,62	Semideciduous Forest
	0,31	Savannah
Emissary of treated effluents	0,87	Semideciduous Forest
River port	2,50	Semideciduous Forest

Knowing that this area currently contains some 150 ha of native forest remnants, so the suppression will correspond only to 2,7% of the existing native forest. Paracel has committed to compensate the suppression by increasing the native area in relation to the current situation, specially enlarging the riparian areas, with approximately 250 ha, so

that the net increase will represent approximately 400 ha. The implementation of the project will determine a native forest coverage in 30% of the mill site, compared to the 12% that it currently occupies. This compensation measure thus determines an increase in the native area of approximately 150% in relation to the current situation.

As summary the following table shows the percentage of the current vegetation cover at Parcel pulp mill property.

Table 8 – Current vegetation cover and PS 6 Type in pulp mill property

Class ID	Class type	Area (ha)	Percentage	Nat/ Mod	Area (ha)	Percentage
1	Native forest	192.96	16%	Natural	205.02	17%
2	Floodable/ Waterland	12.06	1%			
3	Grassland/Pasture/Roads	1,000.98	83%	Modified	1,000.98	83%
Total		1,206	100%		1,206	

Most of the area in which the pulp mill will be built is considered savanna, although it is considered modified habitat because it was used for cattle gaze.

But Parcel has committed to compensate the suppression of 3.99 ha (converted natural to modified area) by increasing the native area in relation to the current situation, specially enlarging the riparian areas, with approximately 250 ha, by converting Grassland/Pasture lands to native forest. So the vegetation cover in the future will be as follows:

Table 9 – Future vegetation cover and PS 6 Type in pulp mill property

Class ID	Class type	Area (ha)	Percentage	Nat/ Mod	Area (ha)	Percentage
1	Native forest	438.97	36.4%	Natural	451.03	37.4%
2	Floodable/ Waterland	12.06	1%			
3	Grassland/Pasture/Roads	754.94	62,6%	Modified	754.94	62,6%
Total		1,206	100%		1,206	

Transmission Line

Likewise the figure below shows the image of the transmission line easement lane, identifying modified and natural existing areas. These area total approximately 23,1 ha. About 84,3% of the area is modified and 15,3% is natural forest and 0,4% is watercourse.

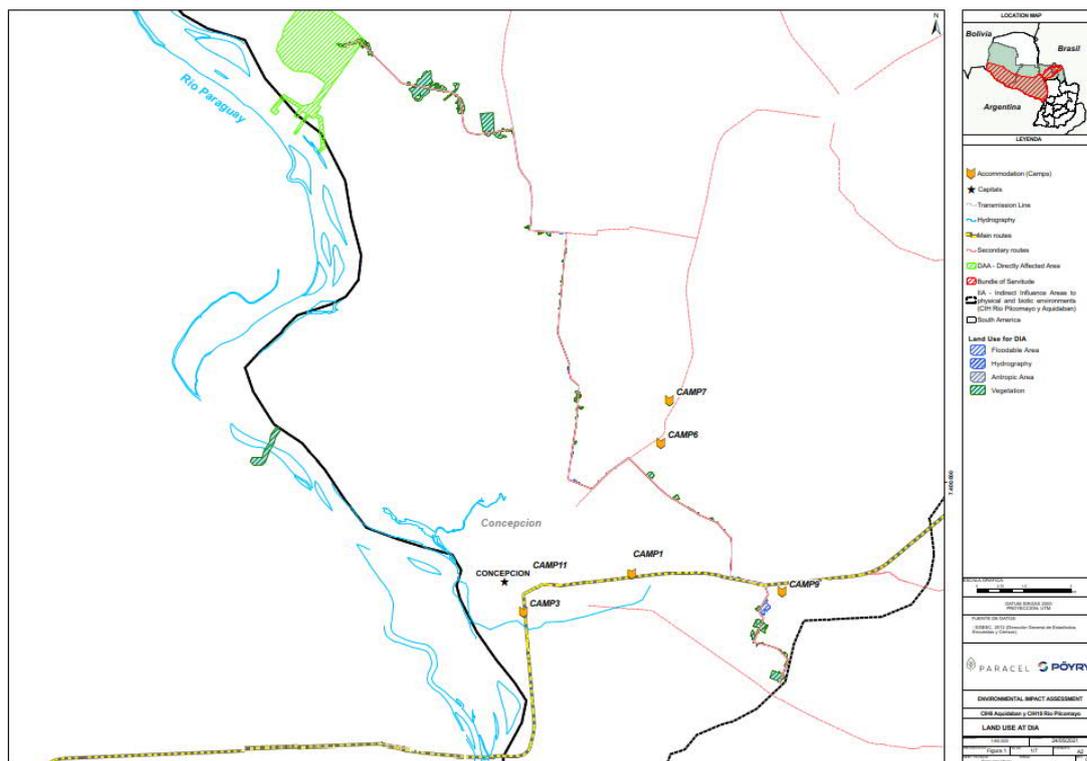


Figure 3 – Natural and Modified Habitat at Transmission line easement lane

Vegetation cover and PS 6 Type in Transmission Line DIA is divided in 3 classes type: native forest, Floodable/Waterland area, Grassland/Pasture/Roads area. The percentage of vegetation cover in DIA is presented at the table and figure below:

Table 10 – Vegetation cover and PS 6 Type in TL DIA

Class ID	Class type	Area (ha)	Percentage	Nat/ Mod	Area (ha)	Percentage
1	Native forest	3,53	15.3%	Natural	3,63	15.7%
2	Floodable/ Waterland	0,10	0.40%			
3	Grassland/Pasture/Roads	19,47	84.3%	Modified	19,47	84.3%
Total		23,10	100%		23,10	

The vegetation cover within transmission line DIA is not expected to change significantly.

In order to mitigate this impact, PARACEL must Implement the Restoration, Compensation and Management Program of Biodiversity in the Industrial Site, including revegetation, reforestation and restoration of natural habitat.

Regarding the Critical Habitat concept as defined by International Finance Corporation (IFC) Performance Standard 6 (PS6) representing areas of high biodiversity value, identified based on five criteria addressing habitats of significant importance to (1) threatened species (EN, CR), (2) endemic species, (3) congregant and migratory

species, (4) threatened or unique ecosystems, and (5) areas associated with key evolutionary processes, there are some located at the northwest and northeast of Parcel property. They are key areas for biodiversity defined by the Ibat tool, there are protected areas and there are key areas, considering these critical habitat areas with threatened and endemic species. Although the Parcel's property is not in a critical habitat as defined by performance standard 6.

From the species sampled in the industry areas, five are listed in the lists of flora species in danger of extinction consulted (SEAM Resolution 524/2006 and SEAM Resolution 2,243/2006): the "jatai" (*Butia paraguayensis*), "grapia" (*Apuleia leiocarpa*), "algarrobo" (*Prosopis alba*), "preto carob" (*Prosopis nigra*) and the "guatambu" (*Balfourodendron riedelianum*).

Threatened species are classified according to the global list (IUCN, 2020-1) and also the classification of Paraguay - Resolution 632/2017.

During the industry study 06 species were found to be listed by IUCN (2020-1) in the category of "Near Threatened" (NT), "Endangered" (EN), "Vulnerable" (VU) and "Threatened" (AM) and 03 in the list of Paraguay (Resolution 632/2017) according to the following table.

Table 11 – List of mammal species threatened with extinction.

Specie	Popular Name in Paraguay	Resolution 632/2017	IUCN (2017)
<i>Cabassous chacoensis</i> Wetzel, 1980	Armadillo chaqueño de cola desnuda		NT
<i>Myrmecophaga tridactyla</i> (Linnaeus, 1758)	oso hormiguero	AM	VU
<i>Sylvilagus brasiliensis</i> (Linnaeus, 1758)	tirica		EN
<i>Leopardus tigrinus</i> (Schreber, 1775)	tirica	AM	VU
<i>Lontra longicaudis</i> (Olfers, 1818)	nutria de río		NT
<i>Tapirus terrestris</i> (Linnaeus, 1758)	Tapir	AM	VU

Regarding mammals species of importance for conservation and of scientific interest on forestry component, we can highlight the records of *Panthera onca* (jaguar), Near Threatened (NT) internationally and Critically Endangered (CR) in Paraguay, as well as *Chrysocyon brachyurus* (maned wolf), NT under the IUCN and Vulnerable (VU) at the national level. Both species have been recorded indirectly based on the reliable testimonies from local people. Other records of interest include *Leopardus braccatus* (gato del pajonal), NT under the IUCN and Data Deficient (DD) at a national level; *Leopardus pardalis* (ocelot), NT in Paraguay; and *Myrmecophaga tridactyla* (giant anteater), *Tapirus terrestris* (tapir) and *Tayassu pecari* (white-lipped peccary), these last three being VU both at national and international levels. Among all the species recorded, eight fall under some category of national or international threat, two are considered DD (lacking data for evaluation) at the international level and one at the national level, while one species (*Sylvilagus brasiliensis*) is not evaluated due to recent

changes in its taxonomy. Furthermore, 18 of the recorded species are found in one or another of the CITES appendices.

Among the threatened birds, the presence of two species of undergrowth foraging and, therefore, dependent on the integrity of the forest should be highlighted: *Conophophaga lineata* and *Mionectes rufiventris*. Habitat loss and fragmentation, associated with a decline in environmental quality, characterize the main causes of the threat to these species.

Six species were recorded on forestry component that fall under categories of threat at an international level (NT and VU), while six species were recorded that fall under categories of threat at a national level (Threatened and Endangered) (MADES Resolution No. 254/19, Rojas et al. 2020, IUCN 2021). There were several records of a single endemic species to the *Cerrado*, *Saltatricula atricollis* (*pepitero de corbata*), at CC and SA in all sampling sites. In spite of being considered an endemic, this species is expanding to the south due to the savannization of landscapes in the eastern region of the country (see ornithological annex). Also, the record of *Alipiopsitta xanthops* (loro cara amarilla) another endemic species, recently documented for the country and with few records (Alvarez et al. 2012), are among the eleven species endemic to the *Cerrado* which occur in Paraguay according to Silva (1997).

Although no herpetofauna species is considered endemic, three of them have some degree of threat or poor data. The toad *Rhinella diptycha* and *Dendropsophus elianae* are in danger of extinction, according to the list of animals threatened according to Resolution 433/2019, meanwhile that *Pithecopus azureus* was found as DD – Deficient Data, in accordance with International Union for Conservation of Nature Red List of Threatened Species (IUCN, 2020). It is not listed, but is highly threatened due to its commercial value, most notably *C. carbonaria*, a species widely used as food by hunters and widely used in wildlife trafficking, which is sold not only in Paraguay but all over the world.

In terms of conservation status, only *Rhinella scitula* and *Dendropsophus elianae* are included under some degree of threat in the forestry component, both at international and national levels. *Rhinella scitula* is a small terrestrial toad (34 -51 mm) endemic to the *Cerrado*; in Paraguay it is found exclusively within the Departments of Amambay, Concepción and San Pedro (Brusquetti et al. 2006, Smith et al. 2012, Sugai et al. 2014). *Dendropsophus elianae* (20 - 26 mm) is an endemic climbing frog of the *Cerrado* (Napoli & Caramaschi, 2000); it has few records in the country which all come from within the Department of Concepción.

Workers Accommodation Sites

The camps will be built in areas that have already been modified, 2 of them are located in the municipality of Concepcion.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative/Positive	+ -

	Qualitative	Quantitative
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Accumulation Type II and III	
Magnitude:	Medium	2
Importance:	Medium	2
Possibilities of potentiation:	Medium	
Degree of potentiation:	Medium	
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures/enhancement

Implementation of the Restoration, Compensation and Management Program of Biodiversity in the Industrial Site, including revegetation, reforestation and restoration of natural habitat.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The industrial plant and associated civil structures of the PARACEL pulp mill will have a local impact on the vegetation, however, there will be no impact on the connectivity of the remaining environment because it is located in a strongly anthropized area, used for cattle rising and as a compensation measure there will be an increase in the native area of approximately 150% in relation to the current situation.

10.1.4.2.3 Socioeconomic Environment

10.1.4.2.3.1 Generation of direct and indirect temporary jobs

Environmental aspect

Hiring of temporary workforce.

Impact-Generating Factor

Mobilization of work.

Technical justification

Employment opportunities will be generated from the construction of the Industrial Plant and related services. The types of employment will be qualified and unqualified labor, professionals, specialists, etc. who will carry out the construction of civil works and roads, the assembly of equipment and machinery, as well as those related to the logistics of materials, inputs, machinery, equipment, human resources, waste, etc.

It is estimated that the Project will directly employ some 8,000 people at the peak of the construction phase, of which 10% will be professionals, 30% technicians and 60% suitable. Among these direct jobs are considered people hired directly by PARACEL and people from contractors and subcontractors hired for construction and assembly. The Project must comply with the principles of IFC Performance Standard 2, clearly defining the employment relationships, depending on whether the employees are direct workers, contract workers, or supply chain workers, depending on the case.

According to the socio-economic data, people in the department of Concepción will be able to cover the demand for unskilled employment, as there is a wide availability of people who could be suitable. In the department of Concepción, a large part of the population is young, 72 per cent of whom are under 35 years of age, with an average of 7.61 years of education. The project could also help to increase the employment of women, since 53 per cent of the population of the department is made up of women. It is also noted that most of the department's population, some 182,000 people, are concentrated in the four districts that make up the Project's DIA and have a young population following the trend in the department. For its part, the population of working age (WAP) is 186,627 people of which 58.33% are economically active. With these data, it is estimated that a large part of the unskilled labor that will be employed by the Project could be local, from the same department of Concepción.

The department of Concepción could also provide a certain amount of qualified labor, as the Social Baseline showed that different types of technical courses are offered in the department with a rapid return to work, especially in the urban areas of the department, and that there are several public and private training centers.

The departments of Amambay and San Pedro, considered within the Project's IIA, will also be able to provide labor, mainly unskilled, for the Project. In both departments, most of the population is young, under 35 years of age (68% Amambay, 70% San Pedro), with averages of 8.48 and 7.21 years of study. Women make up approximately half of the population of the two departments.

The generation of jobs at the local level will contribute to the reduction of unemployment, which is 6.66% (about 7,247 people) in the department of Concepción, higher than the national average rate, and of income poverty and structural poverty,

which in the department of Concepción are high, over 40% in terms of income poverty and over 50% in terms of at least one (1) Unsatisfied Basic Need (UBN), above the national average. In addition, the creation of a source of employment, albeit temporary, could help reduce the levels of migration observed in the department of Concepción, which would be motivated by work, study and, more recently, lack of security.

In addition, the labor required for the construction and assembly of the project will preferably be recruited in the region of Concepción through the Program for the Development for Hiring of Local Workforce.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or duration:	Temporary	1
Reversibility:	Reversible	1
Accumulation:	Type III Accumulation	
Magnitude:	High	3
Importance:	Large	3
Possibilities of potentiation:	High	
Degree of resolution of measurements:	High	
Degree of potentiation	High	
Area of influence:	DIA and IIA	

Enhancement measures

- Promote an information dissemination campaign for the hiring workforce for the construction phase through the Dissemination and Communication Program, giving priority to the hiring of local people through the Local Labor Development and Linkage Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that PARACEL will generate jobs for the construction of the project and this impact can be enhanced by the insertion of other companies that provide services in the region, mitigating the effects of displacement migration and generating direct and indirect jobs in the region of Concepción.

10.1.4.2.3.2 Interference on infrastructure

Environmental aspect

Pressure on local infrastructure due to the increase in the population represented by the workforce in the construction phase.

Impact-Generating Factor

Mobilization of work.

Technical justification

The increase of the population, represented by the labor force of the construction phase and people possibly attracted by the possibility of professional insertion in the activity, tends to increase the demand for public equipment such as: education, health, sanitation, transportation, etc., as well as tends to seek social interaction in the city of Concepción and the region. For the purposes of the study, we consider the increase of people in the region corresponding to approximately 8,000 workers in the phase of greater intensity of this activity.

With respect to education, it is expected that some workers in the construction phase will migrate with their families. Those who migrate with children tend to increase the demand in education, either for basic education for their dependents or for their own technical training to improve the knowledge of the activity to be developed in the operation of the company.

Having said that, PARACEL should disclose the existing options of the educational institutions of the municipality to the workers who decide to migrate with their families, as well as support, if necessary, the competent educational bodies in the technical training of the population.

Regarding health, according to the standards established by the WHO (World Health Organization), the classic indicator of health care and its infrastructure is formed by the number of beds per inhabitant. To meet the necessary demand, WHO recommends a minimum of 4 beds per 1,000 inhabitants.

In the micro territories closest to the location of the Industrial Plant, there is information about the short-term installation of a USF in the community of Roberto L. Petit, and about the management for the installation of a health post in the community of Laguna Plato. It is estimated that the existence of these by the time the construction phase of the

Project begins could contribute to decompressing the demand for more basic health services in the ADA/DIA.

As mentioned by the ADA census personnel, the community does not have health services on site, so they must go to the nearest health posts or centers to receive medical attention. Based on the above information, the following data are obtained:

- 8,33 % (1 of 12) mentioned that they attend the Health Centre in the city of Loreto; located 25 km from the community.
- 8,33 % (1 in 12) mentioned that they attend the Health Centre of Concepción; located about 40 km from the community.
- On the other hand, 91.67% (11 of 12) of the population studied attends the Health Post of Colonia Roberto L. Petit which is located between 9 and 17 km; (approximately one hour by motorcycle).

It can be verified that the region has a health deficit and the project may aggravate this deficit. Therefore, PARACEL must provide ambulatory and hospital structures to its own employees and third parties, which minimizes this impact on the health service in the region.

In addition, PARACEL must develop and follow standards to ensure a safe and healthy working environment for all of its own employees and subcontractors, with a goal of zero accidents.

In relation to the basic sanitation system, the construction of the water supply system; sewage collection and treatment system; and solid waste collection and treatment system is planned.

The water supply for the construction site will be through the Paraguay River or artesian well. The raw water will undergo conventional treatment consisting of coagulation and flocculation processes using aluminum sulfate, caustic soda and polyelectrolyte, followed by decantation, filtration and chlorination, which will be carried out at a compact station. The filtered water must be chlorinated, followed by storage in a tank, for subsequent distribution to users. In principle, this system should provide a flow of the order of 150 m³/h, which should serve the maximum population of 8,000 workers (peak during work) and also for the preparation of concrete.

The quality required for the water must comply with the parameters established in Annex III of Law 1,614/2000 - Law on the Regulatory Framework and Tariff for Drinking Water and Sewerage Services.

With respect to the wastewater treatment system, at the beginning of the work, liquid waste from the chemical bathrooms will be removed by clean trucks, transported, and disposed of by accredited companies at authorized landfills. Once the installation of the construction site is completed, the chemical toilets will be deactivated and returned to the leasing company.

The final wastewater treatment system will consist of a flow meter, aerated lagoon and polishing pond, and subsequent discharge into the Paraguay River. This system is a biological treatment, which works with microorganisms that will degrade the organic matter present in the wastewater (expressed in terms of BOD - Biochemical Oxygen Demand) through the aerobic process.

The increase in population will add to the already existing problem of solid waste, and may aggravate the situation of inappropriate solid waste management in ADA/DIA communities, promoting practices of burning, burying, proliferation of collection sites on streets and/or vacant lots, etc. with potential effects on the health and quality of life of the communities. To prevent this from happening, PARACEL will manage the solid waste generated during the construction of the pulp plant, considering best practices.

At the construction site, there will be a Temporary Solid Waste Storage Center that will be managed by a company specialized in this service. This company will be responsible for receiving, temporarily storing and assigning all solid waste generated during this stage. A Debris Landfill will also be implemented for the disposal of solid waste from the construction phase, with a capacity of 75,000 m³. And for the organic waste, a Sanitary Landfill (Organic) will be implemented within the plant area that will have a useful life to comply with the construction phase plus the first two years of operation of the PARACEL pulp mill, so the capacity of this landfill will be 20,000 m³.

The low coverage of the final sanitary sewerage service for the collection and final disposal of domestic water, and the increase in the transitory and definitive population related to the construction phase of the Project may generate an unhealthy environmental situation in the communities of the DIA where the population will settle, if the contingent of people associated with the Project is not accompanied by the development of the infrastructure of housing and essential basic services. This could lead to the settlement of people in a precarious state, and the deterioration of living conditions in general in DIA communities.

In addition, in view of the need for sanitation on the construction fronts of the plant and the lack of collection and final disposal services in the area where the plant is located, the Project provides for the proper disposal of effluents both in the construction/operational stage of the industrial plant and in the three temporary housing facilities planned for personnel.

Initially, existing accommodations, hotel networks and housing will be used, with minimal provision of toilets, cafeterias, electricity, garbage collection system, sewage and drinking water collection and disposal, and should not overload the existing municipal system.

As there are no public transportation services connecting the Plant's location area to the main population centers of DAA/DIA, one option will be for the Project to provide daily transportation for construction workers (from their homes to the construction site and back), and another alternative is for workers to have their own means of transportation, which is presumed to be preferably motorcycles.

Improvements in public services in education, health, sanitation, transportation and equipment to ensure the safety of the population due to social interaction, in the municipality of Concepción and region should be made from PARACEL associations in coordination with the departmental and municipal governments, support the generation or improvement of spaces for recreation and outdoor recreation, (squares, parks, courts, etc.) as well as improving the local landscape and all types of infrastructure of community relevance through the Community Relationship and Social Investment Program.

Another aspect to take into account is that the social interaction of workers may be reflected in the search for bars, restaurants, prostitution and eventually drugs, leading to an increase in violence. This will require some care in the context of security.

According to the data obtained, there are police stations, sub-commissariats and police posts in the DIA. There are five police stations in Concepción and one in each of the cities of Belén, Horqueta and Loreto. There are five sub-stations in Concepción, one in Belén, eight in Horqueta and five in Loreto.

The DAA population consulted has referred to the "poor police presence" as one of the areas of concern in the community. If this is the case, the effects induced by the construction phase of the Project may further increase the pressure on the existing police capacity.

In order to minimize the impact, PARACEL should carry out awareness raising work with workers and subcontracted companies, to guide workers on: child prostitution, sexually transmitted diseases, drugs, etc., as well as to ask public agencies for greater security supervision, to inhibit illegal acts.

In order to identify in time inconveniences in the fulfillment of the objectives established, and to allow taking corrective actions in a timely manner, the Social Monitoring Program must carry out the monitoring of the social perception through which it will be possible to have updated information regarding opinions and expectations of the local population on aspects related to the project in its different stages.

PARACEL should identify the effects generated by the definition of the design of the project and accesses, seeking to minimize the effects on the ADA population, with emphasis on vulnerable groups through the Social Management Program for ADA communities.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Time of occurrence:	Medium Term	2
Temporarily or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	

Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

- Disseminate the existing options of educational institutions in the municipality to workers who decide to migrate with their families, as well as to support, if possible, the competent educational bodies in the technical training of the population;
- Provide an outpatient and inpatient structure for own and external employees;
- Promote a zero accident practice that minimizes dependence on the region's health infrastructure;
- Implement and operate on the construction site the basic sanitation system composed of: water supply service, wastewater collection and treatment, and solid waste collection and treatment service;
- Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation
- Provide for improvements in the public service system, together with the responsible public agencies, to meet the additional demand of the population of the region through the Community Relationship and Social Investment Program;
- Implement the mechanisms for transporting workers between the municipalities involved and the construction site;
- Identify the effects generated by the definition of the design of the construction site and accesses, seeking to minimize the effects on the DAA population, with emphasis on vulnerable groups through the Social Management Program for DAA communities;
- Carry out a dissemination work with the subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in the Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations with own employees and third parties;
- Address issues such as health, hygiene and safety in the Environmental Education Program with the community;
- Request public agencies to supervise safety, to inhibit illegal acts;
- Implement a Program for Social Monitoring.

Responsibility for the implementation of the measures

PARACEL together with responsible public bodies

Forecast after implementation of measures

There will be interference in the local infrastructure considering that there is already a deficit in public health, sanitation, transport and security services in the region. However, the implementation of PARACEL's mitigation measures and partnerships with the public authorities responsible under the Community and Stakeholder Relations Program and the Social Monitoring Program will make it possible to compensate for the additional demand generated by the increase in population in the region.

10.1.4.2.3.3 Higher risk of accidents

Environmental aspect

Increasing vehicle traffic

Impact-Generating Factor

Movement of vehicles.

Technical justification

It is expected that during the construction of the project, the traffic of light and heavy vehicles, such as machinery, trucks and buses on the access roads to the construction site will increase significantly. The work will require a number of materials, equipment, machinery, various supplies and hired personnel, which could cause an increased risk of accidents on the project access roads.

According to observations of the existing roads in DAA/DIA, the national routes and branches (such as those connecting Concepción and Belén to Loreto) are paved, have widths of up to 10 meters and two lanes of traffic; other secondary roads are dirt roads and their widths allow two lanes of traffic; these will be the roads shared by the Project with other users in DAA/DIA.

The determination of the access route to the area under study took the consideration that no people or economic displacement will occur.

Main access is through the area of the town of San Ramón (south-east), passing through the Pyrendá farm, or the San Miguel farm. The access road extends to a certain extent within the private property, so if this alternative is chosen, roads must be opened and the existing one adapted, with the advantage that these roads would not be used by other users except for the owners.

It should be noted that "infrastructure and road safety" is the aspect most often mentioned by representatives of DIA institutions and communities in relation to the aspects necessary for the further development of their communities/districts. In this sense, they have highlighted the need to improve the state of the roads and the neighborhood roads. The inadequate condition of some roads in the DAA/DIA plus the already existing perception of these roads in the DIA and the loading of the vehicles of

the Project construction give a notion that the impact of the Project will be important on the road infrastructure from the social perspective.

Therefore, it is recommended that these routes undergo constant maintenance and are properly signposted, and it is necessary to inform and raise awareness among vehicle drivers about defensive driving to avoid accidents.

On the main access roads to the internal area of the pulp mill project, PARACEL must install road signs, warning of dangers and speeds. In addition, proper maintenance of the engines of the machines, trucks and vehicles used, together with a Road Safety Program will prevent accidents due to the increase in vehicle traffic.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and Regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Short term	1
Timing or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type II	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

- Install signage plates on the main internal access roads to the pulp mill's implementation area;
- Perform maintenance on the engines of machines, trucks and vehicles used by the company;

- Informing and raising awareness among vehicle drivers about defensive driving through the Road Safety Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that, with the implementation of these mitigation measures, the risk of accidents will be minimal. In order to provide improvements in the road system due to the additional traffic, PARACEL can establish partnerships with the responsible public agencies to mitigate and compensate the impacts generated.

10.1.4.2.3.4 Impact on morphology

Environmental aspect

Change of landscape and land use.

Impact-Generating Factor

Implementation of the pulp mill, consisting of buildings, towers and chimneys

Technical justification

The pulp mill will be located in the municipality of Concepción, about 15 km from the city center.

City people may not see the impact on the landscape, however, everyone who lives nearby, or uses the roads and/or waterway near the company may feel the impact on the morphology.

According to the environmental diagnosis, the existing agricultural routes and activities throughout the study area have historically already led to a modification of the landscape, favoring generalist species, rather than those more sensitive to changes in the environment.

The area planned for the implementation of PARACEL's industrial unit (object of this study) is located in a rural area of the cattle activity, however part of the water intake area, effluent emissary and river port are located in areas of natural vegetation.

Obviously, the industrial unit consisting of buildings, towers and chimneys will change the local landscape.

To mitigate the impact on the morphology (landscape) a landscape project must be implemented to favor the integration of the plant with the environment.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-

Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Partially Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

Implement the landscape project that favors the integration of the plant with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and the reuse of the land in gardens within the plant in accordance with the Landscape Recompositing Program.

Responsibility for the implementation of the measures

PARACEL.

Forecast after implementation of measures

The implementation of the pulp mill will inevitably alter the landscape and local land use, which can be minimized by implementing the landscaping project.

10.1.4.2.3.5 Interference with cultural heritage

Environmental aspect

Earthmoving activities.

Impact-Generating Factor

Possibility of affecting cultural heritage sites.

Technical justification

According to Article 6 - Law # 5621, for the purposes of registration of cultural property, the regime of protection of cultural heritage and sanctions, cultural property must be considered in the following categories:

a) National Cultural Heritage properties:

1. The properties corresponding to the World Cultural Heritage declared by supranational entities, whose instruments were ratified and exchanged by Paraguay.
 2. National monuments declared by the National Secretariat of Culture, by law or by decree, following an opinion by the General Directorate of Cultural Heritage.
 3. Heritage properties of cultural value, exceptionally valuable, which are significant and outstanding exponents of the culture of Paraguay. They must have been declared as such by the National Secretariat of Culture; they may also be declared as such by the governorates or municipalities, subject to a ruling by the Directorate-General for Cultural Heritage.
- b) Assets of Heritage Value:

This category is made up of cultural goods, whether tangible or intangible, that are significant in local or sectorial terms or that have any of the values considered relevant under this Law. They may be declared of specific cultural heritage value by resolution of the National Secretariat of Culture, the governments or municipalities.

Based on a primary archaeological and historical assessment, based on the secondary information available (historical background and local testimonies), added to the field survey conducted in the area of direct and indirect impact of the project, the importance of a deeply rooted cultural territory can be affirmed, with local testimonies that are alive and present in its experiential imagination. For each of the documented testimonies, an assessment is made, and measures are proposed to generate cultural roots and protect the present collective memory.

With regard to the valuation and potential social impacts, both in the Area of Direct and Indirect Influence of the project, specifically with regard to intangible cultural heritage, we can mention that it could suffer a moderate to significant alteration, due to changes in habits and significance as social capital. The presence of external personnel, to complete in the very first part the spatial transformation of the project, is also considered a cultural impact on the uses and forms of appropriation (livelihoods).

Therefore, the information gathered in the diagnosis attests to the potential of the region for the occurrence of national cultural and heritage value Assets. It should be noted that the area where the pulp mill is to be implemented has already been transformed by human activity; however, PARACEL will take measures to ensure that the earthworks during the construction phase do not impact or destroy the cultural assets considered to be protected through the ADA's Program for the Protection and Valorization of Cultural Heritage.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-

Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Simple	
Magnitude:	Low	1
Importance:	Medium	1
Mitigation possibilities:	Partially Mitigated	
Degree of resolution of measures:	High	
Area of influence	ADA	

Mitigation measures

Take actions to ensure that the construction activities of the pulp mill do not affect or destroy the cultural property considered as protected heritage through the DAA's Program for The Protection and Valorization of Cultural Heritage.

Responsibility for the implementation of the measures

PARACEL, as detailed in the "Health, Safety, Environment and Social Management System Manual" report.

Forecast after implementation of measures

It is possible to affirm that there will be no interference with the cultural heritage, taking into account that the area where the project will be implemented is significantly anthropized. Furthermore, all mitigation measures will be taken so that there is no possible interference with the cultural heritage in accordance with the law in force.

10.1.4.2.3.6 Increasing tax collection and Boosting the local economy

Environmental aspect

Growth of activities producing goods and services.

Impact-Generating Factor

Demand for products and services by the company and the workforce employed.

Technical justification

In the construction phase, there is a growth trend in the tertiary sector in the region, possibly generating the installation of new commercial units (workshops, service units, transport unit, food and other activities).

Thus, the local economy tends to benefit from the emergence of this demand, linked both directly to the activity of the company's execution and indirectly, through the consumption made by the labor linked to the implantation.

This dynamism of the local economy can be demonstrated through indicators, which can be the significant increase in public investment, or in tax collection.

The growth of the activities producing goods and services, resulting from the demands generated by the construction of the mill, tends to increase the collection of taxes both among the companies that will provide direct services to the company, and among those indirectly involved.

The acquisition of construction material and the demand for other services in Concepción represent the direct influence of the work in relation to tax collection.

The project will generate an increase in tax collection at the municipal, departmental and national levels, in accordance with current legislation. This increase can be reinvested in improving basic infrastructure to meet the social needs of the municipality and region.

The informal economy will also increase due to the implementation of the pulp mill. The low-skilled population, or those who cannot be included in the formal activity, tends to resort to emerging informal activities, due to the demand generated by the presence of the labor contingent in the construction phase of the project. The appearance of bars, food stands, cigarette and other consumer goods vendors may occur in the area near the company.

Informal commercial activities are generally not recorded. If there are no records, there is no way to evaluate the benefits that could be generated for the public coffers and to monitor the quality of services.

On the other hand, this informal trade can be analyzed in a positive way, taking into account the generation of income and economic activities that will favor the circulation of money in municipalities and regions.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2

	Qualitative	Quantitative
Time of occurrence:	Immediate	1
Time or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	High	3
Importance:	Large	3
Possibilities of potentiation:	High	
Degree of enhancement:	High	
Degree of measurement resolution:	High	
Area of influence:	DIA and IIA	

Measures of enhancement

Give preference to companies, service providers and trade in the region through the Promotion and Development of Local Suppliers Program.

Prioritize the acquisition of services and goods in the construction phase of the project, preferably in Concepción and the region.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The implementation of the pulp mill will generate an increase in tax collection at the municipal, departmental and national levels, so that, there will be a boost to the local economy from the construction phase due to the demand for products and services by the company and the workforce employed, boosted by the Promotion and Development of Local Suppliers Program. However, it is up to the government to reverse the taxes collected in improvements to the municipality and region.

10.1.4.2.3.7 Worker influx increase

Environmental aspect

Demand for workforce.

Impact-Generating Factor

Mobilization of workforce.

Technical justification

It is anticipated that the industry component of the project may impact the migration of people in different ways, due to the increase in the flow of workers in the area.

The increase of the population, represented by the labor force of the construction phase and people possibly attracted by the possibility of professional insertion in the activity, tends to increase the demand for public equipment such as: education, health, sanitation, transportation, etc., as well as tends to seek social interaction in the city of Concepción and the region. For the purposes of the study, we consider the increase of people in the region corresponding to approximately 8,000 workers in the phase of greater intensity of this activity.

One type of migration may occur due to the change of workers from one productive sector to another, bearing in mind that today the predominant activity in the area is livestock and to a lesser extent agriculture. The employment opportunity generated in both stages of the industry component of the project may attract people who currently already have a job in another productive and/or service sector and promote migration to the project, due to various factors that could make the offer of Project employment more attractive than the existing job/income generation offer, such as: better wages/income, job formalization, related benefits, proximity to the home, desire for experience in a project with such characteristics, etc. The impact would be positive if migration means an increase in the level of income and quality of life of the people who have migrated to the project sector. The impact will be negative for the productive/service sectors that will lose employees and will have to hire new personnel and train them, or that will stop producing due to the lack of labor.

In the field data collection, most of the interviewed population declared to work in activities of the primary sector, including agriculture and small-scale livestock; mainly for self-consumption and, as needed, for sale. Part of the population referred to commerce and services (pantries, minor sales, motorcycle workshop, snack bars/dining rooms, sale of mini-phone charges) as their activities.

The ADA population consulted has referred to the "poor police presence" as one of the areas of concern in the community. If this is the case, the effects induced by the construction phase of the Project may further increase the pressure on the existing police capacity.

In order to minimize the impact, PARACEL should carry out awareness raising work with workers and subcontracted companies, to guide workers on: child prostitution, sexually transmitted diseases, drugs, etc., as well as to ask public agencies for greater security supervision, to inhibit illegal acts.

In order to identify in time inconveniences in the fulfillment of the objectives established, and to allow taking corrective actions in a timely manner, the Social Monitoring Program must carry out the monitoring of the social perception through which it will be possible to have updated information regarding opinions and expectations of the local population on aspects related to the project in its different stages.

In addition, after construction is completed, PARACEL may require some service providers to continue their work during the operation phase of the mill, without requiring their demobilization.

PARACEL must also provide training and qualification of people from the region for the pulp sector, or mechanical, electrical and instrumentation maintenance, to enable the retention of people for the operation of the pulp mill.

The program to raise awareness and follow up with contractors and workers regarding compliance with regulations will ensure that all contractors comply with the Human Resources Policy and the principles and regulations they must comply with, which will also minimize the impact.

According to the National Statistical Institute of Paraguay, the population of the Concepción department by 2020 is 254,976 inhabitants, representing 3.5% of the country's total population and in 2018 the municipality of Concepción had 76,378 inhabitants in total. So, although 8,000 workers in the phase of greater intensity of this activity is a high number, it represents about 10% of the total municipality. PARACEL will take efforts to minimize the influx impacts by using existing accommodations, hotel networks and housing will be used, with minimal provision of toilets, cafeterias, electricity, garbage collection system, sewage and drinking water collection and disposal, and should not overload the existing municipal system. Then, PARACEL has foreseen camps for workers accommodation.

It is estimated that the Project will directly employ some 8,000 people at the peak of the construction phase, of which 10% will be professionals, 30% technicians and 60% suitable. Among these direct jobs are considered people hired directly by PARACEL and people from contractors and subcontractors hired for construction and assembly. The Project must comply with the principles of IFC Performance Standard 2, clearly defining the employment relationships, depending on whether the employees are direct workers, contract workers, or supply chain workers, depending on the case.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative/Positive	+ -
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Medium term	2
Timing or length:	Permanent	3
Reversibility:	Reversible	1

	Qualitative	Quantitative
Accumulation:	Accumulation Type II and III	
Magnitude:	Medium	2
Importance:	Medium	2
Possibilities of potentiation:	Medium	
Degree of potentiation:	Medium	
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures/enhancement

- Give priority to hire local people through the Local Labor Development and Linkage Program;
- Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation, the provide camps for the workers;
- Carry out a dissemination work with the subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in the Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations with own employees and third parties;
- Carry out the social perception monitoring through the Social Monitoring Program in order to identify in time inconveniences in the fulfillment of the objectives established, and to allow taking corrective actions in a timely manner;
- Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Contractor and Worker Awareness and Monitoring Program on compliance with regulations;
- Provide in the contract with service providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contracted work is completed; in addition, monitor demobilizations of hotels, rental properties and lodging;
- Promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of contracting for the mill's operational phase, through the Local Labor Development and Partnership Program, signing partnerships with associations and educational institutions.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

By giving priority to hire local people through the Local Labor Development and Linkage Program, accommodate properly the workers from outside Concepción, carry out the demobilization in accordance with the legal procedures of the contracting regime and promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, the negative impacts due to workers influx will decrease and by the end of the construction at least the people will be better qualified.

10.1.4.2.3.8 Impacts to community health and safety

Environmental aspect

Pressure on local infrastructure due to the increase in the population.

Impact-Generating Factor

Mobilization of work.

Technical justification

The ADA/AID health services may be affected by the increase in the temporary and permanent population associated with the construction of the Project, which will settle in the ADA/AID communities. This could translate into a lower average attention span per person.

The most relevant data are those of the department of Concepción, as it is expected that most of the population will settle in the communities near the Mill, within the department. Concepción had 214 hospital beds in 2017 and 76 public health facilities in 2018, throughout the department. In the AID districts, there are the following numbers of establishments of different types, dependent and not dependent on the Ministry of Public Health and Social Welfare (MSPBS): Concepción 21 dependents and 16 non-dependents, Belén 3 dependents, Horqueta 15 dependents and 1 non-dependent, Loreto 5 dependent and 3 non-dependent. The care centers with the highest demand are those located in the district of Concepción, due to the degree of complexity, where 5,295 cases were attended in 2019; in Belén 343 were treated, in Horqueta 1,985 and in Loreto 116 cases.

According to the surveys carried out in the AID districts, “health” is the aspect most mentioned as a priority for a greater development of the communities. They consider that it is necessary to improve: access to quality health care, the number of health units close to the communities, the provision of the necessary equipment, supplies and resources for adequate care. This constitutes an indicator that, despite the numbers currently available in terms of health care units in the AID, these are not sufficient for the current population and would not be, even more so, if the population were to increase in AID districts and/or communities. Added to this is the COVID-19 pandemic, which is a threat that increases the demand for hospital beds.

Information has been accessed on the expansion and/or new opening of Family Health Units (USF, dependent on the Ministry of Public Health) in the AID districts, with a care capacity of between 2,500 and 3,000 people each. In the micro-territories closest to the location of the Industrial Mill, there is information on the short-term installation of a USF in the community of Roberto L. Petit, and the management for the installation of a health post in the community of Plato Lagoon. It is estimated that the existence of these by the beginning of the construction phase of the Project may contribute to decompressing the demand for more basic health services in the ADA/AID.

On the other hand, the Project will be able to provide better preventive health conditions to direct employees in the construction phase and to their families, while the work lasts, since to date only up to 15% of the department's population has medical insurance, either private or IPS. This impact is associated with the formalization of labor ties, since, since the jobs are not formalized, people do not have compulsory social security.

Public services for the protection of the safety of the population may also be affected by the presence of a greater number of people in the ADA/AID communities associated with the construction of the Project.

According to the data obtained, there are police stations, sub-police stations and police posts in the AID. As for police stations, there are 5 in Concepción and one in each of the cities of Belén, Horqueta and Loreto. Sub police stations there are 5 in Concepción, 1 in Belén, 8 in Horqueta, 5 in Loreto.

The consulted ADA population has referred to the "little police presence" as one of the aspects of concern in the community. If this is the case, the effects induced by the construction phase of the Project may further increase the pressure on the currently existing police backup capacity.

The property of the industrial enterprise, as well as the forestry component, will have its own security personnel, which is common in private enterprises. In this sense, the need for the project to have the support of the public police/security service is reduced. However, as it is a sensitive aspect that could involve the violation of human rights, the project will observe, at a minimum, IFC PS 4 on "Community Health and Safety", regarding the safeguarding of personnel and properties; on the one hand, and the minimization of security risks for the surrounding communities, ensuring that these personnel do not exercise "abuses of power" as an extortion measure or pressure on workers and/or the community; Parcel will have a specific area, under the human resources area, which will implement a "Security Policy" at the business level.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2

Probability of occurrence:	Certain	2
Time of occurrence:	Medium Term	2
Temporarily or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

Perform Relationship Plan with the Community and other Social Actors Plan;
Perform Community Health and Safety Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The implementation of PARACEL's mitigation measures and partnerships with the public authorities responsible under the Community and Stakeholder Relations Program and the Social Monitoring Program will make it possible to compensate for the additional demand generated for health and safety by the increase in population in the region.

10.1.4.2.3.9 Impacts to vulnerable groups

Environmental aspect

Pressure on vulnerable groups due to the increase in the population.

Impact-Generating Factor

Mobilization of work.

Technical justification

The increased workers influx and the presence of an unusual number of people associated directly and indirectly with the Project's works in the ADA/AID communities may promote the appearance (or increase) of activities such as sale and consumption of

alcohol and drugs, sex work or prostitution, gender violence, crime, disrespect for the vulnerable population, disturbance of public peace due to a greater number of recreational and/or night-time activities (parties, leisure groups, etc.) on public roads and/or in homes within the communities, disrespecting the current levels of tranquility of the ADA/AID.

Also, the possible alterations in the tranquility, comfort and even the security of the current population of the AID may lead to the need to change their daily habits, customs and ways of life to adapt to the new conditions that the presence of additional population would generate, due in large part to the increase in the workers influx linked to entrepreneurship. The impact would be adverse if it implied a deterioration of the freedoms enjoyed by the current communities and/or the normalization of acts contrary to the tranquility and harmony of the communities (for example, annoying noise, lack of respect towards vulnerable members of the local communities, with an emphasis on women and children, lack of respect for the property of third parties, etc.).

The increased workers influx and the presence of an unusual number of people directly and indirectly associated with the Project's works in the ADA/AID communities may promote the appearance (or increase) of activities such as sale and consumption of alcohol and drugs, sex work or prostitution, gender violence, crime, disrespect for the vulnerable population, disturbance of public peace due to a greater number of recreational and/or night-time activities (parties, leisure groups, etc.) on public roads and/or in homes within the communities, disrespecting the current levels of tranquility of the ADA/AID. In addition, among the vulnerable groups that may be exposed to the aforementioned situations, there are women, children and the elderly.

Regarding the road signaling, it is expected that the projects undertaken by the MOPC in the area, will make the provisions related to the signaling, but these could be reinforced by the project, giving express indications of reduction in the area of entry and exit of trucks to the Industrial Mill as well as in areas where vulnerable groups or groups of children and people in general settle (schools, health centers, churches, others located on the roads of nearby communities). Along these lines, IFC PS 4 on "Community Health and Safety" will be observed by the project.

Support to the strengthening of community identity : Measure by which it is intended to generate activities that promote the strengthening of the existing community nexus between communities; accompanying the process of change that could be generated with the implementation of the project. The activities may include the participatory development of joint projects; including vulnerable groups (women, children, people with disabilities and the elderly), the establishment of community centers, the preparation of training plans in coordination with the regional offices of the MIC, SNPP, USF (training in preventive measures against COVID-19, HIV, and other public health issues), the organization of cultural events, etc.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-

Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Time of occurrence:	Medium Term	2
Temporarily or duration:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

Carry out a dissemination work with the workers and subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in the Environmental Education Program with own employees and third parties

Perform Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations

Support to the strengthening of community identity

Perform Equal Opportunities and Non-Discrimination Program

Perform Women's Empowerment Program

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The implementation of PARACEL's mitigation measures will make it possible to minimize impacts to vulnerable people.

10.1.4.3 Works Deactivation phase

10.1.4.3.1 Socioeconomic environment

10.1.4.3.1.1 Reduction in the number of jobs

Environmental aspect

Termination of the company's construction work

Impact-Generating Factor

Demobilization of temporary work

Technical justification

The workforce required for the construction of the mill is estimated at approximately 8,000 workers in the most labor-intensive and assembly period.

This labor needed for the construction and assembly of the project will be hired preferably in the region of Concepción.

The completion of the works will represent the dismissal of the labor hired temporarily for such activity. Non-residents of the region must, little by little, return to their places of origin. The elimination of demands for goods and services will represent the reduction of previously produced income, with the closure or reduction of the capital of some companies providing services

In addition, PARACEL may require some service providers to continue their work during the operation phase of the mill, without requiring their demobilization.

PARACEL must also provide training and qualification of people from the region for the pulp sector, or mechanical, electrical and instrumentation maintenance, to enable the retention of people for the operation of the pulp mill.

The program to raise awareness and follow up with contractors and workers regarding compliance with regulations will ensure that all contractors comply with the Human Resources Policy and the principles and regulations they must comply with, which will also minimize the impact

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1

Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA and DIA	

Mitigation measures

- Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Contractor and Worker Awareness and Monitoring Program on compliance with regulations;
- Provide in the contract with service providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contracted work is completed; in addition, monitor demobilizations of hotels, rental properties and lodging;
- Maintain the commitment to prioritize the hiring of local labor for the operational phase of the mill;
- Promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of contracting for the mill's operational phase, through the Local Labor Development and Partnership Program, signing partnerships with associations and educational institutions

Responsibility for the implementation of the measures

PARACEL together with the educational institutions.

Forecast after implementation of measures

The reduction of the workforce after the completion of the works is inevitable, however, it will be minimized by the implementation of these mitigation measures.

10.1.4.4 Operation Phase

10.1.4.4.1 Physical Environment

10.1.4.4.1.1 Noise related disturbances

Environmental aspect

Noise generation from the pulp mill.

Impact-Generating Factor

Operational activities for the manufacture of pulp.

Technical justification

To obtain the current noise level (background), the surrounding sound pressure level was measured at 05 (five) different points, during the day and night, around the area planned for the implementation of the PARACEL pulp mill.

The results of the environmental sound pressure level measurement around the area planned for the implementation of the PARACEL pulp mill ranged from 34.5 dB(A) to 50.7 dB(A) during the day; and from 35.0 dB(A) to 50.2 dB(A) at night, being below the limits of the legislation.

The sources of noise in the pulp mill will come from industrial activity, the main noise generating areas are presented below:

- Wood handling
- Cooking (digester)
- Fiber line
- Pulp warehouse
- Evaporation
- Recovery boiler
- Causticizing and Lime Kiln
- Compressed air system (compressor)
- Biomass boiler
- Turbogenerator
- Effluent treatment
- Waste treatment area

In the area surrounding the company, agricultural activities predominate. The most immediate presence of population agglomeration is the Piquete Cue community, which is about 400 meters from the boundary of the property in which will be installed the PARACEL pulp mill.

To verify the impact of noise, the noise propagation study generated by plant operations and the baseline data available for the area were carried out, determining the project's incremental contribution.

The characterization of the sound environment around the industrial plant was quantified by determining the sound pressure levels in 27 receivers: sensitive homes located around the plant, whose identification and location was provided by PARACEL.

In all cases, the sound pressure levels modelled were compared with the applicable reference standards, determined by the reference regulatory framework constituted by Law # 1100/97 and the applicable regulations of the Republic of Paraguay.

Considering the most conservative operational dynamics, 6 different modeling scenarios were defined: 4 scenarios considering the operation of all equipment in the plant, maximum internal vehicle travel and two access options for maximum truck and light vehicle flow and only maximum light vehicle flow. Two scenarios were then modeled in order to evaluate the effectiveness of including a vegetation barrier as a mitigation measure with the operation of all equipment in plant and maximum internal vehicle travel.

The modeling results indicated that in only 1 of the 27 receivers the noise level was 1.4 to 1.8 dB(A) above the norm, at night and in only 2 scenarios.

The above results do not imply that the operation of the industrial plant is imperceptible from the point of view of NPS emission, or that it does not have the potential to generate nuisance in some cases, since perception is a subjective parameter that is not directly linked to absolute values of emission. However, it can be assured from an objective point of view, through the quantification of the effect of increasing SPL and its comparison with reference standards, that its impact would not be significant when the objective values of noise quality are met.

Finally, it should be noted that the plant barrier would have no effect on the attenuation of the NPS of emission for the receivers considered, since none of the results of the model are modified when the barrier is introduced into the model.

In order to minimize disturbances to this community, PARACEL must ensure that low noise machines and equipment are used and whenever possible will acoustically isolate equipment, as well as continue to monitor environmental noise.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3

Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA y DIA	

Mitigation measures

- Use machines and equipment with low noise level;
- Wherever possible, soundproof the equipment by aiming for a low noise level;
- Implementing the Noise Monitoring Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be affirmed that the operation of the mill will be imperceptible in terms of increasing the noise level, however, it does not rule out the possibility of complaints, since the perception of noise is subjective and can vary from person to person. However, disturbances to the community in relation to the noise generated by the company will be mitigated, as the measures will be implemented and monitored

10.1.4.4.1.2 Change in soil and/or surface water and groundwater quality

Environmental aspect

Inappropriate generation and disposal of solid waste

Impact-Generating Factor

Operation of the pulp mill.

Technical justification

During the operation phase, industrial and non-industrial solid waste will be generated at the pulp mill.

The solid industrial waste generated by the pulp production process will come from the wood handling, causticizing, boiler, and water and effluent treatment plant areas.

This category includes the following main wastes:

- Wood preparation waste;
- Biomass boiler ash
- Dregs, grits and lime mud;
- Sludge from the water treatment plant; and,
- Primary, secondary and tertiary sludge from the effluent treatment plant

Non-industrial solid waste will also be generated, corresponding to all the materials discarded by the administrative and operational support activity covering office, cafeteria and maintenance activities.

This category includes the following main waste:

- Metal
- Paper or cardboard
- Plastic
- Glass
- Recyclable and non-recyclable organics
- Waste from health services
- Contaminated with oil and fats
- Used lubricating oil
- Fluorescent lamps and batteries

The management of solid waste generated during the operation of the pulp mill will include best practices.

The mill will have a system of selective collection which aims to segregate materials with similar features at source in advance. In the case of administrative and operational collectors, the segregation will adopt the color pattern, following current standards and legislation, in such a way as to eliminate risks to human health and the environment.

Solid waste shall be destined for treatment and/or final disposal as described in the following Table:

Table 12 – Treatment and/or final disposal of solid waste

Waste	Treatment or final disposal
Waste wood + sand	Production of compost (forest application) or burning in PARACEL's biomass boiler or industrial landfill
Dregs	Production of soil acidity corrector (forestry application) or PARACEL industrial landfill

Waste	Treatment or final disposal
Grits	Production of soil acidity corrector (forestry application) or PARACEL industrial landfill
Lime mud	Production of soil acidity corrector (forestry application) or PARACEL industrial landfill
Ashes + sand	Production of soil acidity corrector (forestry application) or PARACEL industrial landfill
Primary sludge of ETP	Production of compost (forest application) or burning in the biomass boiler or recycling or industrial landfill PARACEL
Biological sludge of ETP	Production of compost (forest application) or burning in PARACEL's biomass boiler or industrial landfill
Tertiary sludge of ETP	PARACEL Industrial Landfill
Sludge from WTP	PARACEL Industrial Landfill
Metal	Recycling
Paper or cardboard	Recycling
Plastics	Recycling
Glass	Recycling
Recyclable and non-recyclable	PARACEL sanitary landfill (organic)
Waste from health services	Decontamination and sanitary landfill (external)
Contaminated with oil and fats	Incineration or coprocessing
Used lubricating oil	Recycling
Fluorescent lamps and batteries	Decontamination and recycling (external)

All solid waste generated in the operation of the pulp mill must follow the procedures of the Solid Waste Management Program (PGRS in Spanish), giving preference to the reuse and recycling of waste and whenever it is necessary to send it for treatment and/or final disposal to duly authorized companies.

The residues generated in the pulp production processes, such as bark and wood yard residues, primary and secondary sludges from the treatment of liquid effluents, may be previously submitted to the composting process by accelerated fermentation.

An alternative to the composting process, which may be used by PARACEL, is the burning of primary and biological sludge together with biomass in the biomass boiler (designed for this purpose).

The inorganic residues of causticizing (dregs/grits, lime mud, precipitator lime) and the biomass boiler (ash) will be used for the production of soil acidity corrector.

An industrial landfill will also be implemented to receive industrial solid waste.

In addition, a sanitary landfill (organic) will be implemented to receive waste from cafeterias (food processing waste, leftover meals, napkins, and the like), bathrooms (toilets), and non-recyclable waste. This measure will prevent the final disposal of waste in existing landfills.

The system for protecting soil and groundwater from contamination (waterproofing) will be properly implemented in all areas where solid industrial waste is handled, processed, treated, and disposed.

To verify that water is not contaminated, the groundwater quality monitoring program must be implemented.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Medium Term	2
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I and III	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA and DIA	

Mitigation measures

- Apply best practices in solid waste management, in accordance with applicable laws and regulations;
- Implement the Solid Waste Management Program (SWMP);
- To train operators for the correct disposal of the waste generated;
- Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of;

- Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity;
- Implement the Groundwater Quality Monitoring Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be assumed that through the implementation of mitigation measures the quality of the soil and/or the groundwater will not be affected.

10.1.4.4.1.3 Change in air, soil and/or surface water and groundwater quality

Environmental aspect

Inappropriate storage and handling causing chemical leaks or spills.

Impact-Generating Factor

Use of chemical products

Technical justification

The use of chemicals in the process, such as: sodium hydroxide, hydrogen peroxide, sulfuric acid, magnesium sulfate, sodium sulfate, methanol, sodium chlorate, virgin lime, aluminum sulfate, starches, calcium carbonate, among others, for the production of pulp, in addition to the operations of storage of inputs and transport of products can cause accidents.

The chemical plant will have the following equipment and structures for storage, containment, control, and safety:

Chemical discharge platforms, provided with containment through thorns or low walls;

Storage of liquid products in metal tanks, made of carbon steel, stainless steel or fiberglass (the material will depend on the type of chemical to be stored);

Concrete containment dikes for chemical storage tanks;

Containment channels in the production areas and in the stock of chemical products;

Process monitoring instruments (level, pressure, temperature, among others) operated remotely, to minimize the need for operators in the production or chemical storage area. Remote operation can be performed by dedicated remote control systems;

With respect to chlorine dioxide, the following measures are foreseen:

- Chlorine dioxide leak detection system;
- Constant ventilation system for the tanks (with redundant source)
- Fixed foam system around the containment dyke to prevent gas emissions in case of leakage.

Atmospheric Discharge Protection Systems (known as ADPS), provided with grounding networks or lightning arresters;

One of the points of attention regarding chemical products from the PARACEL pulp mill is that the transfer system from the Chemical Plant to the points of use will be carried out by means of aerial piping through a pipe bridge (known as Pipe Rack), which avoids manipulation by operators and minimizes the risk of accidents.

Where appropriate, tanks shall be equipped with a fixed internal foam dispersal system.

Fire Department regulations also require the installation of signs in the area reserved for fire extinguishers.

In the event of risk of leaks and spills, the spill collection and handling system has been designed so that accidental discharges can be collected as close to the source as possible and recycled directly to their own process stage.

The main approaches are:

Dam with retaining walls around tanks and equipment where there are black or white chemicals or liquors. In the event of an accidental leak or spill, the material will be collected and returned directly to the process;

Tank systems and equipment that will allow excess liquor to be properly conducted when emptying is required for maintenance. Process liquor will be taken to a spill tank and returned directly to the process instead of being discharged to the effluent network;

In areas with potential for spills, there will be an interconnection of floor channels with pumping wells, from which the liquids will be returned to the process;

Emergency effluent treatment pond, where the main effluents can also be directed in the event of spills that have not been contained with the means previously provided;

Appropriate instrumentation for on-line monitoring of effluent, and a good supervision system to help operators detect accidental discharges and take appropriate corrective measures; and

Training of operators, process managers and implementation of information systems, where environmental problems and accidental discharges require continuous attention.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Medium Term	2

Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I and III	
Magnitude:	High	3
Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance plans and inspections;

Train operators involved in the handling, storage and transport of chemical products;

Implement and operate the system for collecting and handling spills and leaks.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that with the implementation of mitigation measures there will be no change in the quality of air, soil and/or surface and ground water in the event of improper storage and handling causing chemical leaks or spills.

10.1.4.4.1.4 Conflicting water usage

Environmental aspect

Availability of water from the Paraguay River.

Impact-Generating Factor

Water consumption during mill operation.

Technical justification

During the operation of the mill, water will be captured from the Paraguay River, through a surface capture system consisting of a channel and a grid, to a Water Treatment Plant (WTP) to serve the consumption of the PARACEL pulp mill.

It should be noted that the collection will be of the "water mirror operation" type, that is, no dam system will be built.

Four pumps of 2,350 m³/h each will be installed, with a total intake flow of 7,000 m³/h to supply the pulp mill.

A 1,100 mm diameter raw water pipe will be installed.

The raw water, which arrives at the Water Treatment Plant, will be treated with aluminum sulfate, sodium hydroxide and sodium hypochlorite, the latter used to promote the elimination of iron, in addition to oxidizing the organic matter present. After the coagulation process, polyelectrolyte will be added to promote flocculation.

Then, by gravity, the flocculated water will go to the solids removal unit, through a dissolved air flotation system or similar. The sludge formed will be periodically and automatically discharged into the central discharge channel. The collected sludge will be compacted and dewatered and then sent for final disposal.

By gravity, the clarified water will be conducted through channels to the gravity filters. After filtration, the treated water will be stored in the treated water tank that will supply the pulp mill's various consumption points, including water for fire control and drinking water.

The total production capacity of treated water will be 6,700 m³ /h.

With regard to the impacts resulting from water consumption, the studies confirm the availability of water from the Paraguay River, which has a minimum flow (Q7.10) of 1,093 m³/s and an average flow of 2,179 m³/s. Water intake for industry operation is estimated at 0.09% of the average river flow, and about 80% of this volume (effluent) will return to the Paraguay River.

That said, there will be no conflicting use of the Paraguay River, which is positive, but PARACEL will apply best practices in water management, seeking continuous improvement of processes in order to minimize water consumption.

In addition, PARACEL shall ensure that water is available in accordance with drinking water standards for human consumption and for use in the pulp mill's operations, through the monitoring of the Water Treatment Plant (WTP).

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative/Positive	- +
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Long Term	3
Timing or length:	Permanent	3

Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

- Monitor the Water Treatment Plant (WTP) to ensure the availability of water in accordance with the standards of potability for human consumption and for use in mill operations;
- Follow the best water management practices, seeking continuous improvement of processes with the aim of minimizing water consumption.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

There will be no conflicting use of the Paraguay River, given that water intake for industry operations is estimated at 0.09% of the average river flow, and about 80% of this volume will return to the Paraguay River as effluent. In addition, PARACEL will follow best practices in water management, seeking to continuously improve processes in order to minimize water consumption.

10.1.4.4.1.5 Change in river quality

Environmental aspect

Discharging of liquid effluents generated in the Paraguay River.

Impact-Generating Factor

Pulp mill operation.

Technical justification

Basically, the sources of liquid effluent generation that will correspond to the activities of the pulp production process and other auxiliary activities are the following:

- ✓ Effluents from the wood preparation area;
- ✓ Effluents from the brown pulp cooking and washing area;
- ✓ Alkaline filtrates and acid bleach;
- ✓ Effluents from the drying machine;
- ✓ Effluents from evaporation and recovery;
- ✓ Effluents from the causticizing and lime kiln area;
- ✓ Contaminated condensate;
- ✓ Sanitary sewers;
- ✓ Contaminated rainwater; and
- ✓ Miscellaneous (spills, leaks, cleaning of various areas, etc.)

Industrial liquid effluents from the plant will be measured for flow, temperature, pH and conductivity and, depending on the results, diverted to emergency ponds.

Effluents from the chlorine dioxide plant, ash leaching, and the boiler renovation water plant will also be segregated from the main lines, as they have no organic load, requiring only pH control prior to release. The specific neutralized effluents will be added to the other treated effluents in the treated effluent tank for disposal in the Paraguay River.

Sanitary wastewater generated at the plant will be collected from the sanitary effluent network and sent to the ETP directly for biological treatment.

Effluents from the PARACEL pulp mill will be treated at the ETP, which will have the biological treatment system adopted for activated sludge. The activated sludge process is a proven technology commonly used in the pulp and paper industries worldwide.

After the biological treatment, the effluents will undergo a tertiary treatment to minimize phosphorus, color and COD, through a physicochemical process with the application of aluminum sulfate and polymer in coagulation and flocculation tanks, and then be directed to the Dissolved Air Flotation (DAF) system. As an alternative to the physicochemical flotation system, tertiary treatment can be carried out by injecting ozone into the effluent.

The treated effluent will be discharged into the Paraguay River through an underwater emissary.

The emissary is intended to discharge treated effluent into the Paraguay River in a controlled and safe manner by means of underwater discharge under conditions that prevent the formation of foam and promote more efficient dispersion in the receiving body.

It is worth mentioning that the treated effluents will comply with the emission standards established by Resolution # 222/02 and IFC effluent standards.

It should be noted that the PARACEL pulp mill will adopt kraft process production based on Best Available Techniques (BAT), which will minimize the generation of liquid effluents (flow and organic load).

In order to evaluate the quality of surface water in the company's region before the construction and operation of the pulp mill, to be considered as a background and reference for impact studies and future monitoring, three campaigns were carried out to collect and analyze surface water during the dry and rainy seasons in preparation for this ESIA.

The analyses included the parameters established in Resolution # 222/02.

The results showed that most of the parameters analyzed are within the conditions required for class 2 surface water bodies, according to the law in force.

The parameters of total phosphorus, total Kjeldahl nitrogen, color value and metals aluminum and iron exceeded the value of the legislation at some time and/or in some campaigns.

Phosphorus and nitrogen parameters are nutrients naturally originated from the dissolution of compounds present in the soil and from the decomposition of organic matter, which may have contributed to the results found. Because it is a region with agricultural activities, nutrient concentrations above the permitted limit may also be associated with fertilizer use and with rainwater runoff from livestock deposition.

Aluminum and iron values are at odds with the legislation, they may be related to the substrate layer of the region's soils, and therefore may be considered as natural from surface waters.

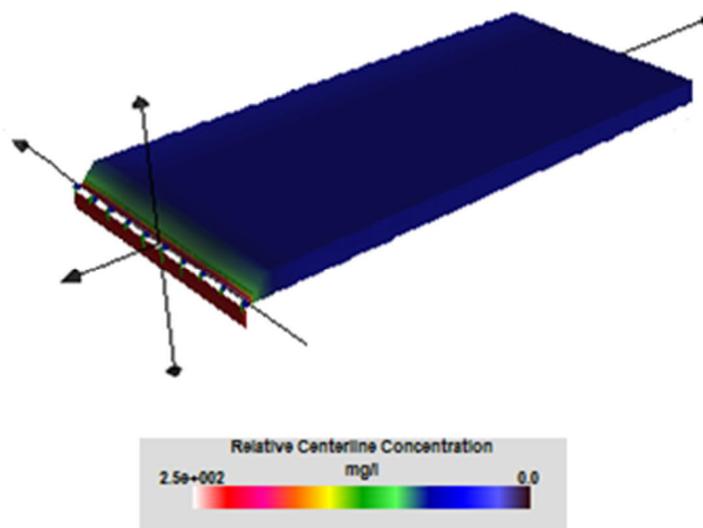
As for the color parameter in point FW01 in disagreement with the legislation, it is believed that such non-conformity is associated with the time of sampling, the rainy season of the region, since there may be an increase of suspended and dissolved solids, mainly organic and inorganic colloidal and suspended material, thus corroborating the alteration of this parameter.

It should also be noted that the Paraguay River presented, in the third campaign, carried out in February/2020, a greater concentration of dissolved salts than in the first and second campaigns, carried out in October and December/2019, respectively. This must be due to the severe drought recorded in October, November and December. The increase in precipitation in the region contributed to the alteration of the concentrations of the parameters under analysis, decreasing the electrical conductivity and all the cations and anions.

It should be noted that the Paraguay River has good homogeneity, very good quality conditions and excellent resources for its use in industrial purposes.

In order to verify the impact of the release of effluents into the river, the Water Dispersion Study was simulated.

According to the results of the simulations, it is observed that in order to comply with the quality standards established by SEAM Resolution 222/2002, with respect to BOD, color, nitrogen and phosphorus parameters, both under the most critical conditions (minimum flow - Q7.10) and under average flow conditions, the distances required for the mixing zone of the effluents treated by PARACEL in the Paraguay river vary between 0.37 and 0.50 m. In the case of AOX, to reach a concentration equal to that obtained in the quality campaigns, the distances required are 0.50 m.



**Figure 4 – Example of a 3-dimensional dispersion plume simulation
(Color, Minimum flow - Q_{7,10})**

In general, due to the results obtained, the dispersion of PARACEL treated effluents into the Paraguay River is rapid and occurs very close to the point of effluent discharge. Because of this, the simulation for the far field was not performed. However, it is important to note that the mathematical model does not consider the BOD, color, nitrogen, phosphorus, and AOX concentrations of the Paraguay River. However, according to the simulation the distance at which the near field variables cease to prevail, i.e., the distance from the near field is 50 m.

It should be noted that the mill's water intake point will be located downstream of the effluent discharge point. This reinforces PARACEL's compliance with environmental issues and demonstrates the commitment and security that PARACEL must have with respect to the mill's future effluent treatment system in order to maintain the quality standard of the water of the Paraguay River.

In addition, it is important to note that the discharge of the effluent from PARACEL's pulp mill will not cause a cumulative impact on the waters of the Paraguay River, due to the existence of few industrial discharges into the river and a high flow of the same.

Other than that, the robustness of the WASP tool enabled the mathematical modeling of the self-depuration process along the Paraguay River between Concepción and Assunción.

The simulations for the current and future situation after the treated effluent discharge of a pulp and paper industry will not impact on the surface water quality of Paraguay River. The behavior of the various parameters is maintained.

The high dissolved oxygen concentrations along the Paraguay River will maintain aquatic life and the ammonia, nitrate and total phosphorus concentrations do not have potential to change trophic state in the watercourse.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Spatial coverage area:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Medium Term	2
Temporarily or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II and III	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

- ✓ Use the best available technologies (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load);
- ✓ Implement an effluent treatment plant based on the best available practical technology (modern and safe), the activated sludge system and tertiary treatment;
- ✓ To properly operate the effluent treatment plant so that the discharge of treated liquid effluents complies with current legislation;
- ✓ Carry out a periodic inspection of the emissary system and its diffusers;
- ✓ Carry out the Effluent Treatment Plant (ETP) Monitoring Program;
- ✓ To carry out the Surface Water Quality Monitoring Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that, through the mitigation measures implemented, the water quality of the Paraguay River will not change significantly even under the minimum flow conditions of the river.

10.1.4.4.1.6 Change in air quality

Environmental aspect

Generation of atmospheric emissions.

Impact-Generating Factor

Operational activities for pulp production.

Technical justification

The main sources of atmospheric emissions from the pulp mill will be generated from the following equipment:

- Recovery boiler;
- Lime Kilns; and
- Biomass boiler

The main control parameters related to significant air emissions from a pulp mill correspond to:

- Particulate matter;
- TRS (Total Sulfur Reduction);
- SO_x (sulphur oxides);
- NO_x (oxides of nitrogen); and
- CO (carbon monoxide).

The minimization, control and monitoring of air emissions will be based on the technologies already established and used with great success, which are listed below:

- Use of low odor recovery boiler;
- High dry solids content of at least 80% in the liquor burned in the recovery boiler, which minimizes SO_x emissions
- Use of high efficiency electrostatic precipitators for the recovery boiler, biomass boiler and lime kilns
- Collection of concentrated non-condensable gases from the digester and evaporation, and their incineration in the recovery boiler or biomass boiler (protected flame incineration);
- Extensive collection of diluted non-condensable gases from the digester, brown pulp line, evaporation, with treatment in the recovery boiler;
- Treatment of gases from the solution tank in the recovery boiler itself;
- Efficient cleaning of bleach plant relief gases; and

- Real-time gas monitoring systems and control system, rapid identification and correction of operational disturbances.

It should be noted that the PARACEL pulp mill will adopt a kraft pulp production process based on the Best Available Technologies (BAT), which will enable the reduction, control and monitoring of greenhouse gas emissions.

It is worth noting that all emission sources will be properly dispersed through a chimney with a height of 140 meters.

The control of emission sources and air quality will also be monitored.

It is important to emphasize that, according to the environmental diagnosis, and in relation to the preferred direction of the winds, these present preferential direction from the south, followed by northeast winds for this. Therefore, even in accidental cases of emergency, atmospheric emissions should not reach the municipality of Concepción since it is located about 15 km south of the future company.

In the air quality assessment, as presented in the environmental assessment, two monitoring campaigns were carried out at three sampling points in the area near the project area.

In these campaigns it was possible to verify that, with respect to the particulate pollutants sampled: Total Suspended Particles - TSP and Inhalable Particles - IP (PM10), they were presented in accordance with current air quality legislation. However, the parameter Breathable Particles - RP (PM2.5) presented concentrations above those established in the regulations, possibly due to the material associated with the suspension of particles originating from unpaved roads and the emission from diesel-powered vehicles.

The parameters NO₂ - Nitrogen dioxide, O₃ - Ozone, CO - Carbon monoxide and SO₂ - Sulphur dioxide were also below the limit set in the standard.

In the technical literature there is no reference for emission limits for the parameter of H₂S - Hydrogen Sulfide and Total Reduced Sulfur.

To evaluate the future concentration of pollutants in the atmosphere from the fixed source of the PARACEL pulp mill, an atmospheric dispersion study was carried out.

According to this study, atmospheric dispersion simulations generated low concentration values of pollutants CO, TRS, NO₂, PM₁₀ and SO₂. The maximum concentration values are below the air quality standards established by the General Directorate of Air of the Environmental Secretariat (SEAM) of Paraguay for CO, NO₂, PM₁₀ and SO₂ and also below the odor perception limit indicated by the World Health Organization for TRS (Total Sulfur Reduction). Specifically, the maximum concentrations of PM₁₀ are even below the air quality standards for PM_{2.5}, considering both the daily average (24 h) and the annual average. Peaks in maximum concentration of all pollutants occur near the mill, at distances between 165 and 2,428 m. The concentrations of pollutants at discrete receptors, chosen to supplement the air quality assessment in the area of interest, are below air quality standards.

Therefore, the air quality in Concepción and the region studied will be in accordance with the air quality standards established by the legislation even after the operation of the PARACEL pulp mill.

It is recommended to prevent that in extraordinary situations (starts, stops and exits of regime), not covered by the modeling, odor events can be caused that will be occasional and with no risk for health, but that can generate a slight and temporary discomfort in some receivers.

PARACEL must implement a program to manage complaints, claims and concerns, which will serve to monitor the resolution and closure of claims.

Other than that it should be noted that the vehicle and boat emissions for wood and pulp transportation will increase, impacting on air quality as well.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I and III	
Magnitude:	Media	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

Follow best practices for air emissions management, as listed below:

- Use of low odor recovery boiler;
- High dry solids content (minimum 80%) in the black liquor burned in the recovery boiler, which minimizes SO_x emissions

- Use of high efficiency electrostatic precipitators for the recovery boiler, biomass boiler and lime kilns;
- Collection of concentrated non-condensable gases from the digester and evaporation, and their incineration in the recovery boiler or biomass boiler (protected flame incineration);
- Extensive collection of diluted non-condensable gases from the digester, brown pulp line, evaporation, with treatment in the recovery boiler;
- Treatment of gases from the solution tank in the recovery boiler itself;
- Efficient cleaning of bleach plant relief gases; and
- Real-time gas monitoring systems and control system, rapid identification and correction of operational disturbances.

To adopt a cleaner energy matrix in its production process, based on the use of renewable fuels, producing pulp with minimum carbon emissions;

Implementing highly efficient emission control equipment, such as electrostatic precipitators;

Install chimney with defined height in the atmospheric dispersion model;

Implement an Atmospheric Emissions Monitoring Program;

Monitor the sources of atmospheric emissions through on-line measurements;

Implement an Air Quality Monitoring Program;

Implementing the Complaints, Grievances and Concerns Management Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that the air quality in Concepción and the region studied will be in accordance with the air quality standards established by the legislation even after the operation of the mill, according to the study of atmospheric dispersion. In extraordinary situations (starts, stops and regime exits), not covered by the modeling, odor events may occur that will be punctual and without any risk to health, but that may generate a slight and temporary discomfort in some receptors. It should also be noted that the Program for the Management of Complaints, Claims and Concerns will be implemented. This will serve to monitor the resolution and closure of complaints.

10.1.4.4.1.7 Fugitive emissions increase

Environmental aspect

Generation of atmospheric emissions.

Impact-Generating Factor

Operational activities for the pulp mill.

Technical justification

Kraft pulp mills were, in the past, easily identified by citizens because of the characteristic odor of rotten things they possessed. Controlling odor emission has always been one of the main challenges of kraft pulp mills.

Atmospheric emissions and odor compounds are associated with wood digestion, evaporation and combustion processes for black liquor recovery (recovery boiler), calcination of lime mud (lime kiln), thermal energy generation (biomass boiler), etc. The formation of these pollutants is closely associated with the burning processes of some fuel containing nitrogen, carbon sulfur, chlorine, etc. In addition to the quality of the fuel, the characteristics of design, design, operation, maintenance and efficiency of combustion equipment are important in this process.

Combustion systems are huge equipment, burn large amounts of fuel every day and launch fantastic gas flows through their chimneys. In general, combustion exhaust gases constitute a mixture of gases containing nitrogen, oxygen, water vapor, reduced compounds and oxidized compounds, as well as particulate matter (ash or soot).

It turns out that in addition to combustion equipment, there are other important sources of odor in pulp mills. Many sources are said to be fugitives, where the odor releases from liquor, effluent, filtrates, pulp, sludge from the effluent treatment plant, industrial landfills. These gases have a range of action of only a few hundred meters. As a result, we have odors both in the vicinity of the plant and a few tens of kilometers from it (due to the displacement of the gas plume from the combustion equipment).

The perception of the odor is then greatly affected by the climatic conditions, being more pronounced on rainy days, fog, or thermal inversion. Because these types of days often happen in any type of location, the company needs to be aware of them as much as in its operations. It is no longer accepted to cause discomfort to neighboring populations and the mill's employees themselves are not satisfied by breathing polluted gases.

Many of the diluted non condensable gases (DNCG) are also understood as fugitive emissions, that is, low concentration emissions that are released from liquor tanks, unwashed pulp, effluent ponds contaminated with liquor, wells and channels, causticizing sectors, etc. The best way to combat these fugitive emissions is to encapsulate the sources, collecting them under vacuum and intended for burning in a combustion system (recovery boiler, lime kiln or power boiler).

In addition, some of these pollutants have a strong odor, such as fugitive emissions from the emergency pond of the effluent treatment plant, when an anaerobic decomposition of its organic matter occurs. Some fugitive emissions are also TRS-type gases. They occur near digester feeding silos, liquor tanks, areas where contaminated condensates occur, pulp overflows, mass washing, condensate channels, etc.

However, the state-of-the-art technological mills (as the case of PARACEL) have state-of-the-art equipment and systems for environmental protection; and this is already conceptually introduced in the concepts and engineering of these equipment, such as boilers, lime kiln, etc. New and modern eucalyptus kraft pulp mills, which began operations in the 21st century, are able to operate virtually odorless and with minimal emissions.

It is important to note that the recovery boiler, lime kilns and biomass boiler at the PARACEL plant are designed on the basis of the best available techniques (BAT) worldwide, which minimizes generation of pollutants for the atmosphere.

For the recovery boiler:

The most effective way to reduce TRS and SO_x emissions from pulp mills is related to the concentration of black liquor in order to produce a black liquor with a higher content of dry solids (> 80%). This makes the liquor burning conditions in the furnace much more suitable and TRS and SO_x emissions are minimized.

In addition, TRS and SO_x emissions in the recovery boiler will also be minimized with the following operational controls:

- Maintaining higher temperatures and high content of dry solids in black liquor. Therefore, higher amounts of sodium (Na) will vaporize, absorbing SO₂ and forming Na₂SO₄, thus reducing SO_x emissions;
- Adequate ratio of sulfur/sodium (S/Na) in liquor;
- Supply of excess air, temperature and distribution of combustion air;
- Maintaining the load in the furnace at optimum operating levels.

In the case of lime kilns, the main measures are presented as follow:

TRS and SO_x emissions are directly related to the sulfur content in the fuel, as well as the quality of the lime mud. Thus, the use of fuels with low sulfur levels is a key element to minimize these emissions.

From an operational point of view, TRS and SO_x emissions will be minimized through optimized combustion, based on an efficient control system that includes: the air/fuel ratio; temperature; residence time; excess oxygen content and good air/fuel mixture.

As for the biomass boiler, SO_x emissions will depend on the fuel to be used. In the case of the use of biomass, SO_x emissions are minimal because eucalyptus wood has low sulfur content.

In the case of the PARACEL pulp mill, these measures have been adopted and are summarized below, by emission source.

Regarding the PARACEL recovery boiler:

Reduction/minimization of TRS and SO_x:

- Burning of concentrated black liquor (> 80% dry solids);
- Maintenance of higher temperatures and high content of dry solids in black liquor;
- Control of the adequate rate of sulfur/sodium (S/Na) in the liquor;
- Control of excess air, temperature and combustion air distribution;
- Maintaining the load in the furnace at optimum operating levels.

Regarding the PARACEL lime kilns:

Reduction/minimization of TRS and SOx:

- Use of fuel oil with low sulfur content, whenever possible;
- Optimized combustion.

Regarding the PARACEL biomass boiler:

Reduction/minimization of SOx:

- SOx emissions will be minimal because eucalyptus wood has low sulfur content.

These measures will be adopted by PARACEL, and consist of the best available techniques (BAT), they will be responsible for low concentrations of TRS, SOx, NOx and CO emissions that will be within or very close to the BAT reference values as presented in this ESIA.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I and III	
Magnitude:	Medium	2
Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA	

Mitigation measures

Follow best practices for air emissions management, as listed below:

- Burning of concentrated black liquor (> 80% dry solids);
 - Maintenance of higher temperatures and high content of dry solids in black liquor;
 - Control of the adequate rate of sulfur/sodium (S/Na) in the liquor;
 - Control of excess air, temperature and combustion air distribution;
 - Maintaining the load in the furnace at optimum operating levels;
 - Use of fuel oil with low sulfur content, whenever possible;
 - Optimized combustion;
 - SO_x emissions will be minimal because eucalyptus wood has low sulfur content;
- Implementing the Complaints, Grievances and Concerns Management Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that since PARACEL will adopt the Best Available Techniques in its processes, the fugitive emissions will be under control. In extraordinary situations (starts, stops and regime exits), odor events may occur that will be punctual and without any risk to health, but that may generate a slight and temporary discomfort in some receptors. So it should also be noted that the Program for the Management of Complaints, Claims and Concerns will be implemented. This will serve to monitor the resolution and closure of complaints.

10.1.4.4.2 Biotic environment

10.1.4.4.2.1 Higher risk of running over animals

Environmental aspect

Increasing vehicle traffic.

Impact-Generating Factor

Movement of vehicles.

Technical justification

In the operation phase, it is estimated that several truck journeys are required daily to transport eucalyptus logs to the pulp mill. It is estimated one truck every 4 minutes.

The increase in vehicle traffic increases the risk of animals being run over on the main access roads to the company.

Losses of animals due to being run over are certain and frequent, mainly in similar rural environments where, on the one hand, the scarcity of native vegetation represents, among other aspects, the need for the transit of animals in relatively large areas to look for food and/or for procreation, simultaneous to the lack of shelter for the movement of these same animals. On the other hand, the network of secondary roads (neighborhood and rural routes) that cross the extensive and continuous cultivation areas, constitutes a scenario of inherent risk.

Therefore, the increase in traffic will lead to an increase in the frequency of being run over, with the consequent loss of wild animals.

Environmental education work, which addresses the issue of "wildlife running over" is extremely important for driver awareness and the application of traffic signs will provide a significant reduction in the risk of animals being run over.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Short term	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Simple	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	Medium	
Area of influence:	DIA and IIA	

Mitigation measures

- Install signage plates on the main access routes to the plant area;

- Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that the risk of running over animals will be minimized by the implementation of the proposed mitigation measures.

10.1.4.4.2.2 Injury or death to fauna and flora due to improper waste disposal, including spills

Environmental aspect

Inappropriate generation and disposal of solid waste and spills.

Impact-Generating Factor

Operation of the pulp mill.

Technical justification

The earth’s ecosystem is very delicate. Every living thing on the planet needs fresh air and clean water, and it is incumbent upon humans to make sure the environment stays healthy and sustainable. Humans create a lot of waste, much of which is toxic to many forms of life. There is a right way and a wrong way to dispose of that waste.

During the operation phase, industrial and non-industrial solid waste will be generated at the pulp mill.

The solid industrial waste generated by the pulp production process will come from the wood handling, causticizing, boiler, and water and effluent treatment plant areas.

This category includes the following main wastes:

- Wood preparation waste;
- Biomass boiler ash
- Dregs, grits and lime mud;
- Sludge from the water treatment plant; and,
- Primary, secondary and tertiary sludge from the effluent treatment plant

Non-industrial solid waste will also be generated, corresponding to all the materials discarded by the administrative and operational support activity covering office, cafeteria and maintenance activities.

This category includes the following main waste:

- Metal
- Paper or cardboard

- Plastic
- Glass
- Recyclable and non-recyclable organics
- Waste from health services
- Contaminated with oil and fats
- Used lubricating oil
- Fluorescent lamps and batteries

The management of solid waste generated during the operation of the pulp mill will include best practices.

All solid waste generated in the operation of the pulp mill must follow the procedures of the Solid Waste Management Program (PGRS in Spanish), giving preference to the reuse and recycling of waste and whenever it is necessary to send it for treatment and/or final disposal to duly authorized companies.

The system for protecting soil and groundwater from contamination (waterproofing) will be properly implemented in all areas where solid industrial waste is handled, processed, treated, and disposed.

To verify that water is not contaminated, the groundwater quality monitoring program must be implemented.

In the event of risk of leaks and spills, the spill collection and handling system has been designed so that accidental discharges can be collected as close to the source as possible and recycled directly to their own process stage.

The main approaches are:

- Dam with retaining walls around tanks and equipment where there are black or white chemicals or liquors. In the event of an accidental leak or spill, the material will be collected and returned directly to the process;
- Tank systems and equipment that will allow excess liquor to be properly conducted when emptying is required for maintenance. Process liquor will be taken to a spill tank and returned directly to the process instead of being discharged to the effluent network;
- In areas with potential for spills, there will be an interconnection of floor channels with pumping wells, from which the liquids will be returned to the process;
- Emergency effluent treatment pond, where the main effluents can also be directed in the event of spills that have not been contained with the means previously provided;
- Appropriate instrumentation for on-line monitoring of effluent, and a good supervision system to help operators detect accidental discharges and take appropriate corrective measures; and

- Training of operators, process managers and implementation of information systems, where environmental problems and accidental discharges require continuous attention.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and Indirect	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Medium Term	2
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I and III	
Magnitude:	High	3
Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DAA	

Mitigation measures

- Apply best practices in solid waste management, in accordance with applicable laws and regulations;
- Implement the Solid Waste Management Program (SWMP);
- To train operators for the correct disposal of the waste generated;
- Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of;

- Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity;
- Implement the Groundwater Quality Monitoring Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be assumed that through the implementation of mitigation measures the fauna and flora will not be affected.

10.1.4.4.2.3 Change in aquatic ecosystems

Environmental aspect

Launching of liquid effluents generated in the waters of the Paraguay River.

Impact-Generating Factor

Pulp mill operation.

Technical justification

The effluents generated by the operation of the industrial unit will be treated and released through an emissary into the waters of the Paraguay River.

The PARACEL pulp mill will adopt a kraft pulp production process based on Best Available Technologies (BAT), which will minimize the generation of liquid effluents (flow and organic load).

It is worth mentioning that the treated effluents will comply with the emission standards established by Resolution # 222/02.

According to the results of the simulations, it can be seen that in order to comply with the quality standards established by SEAM Resolution # 222/2002, with respect to the parameters of BOD, color, nitrogen and phosphorus, both under the most critical conditions (minimum flow - Q7.10) and under average flow conditions, the distances required for the mixing zone of the effluents treated by PARACEL on the Paraguay River vary between 0.37 and 0.50 m. In the case of AOX, to reach a concentration equal to that obtained in the quality campaigns, the distances required are 0.50 m.

In general, due to the results obtained, the dispersion of PARACEL treated effluents into the Paraguay River is rapid and occurs very close to the point of effluent discharge. Because of this, the simulation for the far field was not performed. However, it is important to note that the mathematical model does not consider the BOD, color, nitrogen, phosphorus, and AOX concentrations of the Paraguay River. However, according to the simulation the distance at which the near field variables cease to prevail, i.e., the distance from the near field is 50 m.

It should be noted that the mill's water intake point will be located downstream of the effluent discharge point. This reinforces PARACEL's compliance with environmental

issues and demonstrates the responsibility and security that PARACEL must have with respect to the mill's future effluent treatment system in order to maintain the quality standard of the water of the Paraguay River.

In addition, it is important to note that the discharge of the effluent from the PARACEL pulp mill will not cause a cumulative impact on the waters of the Paraguay River, due to the existence of few industrial discharges in the river and a high flow of the same.

Since there will be no change in the quality of the Paraguay River, it is also not expected to affect the aquatic communities.

The possible change in the structure of the aquatic communities due to the release of treated effluents into the waters of the Paraguay River will be monitored through the Biodiversity Monitoring Program on the industrial site.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type I Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	Medium	
Area of influence	DIA	

Mitigation measures

- Use the best available technology (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load);

- Adequately operate the effluent treatment plant so that the discharge of treated liquid effluents is in accordance with current legislation;
- Implement the Program for Monitoring Aquatic Communities on the Paraguay River.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that, since there will be no change in the quality of the Paraguay River due to the release of treated effluents from the PARACEL pulp mill, the aquatic communities are not expected to be affected.

10.1.4.4.2.4 Noise related disturbance on fauna

Environmental aspect

Replacement of Habitats with pulp mill.

Impact-Generating Factor

Pulp mill operation.

Technical justification

The generation of noise during the operation of the project will be due to the activities of the industrial process.

PARACEL will employ noise treatment systems and protective measures for its employees and third parties in industry, which are based on environmental law and technical standards, such as Law 1,100/1997 on the prevention of noise pollution and IFC Guidelines.

The main noise generating areas and their respective maximum levels (sound pressure) are shown in the following table:

Table 13 – Main places of noise generation

Area	Noise dB(A)
Wood Handling	115
Cooking and Fiber Line	110
Drying	105
Chemical preparation	100
Chlorine Dioxide Plant	100
Oxygen Plant	105
Evaporation	110
Recovery boiler	110

Area	Noise dB(A)
Causticizing and Lime Kiln	110
Biomass boiler	105
Turbines	85
Cooling towers	110
Water treatment	95
<i>Equipment</i>	
Control valves	75
Electric motor	78
Ventilation process	75
Air compressors, pumps, drive units	80
Safety valves and starter valves	85
Safety valve outputs	110

Source: PARACEL Study of noise intensity, 2020.

Considering the total noise accumulation using the formula:

$$=10*\text{LOG}((10^{(D5/10)}+10^{(C6/10)});10)$$

NPS (R 2) = $10 \log (10^{(R 1/10)}+10^{(R 2/10)}) = 120\text{dB A(A)}$ in the worst conditions case, not considering the open space as a disseminator of the noise.

Then after only 200 m the mill noise is in accordance with Day time standard in line with Law 1,100/1997 and within 1 km at Night time.

Distância (m)	Ruído dB(A)
1	120,1
50	86,1
100	80,1
150	76,6
200	74,1
250	72,1
500	66,1
1000	60,1
1500	56,6
2000	54,1
2500	52,1
3000	50,6

With such just distance it is not expected to impact the local fauna.

That law sets the maximum permissible noise levels. For PARACEL's pulp mill, the limits are those of Article 9 and 10.

Scope	Night 20:00 to 07:00	Day 07:00 to 20:00 14:00 to 19:00	Day (Occasional peak) 07:00 to 12:00
	Measured in decibels "A". Db(a) 20 to 40		
Residential areas of specific use, public spaces: recreation areas, parks, squares and public roads.	45	60	80
Mixed areas, transition zones, urban centers, specific programs, service zones and public buildings	55	70	85
Industrial area	60	75	90

Source: Law 1.100/1997

The noise level guidelines, according to the World Bank Group General EHS Guidelines is shown in the table below.

Table 14 – Noise limits established by World Bank Group General EHS Guidelines

Receptor	Daytime (07:00 – 22:00)	Nighttime (22:00 – 07:00)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Other than that, the sound pressure will be attenuated by:

- Construction of buildings and facilities designed with adequate acoustics, such as control rooms, offices and other facilities for individual and collective use;
- Use of appropriate materials during the construction of facilities;
- Facilities provided with vibration and shock isolators, with flexible joints;
- Acquisition of machines and equipment with low noise levels;
- Installation of equipment in suitable locations;
- Acoustic enclosure for equipment with a high sound pressure level;
- Installation of silencers, attenuators, sound energy absorbers.

In addition, PARACEL will have health and safety programs as a way to control and/or minimize the exposure of its employees and partners to industrial noise.

Impact Characterization

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Moment of occurrence:	Short term	1
Time or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Medium	2
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA, DIA	

Mitigation measures

- Acquire machines and equipment with low noise levels;
- Acoustic enclosure for equipment with a high sound pressure level;
- Install silencers, attenuators, sound energy absorbers, if necessary;
- Perform a health and safety programs as a way to control and/or minimize the exposure of its employees and partners to industrial noise.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The actions adopted by PARACEL will minimize the impact.

10.1.4.4.2.5 Impact of oil spills in river due to river transportationEnvironmental aspect

Change in the physical-chemical conditions of soil, water and/or air.

Impact-Generating Factor

Accidental oil leakage or spill.

Technical justification

Environmental issues associated with river transportation operations primarily include the following: management of hydrocarbons and hazardous materials, wastewater and other effluents, air emissions, and the generation and management of solid waste.

The operations and maintenance of vessels used to freight transportation can generate hazardous or potentially hazardous waste (e.g. used lubricants, paint removed in hull maintenance, and chemicals from painting and cleaning, which includes degreasers used for hull and engine tasks).

Accidental leaks of fuel and cargo can occur as a result of accidents during navigation or the transfer of materials at sea, river or port, therefore the following procedures for the operation will be requested from the ship contractor (s):

- Operational certification of the vessel in accordance with the applicable requirements depending on the function and capacity of the vessel.
- Have procedures for the prevention of discharges from fuel supply activities in the port and the sea / rivers.
- Carry out cargo oil transfer activities between ships in compliance with specific safety rules and guidelines to minimize the risk of spills.
- Have procedures for the prevention of spills during the loading and unloading of liquid bulk in accordance with the applicable standards and guidelines that deal specifically with advanced communication and planning with the receiving terminal;
- Properly secure oil and hazardous materials containers on deck;
- Maintain the emergency plans necessary to address accidental spills of oil and harmful liquid substances;
- Maintain the necessary plans and procedures for the prevention of oil spills and harmful liquid substances for operations in special areas.

Likewise contracted shipping companies must implement a system for the proper control, acceptance and transportation of packaged dangerous substances.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and Regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Short term	1
Timing or duration:	Permanent	1
Reversibility:	Irreversible	2
Accumulation:	Type II	
Magnitude:	Medium	2
Importance:	High	3
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

Perform River transportation Management Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be said that, with the implementation of these mitigation measures, the risk of accidents will be minimal.

10.1.4.4.3 Socioeconomic environment

10.1.4.4.3.1 Generation of direct and indirect jobs

Environmental aspect

Hiring of workforce for the operation of the pulp mill.

Impact-Generating Factor

Manpower demand for the operation of the pulp mill.

Technical justification

The operational regime will be 24 hours a day, 7 days a week and 12 months a year. The effective production period will be approximately 354 days, considering the general annual maintenance stop of the equipment.

The total labor force, considering own employees and third parties, necessary for the operation of the mill will be approximately 1,200 people.

The working days of the employees in the industrial area will be carried out in 3 shifts of 8 hours each. In the administrative area, the working day will be 8 hours and will take place during business hours.

The operation of the plant will require skilled and unskilled labor for the production of pulp, for maintenance of equipment and machinery, for administrative tasks, cleaning, transportation, security, and other related services. It is estimated that 20% of those hired will be professionals, 70% technicians and 10% suitable. As for qualified and/or specialized labor, depending on the specialty, foreign personnel will possibly be hired, even foreign, if necessary, since there may be no specific experience related to the pulp production sector in the area of influence. In the same vein, local people will be able to cover the demand for employment that does not require specialized training for production and/or for the maintenance of equipment and machinery; therefore, it is expected that most of the unskilled labor can be provided by the local population.

Some of the jobs in the operation phase may not require the recruitment of new personnel, but may instead rehire personnel already involved in the construction phase of the Project.

Vacancies in these sectors should be offered by companies that provide this type of service through the Dissemination and Communication Program.

In addition, the jobs offered will provide training to the personnel, which is a positive aspect related to the hiring itself.

The Project will provide formal employment links, i.e. in compliance with current national legislation, thus improving working conditions with respect to existing IIA job offers, the characteristics of which were already described for the construction phase.

The formalization of contracts, which will be less in number but of medium and long term duration (during the operation of the Plant), will improve the quality of life of the people directly employed and their dependents by increasing the level of present and future labor and social security.

It is key that the PARACEL considers IFC's Performance Standard 2, as well as the labor standards and working conditions recommended by the World Bank.

As in the construction phase, the Project will promote the training of interested people who can be employed in the operation phase of the Industrial Plant. This will be in order to counteract, to some extent, the lack of qualified manpower existing locally and to enhance the existing one according to PARACEL's specific technical needs.

On the other hand, this training will address what was referred to by the DIA population in the field survey, the fear that there is a "low absorption of local labor" because "they are not trained". Along these lines, the training provided by PARACEL will have a positive impact on the personal training of the future workers of the operation and on the level of hiring of local labor.

Therefore, it is recommended that PARACEL articulate with professional education bodies and institutions for the conclusion of agreements aimed at the professional training of the local population.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Medium	2
Importance:	Large	3
Possibilities of potentiation:	High	
Degree of potentiation	High	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Measures of enhancement

Promote a dissemination campaign to hire labor for the operation phase of the pulp mill through the Dissemination and Communication Program;

Articulate with professional education organizations and institutions for the professional training of the local population through the Program for the Development and Linking of Local Labor.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

Following the implementation of the enhancement measures, it can be assumed that PARACEL will promote the hiring of available labor in the municipality of Concepción and the region, as well as train the local population.

10.1.4.4.3.2 Higher risk of accidents

Potential environmental impact

Risk of accidents in the mill.

Impact-Generating Factor

Pulp mill operation.

Technical justification

The installations contemplated in the PARACEL pulp mill involve a series of chemical products. The following Table shows the main products and their risk class/subclass established by the UN.

Table 15 – Major products and UN class/subclass

Product	Un number	Class of Risk	Risk label
Methanol	1230	3 - Flammable Liquid	
Caustic Soda	1824	8 - Corrosive substance	
Sulfuric Acid	1830	8 - Corrosive substance	

Product	Un number	Class of Risk	Risk label
Diesel Oil	1202	3 - Inflammable Liquid	
Fuel Oil	3256	3 - Inflammable Liquid	
Sodium Chlorate	2428	5.1 - Oxidizing	
Chlorine Dioxide	3139	6.1 - Toxic Gas	
Sodium bisulfite	2693	8 - Corrosive substance	
Oxygen	1072	2.2 - Non-toxic compressed gas	
Hydrogen peroxide	2014	5.1 - Oxidizing	

NOTE: * It should be noted that, conservatively, chlorine was considered to be a representative substance for chlorine dioxide, assuming that in a possible release of chlorine dioxide, the product released will be chlorine. It should also be noted that PARACEL will not use chlorine in its bleaching process (**it will use the ECF Process - Elemental Chlorine Free**).

From the initial characterization of the products, to give continuity to the Preliminary Risk Analysis Study, the most representative liquid or gaseous chemicals in terms of flammability and toxicity were selected.

From the application of the Preliminary Hazard Analysis (PHA) methodology to identify the hazards related to the facilities and operations with the products handled at PARACEL, 53 hazards were identified, always considering relevant accidental

situations, i.e., events caused by non-condensable gas, methanol and chlorine dioxide leaks, which are significant in the plant in question.

The possible effects associated with the accident scenarios identified in the PPP were classified according to severity, always considering two types of phenomena, where appropriate; namely, large and medium leaks, associated with the lack of containment of these products.

The distribution of effects associated with these accident scenarios (hazards) was as follows:

- 13 hazards (24%) classified as negligible risk;
- 10 hazards (19%) rated as Minor Risk;
- 26 hazards (49%) of Moderate Risk;
- 4 hazards (8%) classified as Serious Risk;
- None of the hazards classified as Critical Risk

The following Figure presents the risk matrix with the quantification of the assumptions according to the classifications adopted.

		FREQUENCY OF OCCURRENCE				
		A	B	C	D	E
SEVERITY	IV					
	III		3	4	4	
	II	3	10	6	22	
	I				1	

Figure 5 – Risk matrix with hypothesis quantification

In this risk analysis, it was verified, through the application of the APP (Preliminary Risk Study) methodology, that no hazard was classified as Critical, and that the majority (92%) of the identified risks are classified as Negligible, Minor or Moderate.

In order to prevent and give a prompt response to social contingencies in the constructive and operational stage of the undertaking, the Social Contingency Prevention and Management Program will be implemented.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Possible	1
Time of occurrence:	Short Term	1
Timing or length:	Temporary	1
Reversibility:	Irreversible	2
Accumulation:	Simple	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

- Follow the guidelines of the Risk Analysis Study, including
 - ✓ Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance and monitoring plans;
 - ✓ Provide training to operators involved in the handling, storage and transportation of hazardous products;
 - ✓ Install firefighting and control systems
- In the event of an operational emergency, implement the Emergency Action Plan;
- Use the appropriate PPE (Personal Protective Equipment) on the pulp mill facilities;
- Implement the Program for Prevention and Management of Social, Environmental and Labor Contingencies.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The risk analysis study concluded that no hazard was classified as Critical, and that most of the identified risks are classified as Negligible, Minor or Moderate, and accidents will be limited to the internal area of PARACEL's industrial plant, even though the planned prevention and mitigation measures must be implemented.

10.1.4.4.3 Increasing tax collection and Boosting the economy

Environmental aspect

Growth in the production of goods and services.

Impact-Generating Factor

Demand for products and services.

Technical justification

Trade in the region tends to benefit from the emergence of demand for products linked both directly to the operation of the mill and indirectly, through consumption by the workforce linked to the activity.

The demand for formal trade products and services in the region tends to increase. This dynamization may lead to the opening of new small and medium-sized enterprises, products and services, as well as the strengthening of existing ones. The growth in the number of jobs in the region is a foreseeable consequence.

The operation of the pulp mill in the municipality of Concepción, as well as the creation of direct and indirect jobs, will promote an increase in tax collection, which will provide the government with investment possibilities in social and economic areas. This process is called the multiplier effect and is based on economic theories to estimate the economic impact of the main initiatives.

Thus, the increase in the collection of taxes derived from the company is considered a positive impact and of great importance.

This dynamism of the local economy can be demonstrated through indicators, which can be the significant increase in public investment, the increase in tax revenue.

The informal economy will also benefit. The low-skilled population, or those unable to enter formal activity, tends to resort to emerging informal activities, due to the demand generated by the presence of the labor contingent in the operation phase. The emergence of bars, food stalls and other consumer items may occur in the area near the company.

Informal commercial activities are usually not recorded neither legal. If there are no records, there is no way to evaluate the benefits that could be generated for the public treasury and to monitor the quality of services.

On the other hand, this trade can be analyzed in a favorable perspective, considering the generation of income and economic activities that will promote the circulation of currency in municipalities and regions.

Therefore, there will be dynamism in the local economy from the implementation phase and will remain during the operation phase of the mill, with the government having the responsibility to monitor informal activities and reinvest the taxes collected in improvements to the municipality.

Also, the effect of operating the PARACEL project in energy terms can be considered positive, although the pulp mill will be an exporter of clean energy generated by the combustion of eucalyptus biomass in the production process.

The tax collection will also come from the sale of pulp since preferably, all the production will be destined to export, directed to the markets of Latin America, United States, Western Europe and Asia.

By prioritizing the acquisition of local goods and services and requiring fiscal compliance from contractors and subcontractors, tax collection in the region will be increased.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	High	3
Importance:	Large	3
Possibilities of potentiation:	High	
Degree of enhancement:	High	
Degree of resolution of measurements:	High	

Area of influence:	DIA and IIA	
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Measures of enhancement

- Give preference to companies, service providers and trade in the region through the Promotion and Development of Local Suppliers Program.
- Encourage the purchase of services and products preferably in Concepción and the region through the Promotion and Development of Local Suppliers Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The pulp production will boost the economy of the municipality of Concepción, and the region through the purchase of inputs and services from the local economy and tax collection.

The company will generate an increase in tax revenue, in accordance with current tax law, which will be enhanced through the Promotion and Development Program for local suppliers.

10.1.4.4.3.4 Road transportation increase

Environmental aspect

Increasing vehicle traffic and Increasing running over animals.

Impact-Generating Factor

Movement of vehicles.

Technical justification

The access to PARACEL pulp mill, from Concepción will be done through a main access, as shown in the following figure.

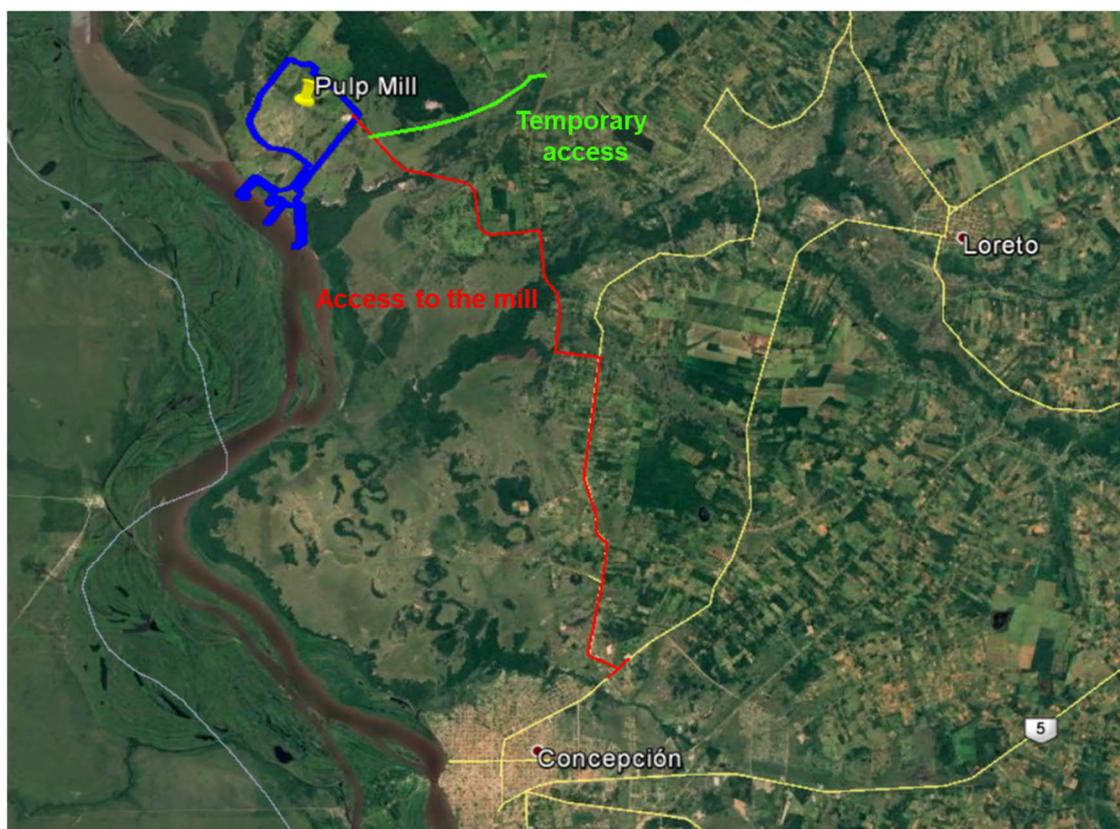


Figure 6 – Access to PARACEL pulp mill. Source: Google Earth, 2020.

Other than that, the process of forest transportation which starts in farms (own or third parties) in which harvesting activity takes place, and comprehends the transportation of logs from the plantation site to the point of delivery (PARACEL's pulp mill in Concepción) will also increase road transportation. It includes the steps of loading, transportation and unloading, for wood coming from properties owned by PARACEL as well as leased properties. The transportation is made by truck, which transits through public and private paved or unpaved roads.

Giving the 6-year period necessary for PARACEL'S own forests to grow and start supplying the market, the early stages of the project will depend on wood bought from the market. This wood will be sourced from different producers in Brazil, Argentina and Paraguay, aiming to achieve a share of 70/30 of FSC certified forests and controlled wood sources.

The logistics for wood bough from the market, from the source to the PARACEL mill site, will consider river transportation for wood coming from Argentina and both river and road transportation for wood coming from Paraguay and Brazil. This is a measure that will prevent accidents and traffic due to road transportation.

It should be noted that "infrastructure and road safety" is the aspect most often mentioned by representatives of DIA institutions and communities in relation to the aspects necessary for the further development of their communities/districts. In this sense, they have highlighted the need to improve the state of the roads and the neighbourhood roads. The inadequate condition of some roads in the DAA/DIA plus

the already existing perception of these roads in the DIA and the loading of the vehicles of the Project construction give a notion that the impact of the Project will be important on the road infrastructure from the social perspective.

Therefore, it is recommended that these routes undergo constant maintenance and are properly signposted, and it is necessary to inform and raise awareness among vehicle drivers about defensive driving to avoid accidents.

On the main access roads to the internal area of the pulp mill project, PARACEL must install road signs, warning of dangers and speeds. In addition, proper maintenance of the engines of the machines, trucks and vehicles used, together with a Road Safety Program will prevent accidents due to the increase in vehicle traffic.

The increase in vehicle traffic also increases the risk of animals being run over on the main access roads to the company.

From the point of view of improving the infrastructure conditions of and for the communities, as well as the development of the quality of life in the area, the project will determine an incremental benefit over time in the structural improvement and of paving of all public routes to be used for the transport of wood, which would have a positive impact, through: i) decrease in travel times (note that traveling the 70 km between Jhugua Ñandu and Puentesíño takes today 1,5 hours), ii) improvement of road safety; iii) reduction of the emission of rolling dust, with its consequent benefits to the environment and public health in general, iv) facilitation of access to/from emergency services (ambulances, police, firefighters). In relation to potential cumulative negative impacts, the impact on infrastructure and road safety is mentioned, since in the operational stage of the forest fields (during the harvest season and transportation of wood to the industrial plant), the movement of vehicles at the rate of one truck every 4 minutes approximately from years 6 - 7 after the installation of the plantations in each forest field. If to this we add the development of new similar ventures, this rate could increase. Although better roads lead to drivers going faster, therefore PARACEL will inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program, other than that priorities the river transport.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Possible	1
Time of occurrence:	Long term	3
Timing or length:	Permanent	3

Reversibility:	Irreversible	2
Accumulation:	Simple	
Magnitude:	Medium	1
Importance:	Medium	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Mitigation measures

- Consider river transportation for wood to prevent accidents and traffic on roads;
- Install signage plates on the main access routes to the plant area;
- Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It can be stated that the risk of personal accidents and running over animals on roads will be minimized by the implementation of road signs and drivers training about defensive driving, other than using river transportation for wood.

10.1.4.4.3.5 Impacts from the Transmission line and substation

Environmental aspect

Risk of accidents and electromagnetic field.

Impact-Generating Factor

Pulp mill operation.

Technical justification

The electrical energy required is estimated at 7 MW for the implementation stage of the plant and will be supplied through generators until the high voltage transmission line is completed. These generators will supply the offices, bathrooms, cafeteria, and other facilities, as well as the pumps of the temporary effluent treatment system.

At the peak of the works, four 1,250 kVA diesel generators will be installed. The estimated diesel consumption for each generator is 30 liters/hour during 12 hours of

operation, for a total of 1,500 liters per day, which will be supplied by the storage tank with a capacity of less than 15,000 liters and also supplied by trucks.

The generators and their respective diesel tanks will be installed on a waterproofed area, protected by metal trays, preventing any spillage from contaminating the soil.

Thus, the infrastructure required for the implementation of the pulp mill consists of water intake, discharge of treated effluent, transmission line, road access and river port for the outbound of pulp.

As already mentioned, there will be a cogeneration system in the pulp mill, beginning with the production of high-pressure steam by the recovery boiler and the biomass boiler.

The high-pressure steam will undergo expansion in the turbine blades and will be extracted at different pressure levels for use in the pulp manufacturing process.

Turbogenerators will have the purpose of transforming the thermal energy of the high-pressure steam into mechanical energy to activate the electrical energy generators.

The supply of steam to the turbogenerators will cover the operation, plus the contingency. The contingency is considered to absorb any variation in steam production in the recovery boiler due to variations in the solids contained in the liquor or even considering calorific value.

It is planned to install 2 turbogenerators for total generation of up to 220 MW for producing pulp for paper. The pulp production will consume about 120 MW, with a surplus of 100 MW to be exported to the grid.

Therefore the project involves the construction, assembly and commissioning of the 220 kV Simple Air Transmission Line, of which the stretch will be between the Concepción Substation and the new Estancia Zapatero Cue Substation, presenting an approximate 33 km length.

In order to analyze the impacts of the transmission line and new Zapatero Cue substation, during the construction and operation phases, the impacts on the physical, biotic and socio-economic environment due to the works will be described below:

Construction phase

– Impacts on Noise and Air Quality

Noise emissions will occur at the construction stage from the use of trucks and machinery that can affect the fauna that lives in nearby workplaces and also the populations whose homes are close to construction sites. However, it is estimated that these impacts will not be severe and will not be long-lasting either.

There will also be generation of gases and particles in the atmosphere as a result of the combustion of trucks and machinery, but their impacts will be slight considering that the number of vehicles and machinery operating on site at the same time will not be large.

– Impacts on the Soil

Soil erosion may occur during the construction stage of the transmission line.

This erosive process will result from the clearing of plant cover and the movement of land to install the structures, but it is estimated that this impact will not be important as they will be carried out on soils that are generally not intended for agricultural crops because of the ability to use such soils and in grazing soils they are already generally eroded by overgrazing as can be seen in the photograph below.

Land-use conflicts are not expected to occur because there will not be any displacement, the 33 km length of the transmission line will follow the existing roads paths, and there will be appropriate negotiations for the release of the corridor's road rights for the transmission line.

– Impacts on Water Resources

The trace of the electrical transmission line will not significantly affect surface water because they will not interrupt or modify the natural course of the waters through which they will travel.

During construction some drainage alterations and quality change can occur due to the construction of foundations, fillings, etc., and also by the assembly of structures and conductors, but the magnitude of the impact is considered not to be very significant.

Special attention should be paid to the potential impacts on existing wetlands in the three sections of the transmission line trace.

– Impacts on Fauna

The elimination of grasslands and tree vegetation can result in a decrease of food source, amide and rest areas for the fauna due to the fragmentation of their habitats and the modification of ecosystems suitable for the settlement of faunistic populations.

The elimination of plant cover, whether trees or grasslands, also involves the alteration of ecosystems suitable for the settlement of faunal populations, increased hunting pressure on threatened species, endangered species and/or species for commercial purposes and increases run-in of individuals of fauna by increasing vehicular traffic.

The barrier effect caused by the cutting of wildlife habitat to allow the placement and installations of electrical structures can have an initial disturbing effect on terrestrial and air species, although subsequently the species will be used to the facilities.

Aquatic fauna, along the trace of the transmission line, has not been identified as it is affected by not being modified as its direct habitats are not modified.

The impacts, estimated as not very relevant, will be associated with the assembly of the structures, the laying of conductors and cables, and during the operation and maintenance and cleaning of the bondage strip.

– Impacts on Flora

As had been described in the characterization of the three sections of the trace of the Electric Transmission Line, most of it will develop on soils of natural meadows and agriculture, usually subsistence and few places with species of tree vegetation, except for Section II trace where tree vegetation could be more relevant, in the still-selected trace of selection, which would produce some vegetation changes over the right of way to meet the technical requirements demanded by the electrical transmission line system.

If the affectation of plant cover is severe, the energy base of the affected ecosystem may be altered, which decreases the quality and supply of the flora resource. Likewise, in case of gallery forests, alteration and decrease of the protection of the associated body of water can be generated. These manifestations have a global impact on the quality of the landscape and ecosystems.

The loss of natural pastures will be minimal caused, mainly, by the excavation of the soil for the installation of the infrastructures and it is estimated that the magnitude of its impacts will be very low.

In tree felling, which could occur especially in Section II trace, it is not identified that endangered forest species will be affected according to vegetation studies carried out in the region.

– Spread of invasive species within transmission line Right of Way

The Transmission Line has the potential to impact sensitive ecosystems such as wetlands, impact high quality fishery resources when waterways are crossed, and create pathways for the spread of invasive species.

It should be noted that the Right of Way area total approximately 23,1 ha. About 84,3% of this area is already modified, specially by roads and 15,3% is natural forest and 0,4% is watercourse.

From the 23 km, the transmission line will pass through only one watercourse, according to the figure bellow:



There should be noted that there is already a road in this area, so it is no expected that the transmission line will interfere within this area.

- Artificial night light impacts to fauna

Light pollution within parks and protected lands can have a measurable impact upon the habitat quality of the park, even if the light itself originates outside of the park's administrative boundary. Minimizing ecological impacts requires that land managers adopt an ethic of using only the minimum light necessary for human needs and being cautious when introducing light into or near a natural landscape.

- Impacts on Land Use

The greatest impact of electric power transmission lines occurs on terrestrial resources as a range of exclusive easement is required for the line, where grazing or agricultural use is not prohibited, but in general, the other uses are incompatible.

While road rights are not very wide, they can disrupt or fragment the established use of land to its full extent.

Transmission lines can also serve to open the most remote lands for human activities such as colonization, agriculture, hunting, recreation, etc.

The construction of the bondage strip can lead to habitat loss or fragmentation, or vegetation found in its path.

These effects can be important if natural areas, such as wetlands or wild lands, are affected, or if newly accessible land is occupations of indigenous peoples. The description of land uses shows that there are large areas of wetlands in the area whose main function is to act as a zone for reloading, storing and/or unloading surface channels.

It should be considered that the restriction of dominance in land use will not prevent agricultural and livestock activities; it limits the use in the sense that constructions cannot be carried out or high-altitude forest species maintained.

- Impacts on the Economy

The construction of the transmission line will generate new local jobs that will be temporary of a positive and direct relationship nature, in addition to the Cellulose Factory and the Substation that is intended to be installed. Some qualified labor will be needed that can be covered with workers in the project's area of influence, which although of a small magnitude, will nevertheless result in a temporary increase in the economic income levels of workers' families and thus the possibility of improving their standards of quality of life. The negative impact of the economic damage affected by the right of servitude should be adequately mitigated through negotiations for fair economic compensation to the owners of affected land.

- Impacts on the Landscape

In the design of the trace even when the greatest care of the vertex location of the transmission line will be taken in order to avoid, within what possible vegetation areas and populated areas will always occur some kind of impact on the site.

Indeed, electric transmission lines have impacts on the landscape by adding new visual elements that will modify or often interfere with existing visual resources and in this

sense the greatest impacts on the landscape are considered to occur in wetland areas, river crossings and saw dries.

There will only be an impact on the visual aesthetics of the area during the construction period of working camps, warehouses, material couplings, etc., which will be transient.

- Impacts on Health and Safety

During the construction phase, the risk of accidents especially of local people and project workers will increase, due to the handling of existing power grids, movement of poles, machinery and others.

Due to the increase in the generation of dust, noise and even automotive gases, there may be discomfort and mainly respiratory diseases in local people and workers, impacts that will be temporary and can be minimized.

There is also the latent risk of rejection of the implementation of the transmission line by the local community, which will require implementing appropriate communication strategies.

Operation phase

At the operating stage the electromagnetic field that will occur during the period of operation of the installations is because the high voltage lines near the conductors cause partial depressions in the air around them, causing alterations recognized as the "crown effect", noises in radio broadcasts, interference in television signals and in telecommunications. It is possible to decrease the power of the fields, both electrical and magnetic, if the distance of the transmission lines is greater. Atmospheric disturbances such as rains and mists favor the appearance of this phenomenon while the aging of the driver slows it down.

However, these effects will not be very relevant when it comes to public health as the electro-magnetic field effect will be mild, remaining at values below the limits set by the World Health Organization (WHO).

In the Project the impact of the electric and magnetic fields to be generated during the operation of the line, in terms of the possible health effects due to the exposure of people, will be minimized due to the release of the bondage strip of the line and implementation of the safety and service zone.

Estimates indicate that field values will be below the maximum values recommended by the World Health Organization (WHO) and established by Decree 10.071/07.

- Generation of particulate matter

There will also be some generation of particulate matter that will be of little importance and already during the operation of the system will be imperceptible.

- Risk of accidents

In the operation phase of the transmission line, the risk of accidents will already be very low.

Likewise, some contamination of surface water from oil spills, fuels, solid waste, etc., during the maintenance stage of the line, impacts that can be minimized by strict compliance with the Environmental Management Plan of the transmission line could occur.

Appropriate techniques should also be used in the clearing and control of vegetation in the bondage strip to clean vegetation from the right of way and control the quantity and type of the new vegetation. Selective clearing using mechanical means is preferable and should be analyzed in the project ESIA. Aerial dew of herbicides should be avoided because it is not selective and introduces large quantities of chemicals into the environment, and is also an imprecise application technique and can contaminate surface water as well as terrestrial food chains.

- Risk of bird collision

There is also the risk of bird collision or physical collision of birds with transmission line cables, especially in rural areas. In general the vulnerability of the group of birds to collisions appears to be a low risk factor, however this impact should be taken into account in specific habitats that are more vulnerable.

To find a solution to the problem of bird collision with transmission lines, it is envisaged that flight diverters will help migratory birds to have a visual image of vivid colors to avoid colliding with high voltage lines.

- Local labor

Local labor may also be used at the operating stage for the maintenance activities of the bondage strip, resulting in a positive impact to improve local income levels.

In addition, the electric transmission line may induce development alongside road rights or on nearby lands that have become more accessible to the development of the Project.

However, the most relevant and permanent positive impact can be considered to occur in the global economy because of the increased supply of electricity that will be available to generate sustainable productive activities and new investments in the country's industrial development, which will ultimately result in greater well-being of the population and these benefits will already be permanent in nature.

- Impacts associated with substation operation are:

- a) Exposure to electromagnetic fields

Exposure to electric and magnetic fields shall be given by permanent personnel attached to the future Substation. Public exposure is considered not significant because nearby populations or dwellings are not observed in the indirect area determined above.

Other potential negative impacts

During operation, maintenance tasks for line installations and power equipment to be installed in substations are considered minimal. Changes in transformer gel silica, when required, are made under strict safety conditions. On the other hand, safety systems and standards used in the design of electrical installations ensure reasonable protection against accident risks that endanger the health of workers and third parties.

- b) Impact on electricity service

The most significant impact attributable to the project is given by the benefits it will represent for the performance of the Transmission System, allowing to meet the demand for electrical energy with reliability and quality.

c) Noises and other environmental factors

Noise emitted by the Substation is considered not significant. In addition, the environmental impact on the medium air is punctual and dissipates as the distance to the source of generation increases.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative/Positive	-+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local and regional	2
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II and III	
Magnitude:	Medium	2
Importance:	Medium	2
Possibilities of potentiation:	Medium	
Degree of potentiation	Medium	
Mitigation possibilities	Mitigated	
Degree of resolution of measures:	Medium	
Area of influence:	DIA and IIA	

Mitigation measures/enhancement

Follow the guidelines of the programs of the mill site regarding noise, dust and erosion generation besides water resources sedimentation, impacts on fauna and flora due to transmission line and substation construction.

Minimize impacts on land use and landscape by tracing the transmission lines on the path of existing roads.

Improve economy by hiring local people for the construction.

Perform workers training to prevent accidents, through Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations.

Minimize the impact of the electric and magnetic fields to be generated during the operation of the line, due to the release of the bondage strip of the line and implementation of the safety and service zone.

Envisage flight diverters that will help migratory birds to have a visual image of vivid colors to avoid colliding with high voltage lines.

Use safety systems and standards in the design of electrical installations to ensure reasonable protection against accident risks that endanger the health of workers and third parties.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The Transmission line and substation implantation and operation will not cause any significant impact to the physical and to the biotic environments, neither to the communities because they will be placed on anthropized areas along existing road rights sides. The most relevant and permanent positive impact can be considered to occur in the global economy because of the increased supply of electricity that will be available to generate sustainable productive activities and new investments in the country's industrial development, which will ultimately result in greater well-being of the population and these benefits will already be permanent in nature.

10.1.4.4.3.6 Port operation

Environmental aspect

Risk of accidents.

Impact-Generating Factor

Maneuver, loading and unloading.

Technical justification

The river port of the pulp mill will be a terminal-type construction on the left bank of the Paraguay River, built as an elevated platform on a structure composed of: an operating platform, an access bridge for vehicles and people, and a shed structure for the pulp transport area. All the structures will be made of reinforced concrete and the loading roof will be made of a metal structure. It will be implemented from the shore through the sustainable methodology of the Cantitraveller type with prefabricated elements.

The port will move the following loads:

- Pulp transport by river barges at an average rate of 1,500,000 t/year;
- Reception of logs with volumes varying between 2 and 5 million m³ s sc/year;

- Reception of inputs for the pulp mill (liquid or bulk) up to 450,000 t/year.

The boats that will operate in the port will be the current models in circulation in the fluvial section of the Paraguay River with the format of convoys according to the official conditions of navigation. The typical pulp convoy will consist of barges) with a unit capacity of up to 2,500 tonnes each.

The boats for wood and inputs will be suitable for each of the operations/products and will be regulated by the navigation conditions.

No dredging actions will be required for the approach channel, the evolution basin and the anchorage area of the vessels (barges and pusher craft). For platform or access bridge construction services, bottom forming services may occasionally be required at the site of underwater structures.

The selection of the positioning of the river port was defined according to the format of the pulp mill area and the morphological characteristics of the Paraguay river, shown in the following figure.

The selected point is characterized by having natural draft conditions for boats (pulp barges) without the need for deepening actions or maintenance of dredging, and preserves the conditions of regular distance from the navigation channel, in accordance with the premises and institutional regulations.

The train anchorage areas are located upstream of the river port for empty trains awaiting cargo and downstream for loaded trains awaiting final train formation.

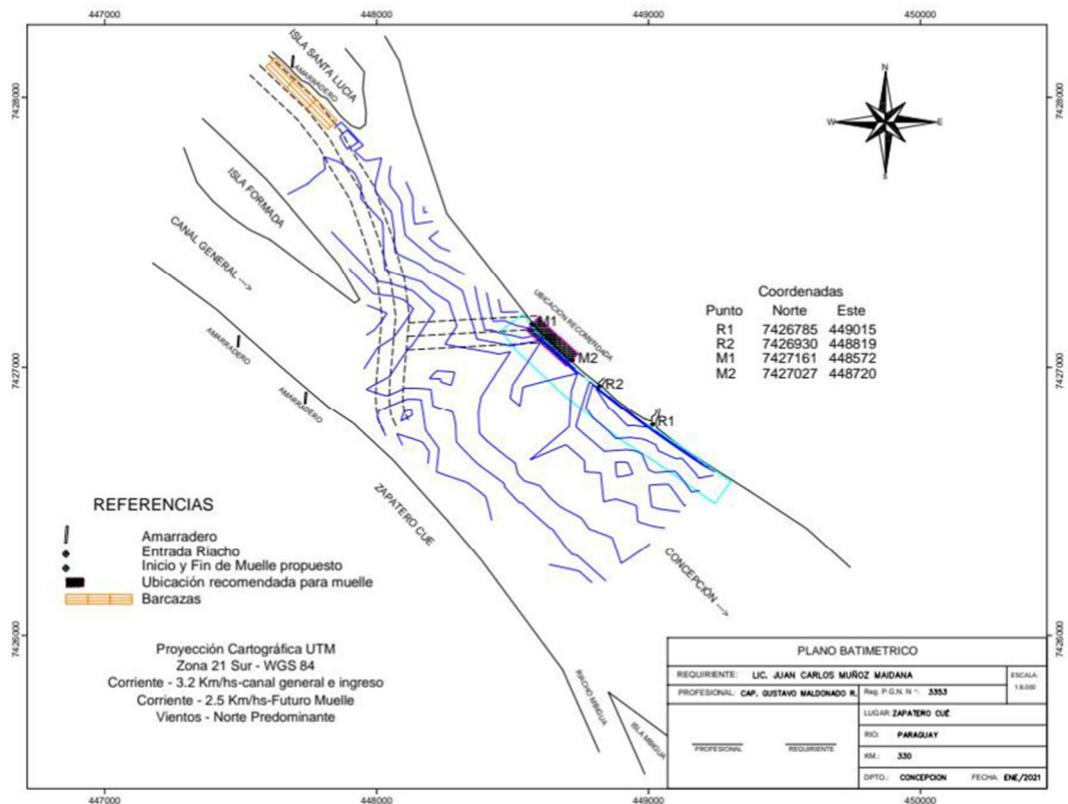


Figure 7 – Location for the port

The logistics for wood bough from the market, from the source to the Paracel mill site, will consider river transportation for wood coming from Argentina and both river and road transportation for wood coming from Paraguay and Brazil. This is a measure that will prevent accidents and traffic due to road transportation, although vessel accidents should also be avoided through good maneuver, loading and unloading procedure.

The pulp waterway route to Nueva Palmira is presented in the picture below.

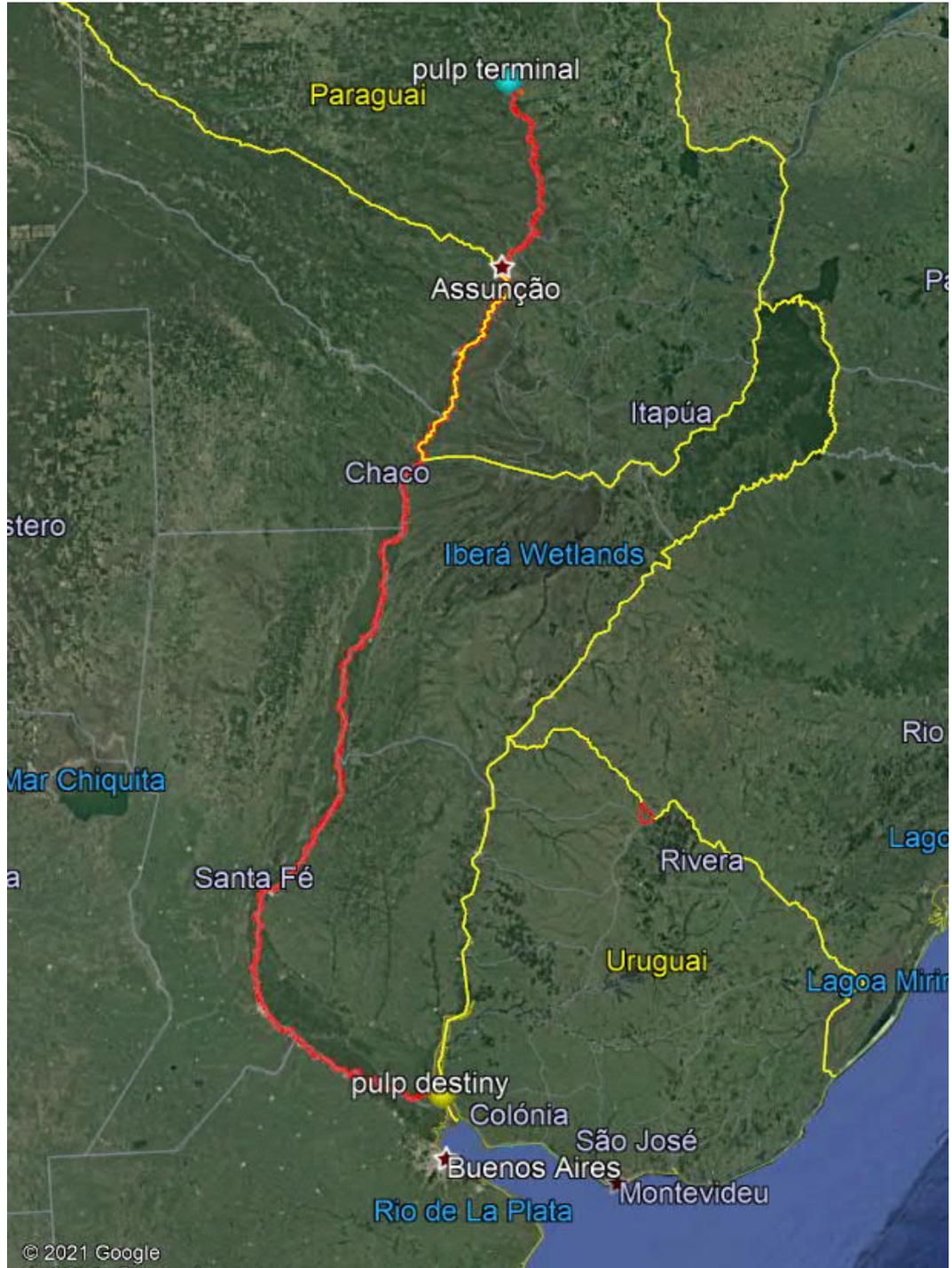


Figure 8 – Pulp waterway route

Facilities Description

AWT

The AWT (All Weather Terminal) will be completely developed in metallic structure, therefore, the covering, the closings and the beams will be metallic. The 56 t capacity crane support columns will be made of precast concrete.

Support Building

This building will have a conventional concrete structure, structural masonry, precast slab and metal roof. The support building will have house bathrooms, meeting rooms and control rooms.

Mooring Points

The design includes tie-down points, main protection points and protection points of the AWT roof columns. It is planned to use metal jacketed perforated inclined piles filled with reinforced concrete and their respective blocks, which consist of a precast bark element for the second subsequent concreting step.

Barge Pier

The barge dock will have reinforced concrete platform. Its structure will be made of perforated metal-clad piles filled with reinforced concrete, beams and precast slabs in solidarity with the reinforced concrete in situ.

Access Bridge

As well as the pier, the access bridge will be made up of wide reinforced concrete structure. Its structure will be made of perforated metal-clad piles filled with reinforced concrete, beams and precast slabs in solidarity with the reinforced concrete in situ.

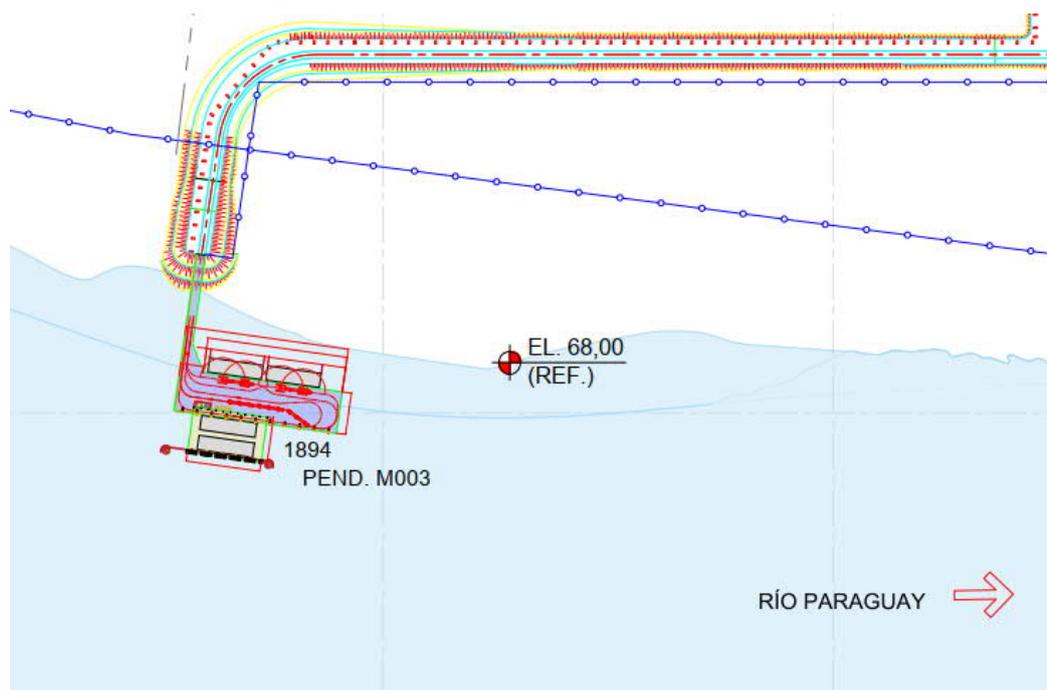


Figure 9 – River Port

It should be noted that PARACEL will require the best practices from all its service providers, and require periodic maintenance in all operating boats, but in case of fuel leak in Paraguay River an Emergency Plan should be started immediately to contain the spill to cause the least possible impact.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Temporality or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

Perform good maneuver, loading and unloading procedure to prevent accidents due to river transportation.

Require the best practices from the services providers.

Perform an Emergency Manual in the Port.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

It is difficult to foresee the intensity of these risks, but they can be efficiently minimized through the application of proceedings in port structures.

10.1.4.4.3.7 River transportation increase

Environmental aspect

Risk of accidents.

Impact-Generating Factor

Port operation.

Technical justification

The commercial navigation of the Paraguay River began in 1870 with the export of tannin in ships of the Mihanovich Company to which, later, the products of the cement industry (Vallemí SA) were added, the supply of the populations located at North (to the town of Bahía Negra and even extending to the towns of Corumbá and Cuyabá) as well as commercial traffic between the cities of Asunción and Buenos Aires.

In its current conditions, coinciding with an alternation of periods of high and low water, which occurred between 1911 and 1961, navigation began in the mid-1950s with the exploitation of the iron deposits of the Mutún and Urucum (in the surroundings of Corumbá and Puerto Quijarro), being interrupted in the period of low water developed between the years 1962 - 1973.

Subsequently, as of 1974 and taking advantage of a new period of high waters, both navigation and economic activities for the production of bulk cargoes (iron ore and manganese, soybeans and by-products, wheat, oil and derivatives, forest products, clinker and calcareous materials).

In more recent years, particularly as of 1998, a new period of low water seems to have begun (although the great interannual variability is preserved), and it should be noted that, at the time of preparing this report, the Paraguay River is in a situation of extraordinary downspout, having reached, in the town of Asunción and on October 25, a minimum value of -0.54 m at Local Zero, which is even below the historical minimum (-0.16 m in 1938, -0.19 m in 1944, -0.36 m in 1967, -0.14 m in 1968, -0.40 m in 1969, -0.25 m in 1970 and -0.14 m in 1971).

Regarding its use, the inland waterway of the Paraguay River is, for the most part, operated by convoys of barges that transport solid bulk (soybeans and its by-products, wheat, iron and manganese ore, clinker, calcareous materials, cement) and liquids (petroleum and its derivatives, oils) and that carry out the traffic between ports of the Brazilian SW (Corumbá and Ladario), of the Bolivian West (Jennefer, Aguirre and Gravel) and of the own Paraguay (Vallemí, Concepción and other smaller ports) with ports of Argentina, Uruguay and Paraguay itself.

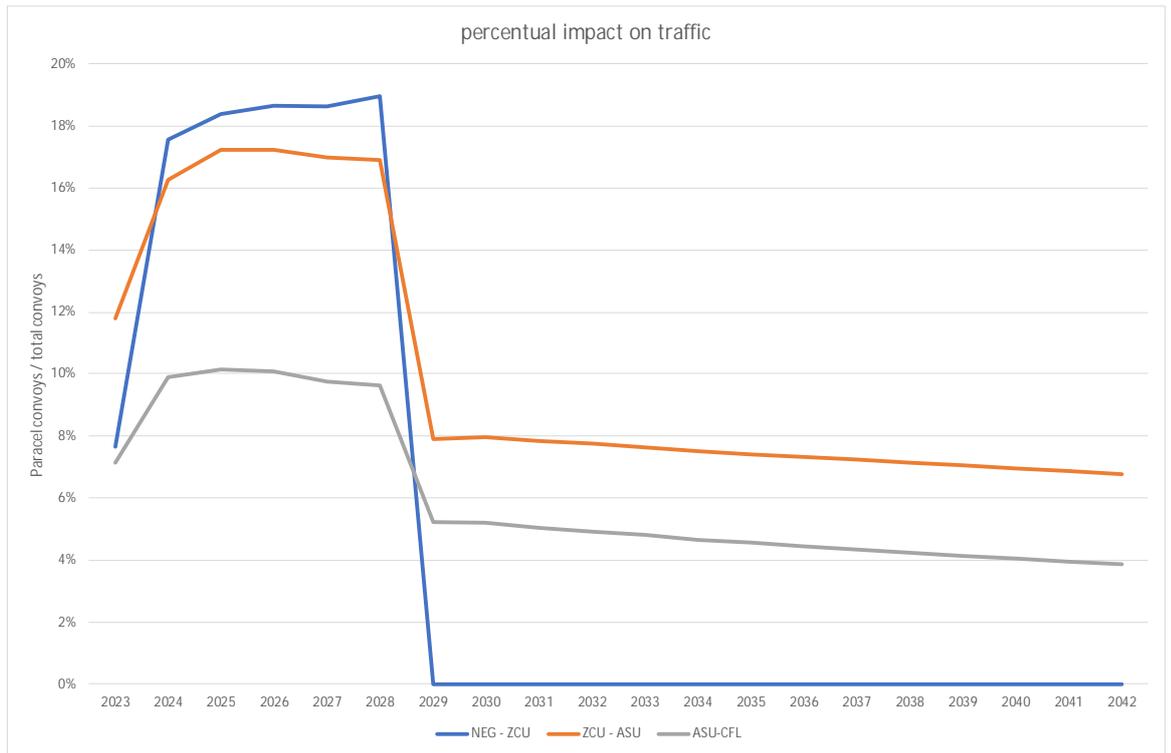
The main problems are related to the conditions of the inland waterway and the navigation itself. Indeed, within the framework of studies, between 2009 and 2011, various interviews and consultations were carried out with officials of the Ministry of Public Works and Communications (MOPC) and the Management of Navigation and

Hydrography (GNH) of the National Administration of Navigation and Ports (ANNP) as well as with captains of the main navigation companies (Panchita G SA, Transbarga de Navegación SA and UABL Paraguay SA) and members of the Societies of Captains and Pilots of the North and South Zones of the Paraguay River.

Such difficulties necessarily imply cost overruns for the economies of the companies involved (not only shipping companies but also those related to production and other diverse items). Additionally, the non-optimal use of the available resources and the delays in navigation, invariably cause delays in the delivery of the cargo and in the transfers of the transshipments (with the concomitant risks of loss of products or the need to use the own barges as “floating tanks”, at least until the corresponding load transfer is achieved).

The logistics for wood bough from the market, from the source to the Paracel mill site, will consider river transportation for wood coming from Argentina and from both river and road transportation for wood coming from Paraguay and Brazil. It is known that river transport causes less environmental impacts than roads impacts specially when the load is not hazardous, because it is basically wood. Therefore it is recommended for PARACEL which aims to introduce this venture covering all concepts of sustainability, following the principles and criteria of the best environmental certifications.

It was done a study to calculate the impacts within the existing ports in Paraguay River from the Paracel project. According to the figure bellow, it can be seen that the greatest impact will be from Rio Negro to Paracel Port (in blue) being the increase up to 19% of its current capacity, but it will occur only in the first 6 years of operation, the traffic from Paracel Port to Assunción port will increase by 17% on the first 6 years and then keep the boats traffic increase within only 8%-7%, and the least impacted river path will be from Assunción port to Confluencia port, where within the first 6 years will increase traffic in about 10% and then keep the movement in this path about 4% greater then todays traffic. But the ports are able to support this increment.



It should be noted that river transportation has many advantages from road transportation, like:

- Greater energy efficiency;
- Greater load concentration capacity;
- Longer infrastructure life;
- Longer equipment and vehicles life;
- Lower fuel consumption;
- Reduced pollutant emissions (climate change and greenhouse effect);
- No traffic congestion;
- Lower infrastructure cost;
- Less likely to have accidents;
- Lower operating cost; and
- Minimize noise emission.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative/Positive	--+
Form of incidence:	Direct	

Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Temporality or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type II Accumulation	
Magnitude:	Medium	2
Importance:	Small	1
Mitigation possibilities:	Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

Priorate or balance wood from river transportation instead of road transportation.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

There are more environmental benefits by using river transportation instead of road transportation and PARACEL should balance both ways.

10.1.4.4.3.8 Visual impact

Environmental aspect

Change of landscape and land use.

Impact-Generating Factor

Implementation of the pulp mill, consisting of buildings, towers and chimneys.

Technical justification

The pulp mill will be located in the municipality of Concepción, about 15 km from the city center.

City people may not see the impact on the landscape, however, everyone who lives nearby, or uses the roads and/or waterway near the company may feel the impact on the landscape.

According to the environmental diagnosis, the existing agricultural routes and activities throughout the study area have historically already led to a modification of the landscape, favoring generalist species, rather than those more sensitive to changes in the environment.

The area planned for the implementation of PARACEL's industrial unit is located in a rural area of the cattle activity, however part of the water intake area, effluent emissary and river port are located in areas of natural vegetation.

Obviously, the industrial unit consisting of buildings, towers and chimneys will change the local landscape.

To mitigate the impact on the landscape the project must be implemented to favor the integration of the plant with the environment.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Negative	-
Form of incidence:	Direct	
Area of spatial coverage:	Local	1
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or duration:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Low	1
Importance:	Small	1
Mitigation possibilities:	Partially Mitigated	
Degree of resolution of measures:	High	
Area of influence:	ADA	

Mitigation measures

Implement the landscape project that favors the integration of the mill with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and reuse of the soil from earthworks in gardens within the industrial area in accordance with the Landscape Recomposition Program besides revegetation of riparian forests.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

The implementation of the pulp mill will inevitably alter the landscape and local land use, which can be minimized by implementing the Landscape Rehabilitation Program.

10.1.4.4.3.9 Increase communication with local Stakeholders

Environmental aspect

Affected elements from the mill and Communities consultation.

Impact-Generating Factor

Pulp mill operation.

Technical justification

In order to develop a good management system during the different stages of the project, a comprehensive evaluation is required to identify impacts, risks and opportunities at the environmental and social levels. This requires the inclusion of stakeholders as part of participatory processes, as well as the dissemination of relevant information about the project.

The effective and systematic participation of stakeholders must be guaranteed through informed consultation and participation processes in the different phases of the project.

The program of relations with the community and local development refers, first of all, to the generation of mechanisms for the participation of the population of the areas involved in the project DAA/DIA for the industrial component. In actions that are oriented to the identification and formulation of alternatives to the changes that could occur with the implementation of this. Likewise, it seeks to contribute to the strengthening and development of communities, both in the social, economic, cultural, and other aspects; and the active involvement of the inhabitants in matters that make the transformation of the current conditions of their environment.

With the field work carried out for the preparation of the LBS (Social Line Basis) studies; in the first and second stages, information gathering and exchange activities were carried out with the population of the areas that make up the DIA of the component, enabling a first communication channel with them, which in turn could know the situation of these territories with respect to access to basic services, health, education, participation, others. This process and the international regulations involved

constitute the basis for the generation of community development proposals in these areas, before which the following points should be considered:

- The importance of sustaining the communication, already initiated, in the territory by returning the results of the information survey; carried out for the baseline studies and the involvement of the various stakeholders and interest groups; already identified in the different spaces.
- All actions that involve the community must consider the prior elaboration of participatory diagnoses in consultation spaces, promoting equitable participation between women and men in the community, and permanent monitoring of the activities planned for this purpose.

The implementation of the activities with the aforementioned considerations ensure compliance with the principle of Equator No. 5; that highlights the importance of the “effective participation of Stakeholders in a continuous, structured and culturally appropriate manner for the Affected Communities; and, where appropriate, for Other Stakeholders”, the importance of carrying out consultation processes according to the degree of adverse impacts that may occur in each area, adapted to their linguistic preferences; their decision-making processes, and the needs of disadvantaged and vulnerable groups.

The communities located on the access roads to the area surveyed for the construction of the plant have the particularity of becoming an area with an identity of cohesion between communities that are linked to each other and interdependent on each other. Saladillo, Mongelos and Roberto L. Petit are communities with greater capacity, in which educational institutions, health services, etc. are concentrated, to which residents of neighboring communities with less capacity attend daily.

In the areas involved in the project, community organizations, producer committees, neighborhood commissions, water and sanitation boards, among others, were also identified; as well as private initiatives for recreation such as watering places, and also small businesses and places with some type of service.

Taking into account this information and other characteristics surveyed, the following measures are proposed to strengthen local capacities by the project to be implemented:

- **Support for the strengthening of community identity:** Measure through which it is intended to generate activities that promote the strengthening of the existing community link between communities; accompanying the process of change that could be generated with the implementation of the project. Activities may include the participatory development of joint projects; including vulnerable groups (women, children, people with disabilities and the elderly), the setting up of community centers, the development of health appeasement in coordination with the regional offices of the MIC, SNPP, USF (training in preventive measures against COVID-19, HIV, and other public health issues), the organization of cultural events, etc.
- **Support for the strengthening of community organizations in the area:** In connection with the previous measure; it will seek to offer the organizations in the areas activities that promote their strengthening, placing special emphasis on productive committees (for example, in the forestry component, artisans dedicated to the production of karanday products), technical assistance with a

gender approach and the provision of marketing spaces in coordination with different relevant actors in the district. In addition, actions related to the rational use of water, the importance of the prior purification of the water provided by the sanitation boards or commissions, water quality monitoring, among others, will be promoted.

- **Promotion and development of local initiatives:** Aiming to provide technical support for the improvement and sustainability of local initiatives such as MSMEs, small businesses, workshops and others. In addition to support and advice for legal issues; such as the provision of tourist and recreation spaces (watering places) in the area.
- **Improvement of existing infrastructure:** In coordination with departmental and municipal governments, support the generation or improvement of spaces for recreation and outdoor recreation (squares, parks, courts, etc.), road safety signs in areas with concurrence of people and especially children (squares, schools, churches); as well as the improvement of the local landscape and of all kinds of infrastructure of community relevance.

It is important to highlight that although the communities are important stakeholders, they are not the only ones. Therefore it was mapped the stakeholders divided by category and sectors as below:

Category	Sector
Control Agencies	Public sector (Ministries, Secretaries, etc..)
Project decision	Public sector (Ministries, Secretaries, etc..)
Interest in the project	Public sector (Ministries, Secretaries, etc..)
Interest in the project	Private Sector (Gremios)
Interest in the project	Private Sector (Communication Media)
Interest in the project	Civil Society Organizations (Environment)
Control Agencies	Civil Society Organizations (Indigenous Communities)
Interest in the project	Civil Society Organizations (Inclusion / Sustainability)
Potential Benefits	Academy, educational and research institutions
Interest in the project	Religious institution
Potential Benefits / Potentials Affected	Micro territories
Potential Benefits / Potentials Affected	Suppliers
Potential Benefits / Potentials Affected	Collaborators
Project decision	Shareholders (investors)
Project decision	Investors (banks)

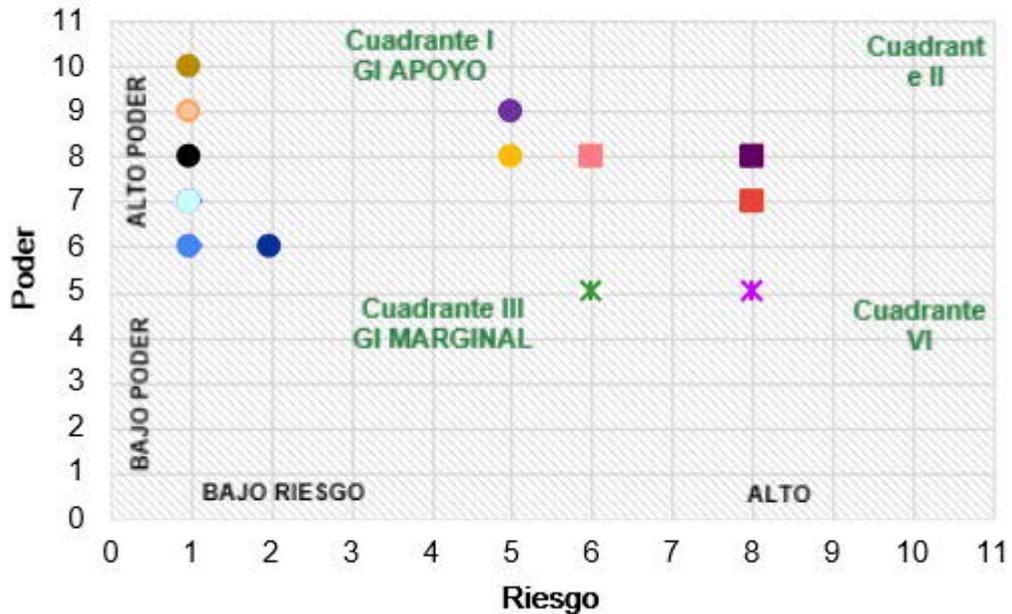
Category	Sector
Potential Benefits	Communication and Monitoring Committee
Interest in the project	Civil Society Organizations (Forestry Rubro - Brazil)

According to the stakeholders evaluation, it was performed graphics of Preponderance, Power, Legitimacy and Urgency levels, as follows:



The resulting is a Power and Risk Matrix of the stakeholders, as follows:

MATRIZ PODER- RIESGO



By mapping the stakeholders, PARACEL can anticipate their needs, bring confidence and satisfaction regarding the implementation of the project, contributing to the good image and transparency of the company.

Other than that, Paracel provided communities consultation, specially the indigenous people, regarding the project. There will be impacts to indigenous people as a result of the pulp mill activities, but these are detailed in the Forestry ESIA. The only indigenous community near the site is called Redención, located about 13 km from the site.

Presidential Decree No. 1039 of 2018, which approves the "Protocol approving the process of consultation and free, prior and informed consent with the indigenous peoples inhabiting Paraguay", grants INDI the power to issue "the relevant regulations for the effective implementation of the Protocol, with the collaboration of the indigenous peoples". In this context, INDI produced Presidential Resolution No. 251/2019 on the Certificate of Non-Objection.

The consultant of the indigenous component, Urbano Palacio, advised that a protocol visit should be made to the authorities of INDI in order to inform them of the establishment of PARACEL pulp mill in the Department of Concepción, and to hear their recommendations on the preliminary study being conducted by the firm PARACEL S.A., in the process of conducting a free and informed prior consultation of the indigenous communities in the area on the possible impact of this industry.

It was performed by Fundación Natán the Free, Prior and Informed Consent about PARACEL project according with Paraguayan Law 234/94 and Regulated by Decree 1039/18. Successfully, after performed meetings and workshops, the community gave a written consent about the project. All members of the communities consulted expressed positive expectations about the PARACEL Project, thinking it can be a development opportunity for their communities, and hope to continue close and effective relationship

throughout all processes involving them. The meetings conducted with indigenous people are described in more detail in Annex II, Socioeconomic of the Forestry ESIA.

Although it was verified that the community is interested in improving their health, education, safety and economic conditions. They also anticipated that the implementation of the mill could affect migration activities with other communities leading to an increase in the volume of people within its community. Because the indigenous community lives in vulnerable conditions, the increase in people and economic development in Concepción could increase the risk of indigenous prostitution and human trafficking, mainly. (CLACSO, 2013)

So it is recommended that PARACEL carries out a conscious dissemination with direct and subcontractor workers to orient them about: child and indigenous prostitution, drugs, sexually transmitted diseases, etc., in the Environmental Education Program.

Other than that PARACEL should systematize, analyze and present the data in a Community Development Plan that will address people's integral needs.

A summary of PARACEL'S record of public consultations and stakeholder engagements are presented in ANNEX I.

Characterization of the impact

	Qualitative	Quantitative
Nature:	Positive	+
Form of incidence:	Direct and indirect	
Area of spatial coverage:	Local, regional and strategic	3
Probability of occurrence:	Certain	2
Time of occurrence:	Immediate	1
Timing or length:	Permanent	3
Reversibility:	Irreversible	2
Accumulation:	Type III Accumulation	
Magnitude:	Medium	2
Importance:	Large	3
Possibilities of potentiation:	High	
Degree of potentiation	High	
Degree of resolution of measures:	High	
Area of influence:	DIA and IIA	

Measures of enhancement

- Perform Community Relationship and Social Investment Program.
- Disseminate the project, informing the positive impacts that will be generated to the stakeholders through meetings and other means, in the Dissemination and Communication Program.
- Carry out a conscious dissemination with direct and subcontractor workers to orient them about: child and indigenous prostitution, drugs, sexually transmitted diseases, etc., in the Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations and Supplier Code of Conduct.

Responsibility for the implementation of the measures

PARACEL, as detailed in the “Health, Safety, Environment and Social Management System Manual” report.

Forecast after implementation of measures

By mapping the stakeholders, PARACEL can anticipate their needs, bring confidence and satisfaction regarding the implementation of the project, contributing to the good image and transparency of the company.

It can be stated that the dissemination of the project to all stakeholders (community, employees, suppliers, government, customers, etc.) and the clarification of doubts that may arise about the project, through meetings and other means, will bring confidence and satisfaction regarding the implementation of the project, contributing to the good image and transparency of the company.

Quantitative Assessment

For quantitative analysis, the maximum score will be - 893 (47 qualitatively identified impacts x - 19 points per impact). The following Table presents the quantitative analysis of the impact assessment.

Table 16 – Quantitative analysis of the impact assessment

Phase	Identified impacts	Coverage area	Probability of occurrence	Time of occurrence	Timing or length	Reversibility	Magnitude	Importance	Total Positive	Total Negative	Sum
Design	Generation of expectations in the population	-3	-1	-1	-1	-1	-3	-3	13	-13	0
	Generation of direct and indirect temporary jobs	3	2	1	1	1	2	3	13		13
	Hypothesis of non-realization of the project	-3	-1	-3	-3	-2	-3	-3	18	-18	0
Installation	Generation of erosive processes and sedimentation of the river	-1	-1	-1	-1	-2	-2	-1		-9	-9
	Conflicting water usage	-1	-1	-1	-1	-2	-2	-1		-9	-9
	Change in surface water quality	-2	-1	-1	-1	-1	-1	-1		-8	-8
	Change in air quality	-2	-2	-1	-1	-1	-1	-1		-9	-9
	Noise related disturbance	-2	-2	-1	-1	-1	-1	-1		-9	-9
	Change in soil and/or surface water and groundwater quality	-2	-1	-2	-1	-1	-2	-1		-10	-10
	Impacts generated in the	-1	-2	-1	-1	-2	-2	-1		-10	-10

Phase	Identified impacts	Coverage area	Probability of occurrence	Time of occurrence	Timing or length	Reversibility	Magnitude	Importance	Total Positive	Total Negative	Sum
	construction of the river port										
	Vegetation and land habitat loss	-1	-2	-1	-3	-2	-2	-2		-13	-13
	Dust generation due suppression of local vegetation	-2	-2	-1	-3	-2	-2	-2		-14	-14
	Change in water ecosystems	-1	-1	-1	-1	-2	-1	-1		-8	-8
	Higher risk of running over animals	-2	-1	-1	-1	-2	-1	-1		-9	-9
	Impact to Natural and modified habitat	1	2	1	3	2	2	2	13	-13	0
	Risk of harassment to flora and fauna by workers	-2	-1	-2	-3	-2	-2	-2		-14	-14
	Generation of direct and indirect temporary jobs	3	2	1	1	1	3	3	14		14
	Interference in infrastructure	-2	-2	-2	-1	-2	-2	-1		-12	-12
	Higher risk of accidents	-2	-1	-1	-1	-2	-2	-1		-10	-10
	Impact on the morphology	-1	-2	-1	-3	-2	-1	-1		-11	-11
	Interference with cultural heritage	-1	-1	-1	-3	-2	-1	-1		-10	-10

Phase	Identified impacts	Coverage area	Probability of occurrence	Time of occurrence	Timing or length	Reversibility	Magnitude	Importance	Total Positive	Total Negative	Sum
	Increasing tax revenues and Boosting the Economy	3	2	1	3	2	3	3	17		17
	Worker influx Increase	-2	-1	-2	-3	-1	-2	-2	13	-13	0
	Impacts to community health and safety	-2	-2	-2	-1	-2	-2	-1		-12	-12
	Impacts to vulnerable groups	-2	-2	-2	-1	-2	-2	-1		-12	-12
Deactivation of construction	Reduction in the number of jobs	-2	-2	-1	-3	-2	-2	-1		-13	-13
Operation	Noise related disturbances	-1	-2	-1	-3	-2	-1	-1		-11	-11
	Change in soil and/or water quality	-1	-1	-2	-3	-2	-2	-1		-12	-12
	Change in air, soil and/or surface water and groundwater quality	-1	-1	-2	-3	-2	-3	-2		-14	-14
	Conflicting Water Use	-1	-1	-3	-3	-2	-1	-1	12	-12	0
Operation	Change in river quality	-2	-1	-2	-3	-2	-2	-1		-13	-13
	Change in air quality	-1	-2	-1	-3	-2	-2	-1		-12	-12
	Fugitive emissions	-1	-1	-1	-3	-2	-2	-2		-12	-12
	Higher risk of running over animals	-2	-1	-1	-3	-2	-1	-1		-11	-11

Phase	Identified impacts	Coverage area	Probability of occurrence	Time of occurrence	Timing or length	Reversibility	Magnitude	Importance	Total Positive	Total Negative	Sum
	Injury or death to fauna and flora due to improper waste disposal, including spills	-1	-1	-2	-3	-2	-3	-2		-14	-14
	Change in aquatic ecosystems	-1	-1	-1	-3	-2	-1	-1		-10	-10
	Noise related disturbances on fauna	-2	-2	-1	-3	-2	-2	-2		-14	-14
	Impact of oil spills in river due to river transportation	-2	-1	-1	-1	-2	-2	-3		-12	-12
	Generation of direct and indirect jobs	3	2	1	3	2	2	3	16		16
	Higher risk of accidents	-1	-1	-1	-1	-2	-1	-1		-8	-8
	Increasing tax collection and Boosting the Economy	3	2	1	3	2	3	3	17		17
	Road transportation increase	-2	-1	-3	-3	-2	-1	-1		-13	-13
	Port operation	2	2	1	3	2	2	2	14	-14	0
	River transportation	-1	-2	-1	-3	-2	-2	-1		-12	-12
	Visual impacts	1	2	1	3	2	2	1	12	-12	0
Operation	Impacts from Transmission line and substation	-1	-2	-1	-3	-2	-1	-1		-11	-11
	Increase communication with local Stakeholders	2	2	1	3	2	2	3	15		15

Phase	Identified impacts	Coverage area	Probability of occurrence	Time of occurrence	Timing or length	Reversibility	Magnitude	Importance	Total Positive	Total Negative	Sum
Full quantitative impact assessment									187	-476	-289

Note: For negative/positive impacts, the zero impact value is considered in the quantitative totalization. Positive impacts are added and negative impacts are subtracted.

In the quantitative assessment, the total sum of the impact assessment, adding the positive minus the negative resulted in - 289 (negative), as shown in the Table above; i.e. the quantitative sum of the negative impacts was greater than the sum of the positive impacts.

For evaluation purposes, the result of the total sum of the impact assessment was compared with the maximum achievable score (all negative impacts in the worst condition), which in this case was - 893 points (47 impacts x - 19 points per impact). This gave a result of 32.4%.

The score obtained if the mitigation measures are not applied and if there are no positive impacts, would be -476 points, or 53.3%.

In summary:

Total possible points: 893 points;

Total points added without the implementation of the proposed measures: 476 points, or 53.3%;

Total points added in this evaluation with the implementation of the proposed measures: 289 points, or 32.4%.

Since the percentage, with the implementation of the measures, is less than 50 %, it can be concluded that the company is environmentally feasible. However, it is recommended that PARACEL implements all the measures proposed in this assessment to further minimize the negative impacts generated by the construction and operation of the pulp mill.

10.1.5 Evaluation Summary Tables

Once the impacts were identified and evaluated, a synthesis framework - organized according to the affected environment and the respective phase of the project - allowed us to confront them with the attributes described above.

The evaluation of the environmental impacts in the areas involved, and the consequent proposal of mitigation or enhancement measures to be applied, were elaborated on the basis of the degree of change produced in the environmental components.

The following tables summarize the impacts expected for the design phase, construction, deactivation of the works and operation, respectively, of the pulp mill in the municipality of Concepción.

The tables show the impacts identified and attribute the degrees to each one according to the capital letters used in the item 10.1.2 Methodology for assessing environmental impacts.

Table 17 – Design Phase Impacts

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Dissemination of information about the company's implementation .	Generation of expectations of the population in relation to the opening of work fronts resulting from the implementation of the company.	Generation of expectations in the population	P/N	D/I	L/R/E	P	I	T	R	S	A	G	M	A	Disseminate the project, informing the data of jobs that will be generated, as well as the strategy to prioritize the local workforce, in addition to the capacity data, the technology to be used, the environmental control systems, the information on the negative and positive impacts of the company, among others, through meetings with the community and also through other means, in the Dissemination and Communication Program.	-	A	It can be stated that the dissemination of the project with all interested parties (community, employees, suppliers, government, customers, etc.) and the clarification of doubts that may arise in the sector, will bring confidence and satisfaction to the population regarding the implementation of the project, contributing to the good image and transparency of the company.

(The tables show the impacts identified and attribute the degrees to each one according to the capital letters used in the item 10.1.2 Methodology for assessing environmental impacts).

Table 18 – Design Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Environmental studies for the generation of technical and scientific knowledge of the project region.	Hiring of services for the preparation of environmental studies.	Generation of direct and indirect temporary jobs	P	D/I	L/R/E	C	CP	T	R	S	M	G	-	A	Disseminate the project, informing data such as: the company's impacts and future monitoring programs, which may require labor through the Dissemination and Communication Program.	A	A	The dissemination of the environmental monitoring programs to be implemented at the time of construction and later in the operation phase of the project can be considered to generate new data and jobs, which will contribute to clear expectations of the jobs that will be generated.

Table 19 – Design Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Non-implementation of the project.	Stopping or non-execution of the project	Hypothesis of non-realization of the project	P/N	D/I	L/R/E	P	LP	P	I	S	A	G	M	-	To implement the pulp mill in a sustainable manner, reinforcing the company's commitment to the preservation of natural resources and the reduction of environmental impacts through the Environmental and Social Management System Program.	-	A	Paracel intends to implement the company in a sustainable manner, committed to the preservation of natural resources and the reduction of environmental impacts, and in accordance with current legislation. The hypothesis of not carrying out the project will have an impact on the economic aspects in the municipality of Concepción and will create frustration in the expectations of the population of the municipality and the region.

Table 20 – Construction Phase Impacts.

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Services of earthwork and works of water intake and emissary.	Earthworks and interventions in land areas near the river	Generation of erosion processes and river sedimentation	N	D	L	P	I	T	I	II	M	P	M	-	To implement the Monitoring and Containment of Erosive Processes Subprogram of the Environmental Management Program for Construction - PAC, which aims to: - Plan the implementation of earth-moving and land-preparation works preferably outside the rainy season, in order to reduce the possibility of erosion phenomena due to the susceptibility of the land; - Minimize the exposure time of uncovered areas in the construction phase; - Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, in gardening within the pulp mill; - Build temporary drains and sedimentation boxes around the embankment service works, to retain the solids, avoiding sedimentation in the water body.	-	A	It can be said that there will be no change in water quality since the execution of earthmoving works and land preparation will be planned preferably outside the rainy periods and minimizing the exposure time of the areas without vegetation cover. In addition, the project includes solids retention cells, as well as drainage channels provided around the earthmoving area in order to retain sediments and avoid sedimentation in the local water bodies.

Table 21 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Water consumption during the construction phase.	Groundwater availability.	Water use conflict	N	D	L	P	I	T	I	II	M	P	M	-	<ul style="list-style-type: none"> - Send to MADES a diagram of the place where the well is to be drilled, in which possible points of interference will be presented, such as: other wells installed, existence of springs, water courses, possible sources of contamination, etc., all within a radius of 500 m from the point of interest, as well as their relative distances to the future well; - Carry out a hydrogeological study before the construction of the wells; - Carry out Groundwater Quality Monitoring; - Coat the well with pipes to prevent the entry of unwanted water and not allow the collapse of the soil layers; - Properly close the wells to avoid any contamination of the aquifer, at the end of the works; - If it is necessary to drill wells for housing, PARACEL will inform the MADES beforehand and take the same care to avoid any contamination of the aquifer, from drilling to closing the wells. 	-	A	It can be affirmed that there will be no change in the quality or availability of the groundwater since the execution of the wells will be done in an environmentally correct way, according to a hydrogeological study before the drilling, and the captured flow will be little and temporary, in addition, at the end of the works the wells will be properly closed to avoid any contamination to the aquifer.

Table 22 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Construction works of pulp mill.	Inadequate generation and disposal of sanitary wastewater.	Change in Surface Water Quality	N	D	L/R	P	I	T	R	II	B	P	M	-	<ul style="list-style-type: none"> • Certify that the company hired to collect the wastewater from the chemical baths is properly regulated, and that the wastewater is disposed of in an environmentally sound manner; • Implement and operate a sanitary wastewater treatment plant to treat the wastewater generated during the construction phase after the chemical baths have been deactivated; • Perform Water and Effluent Management Program. 	-	A	It can be stated that there will be no change in the quality of surface waters, since the sanitary wastewater generated during the works will be duly treated and disposed of in an environmentally appropriate manner and in accordance with the legislation in force.

Table 23 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Generation of dust due to the movement of machinery and vehicles	Movement of vehicles and machines for the implementation of the project.	Change in air quality	N	D/I	L/R	C	I	T	R	II	B	P	M	-	<ul style="list-style-type: none"> Follow the guidelines of the Environmental Management Program for Construction - PAC, to minimize the generation of dust, such as: <ul style="list-style-type: none"> - Humidify the internal circulation routes and the work yard during the execution of services, when necessary; - Cover the trucks transporting earth, rocks and all powdery material with tarpaulins. 	-	A	It can be stated that, through the implementation of mitigation measures, air quality will not be changed.

Table 24 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Noise generation due to the company's construction work.	Movement of vehicles and machines for the establishment of the company.	Disturbance related to noise	N	D/I	L/R	C	I	T	R	II	B	P	M	-	<ul style="list-style-type: none"> Follow the guidelines of the Environmental Management Program for Construction (PAC) with respect to noise generation, such as: <ul style="list-style-type: none"> Carry out maintenance on machine, truck and vehicle engines; Carry out activities in the area predominantly in the daytime period; Carry out noise monitoring during the construction phase. 	-	A	It can be said that, through the implementation of mitigation measures, there will be no noise disturbance.

Table 25 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	The pulp mill's construction work.	Inappropriate generation and disposal of solid waste.	Changes in Soil and/or Surface Water and Groundwater Quality	N	D	L/R	P	MP	T	R	III	M	P	M	-	<ul style="list-style-type: none"> Follow the guidelines of the Environmental Management Program for Construction - PAC, with respect to best practices in Solid Waste Management, among which: <ul style="list-style-type: none"> To manage the solid waste generated in the construction of the PARACEL pulp mill with the best practices, in accordance with Law # 3,956/2009 and Decree # 7,391/ 2017 (Integral Management of Solid Waste in the Republic of Paraguay), among which are: <ul style="list-style-type: none"> Minimize waste generation through the 3R principle (Reduce, Reuse, Recycle); Segregation of solid waste according to color standard; Collection, packaging, storage and transport of solid waste in accordance with current legislation; Environmentally appropriate final destination (reuse, recycling, composting, energy use, etc.) and/or environmentally appropriate final disposal of solid waste generated in the company. Arrange the materials (excavation soil), if necessary, in duly authorized external areas. Implement a Temporary Solid Waste Storage Center that will be managed by a company specialized in this service. Implement a Debris Landfill and a Sanitary Landfill (organic). 	-	A	After the implementation of the measures, it can be said that there will be no changes in the quality of soil and/or water due to the generation and disposal of waste, without compromising the environmental quality of the area.

Table 26 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact											Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures	
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation					Possibilities of enhancement
Physical	Civil works for the implementation of the port infrastructure.	Impacts on the physical, biotic and socioeconomic environment due to the port construction.	Impacts generated by the construction of the river port	N	D	L	C	I	T	I	II	M	P	M	-	<ul style="list-style-type: none"> - To implement the Monitoring and Containment of Erosive Processes Subprogram of the Environmental Management Program for Construction - PAC, which aims to: <ul style="list-style-type: none"> • Plan the implementation of earthworks and land preparation works preferably outside the rainy season, in order to reduce the possibility of erosion phenomena due to the susceptibility of the land; • Minimize exposure time for areas without plant cover in the construction phase; • Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, in gardens within the mill; • Build temporary drains and sedimentation boxes around the earthworks to retain solids, preventing sedimentation in the water body. • Follow the guidelines of the Environmental Management Program for Construction (PAC) regarding noise generation, such as: <ul style="list-style-type: none"> - Carry out maintenance on machine, truck and vehicle engines; - Perform activities in the area predominantly in the daytime period; - Performing noise monitoring during the construction phase. • Implementation of the quay in the river port with the least number of pillars possible; <ul style="list-style-type: none"> • Supervise the environmental performance of the works during the project period; • Monitor the quality of surface water in the construction phase; • Follow the guidelines of the Environmental Management Program for Construction - PAC, in terms of criteria and operational controls to be carried out in the removal of vegetation, which are: <ul style="list-style-type: none"> - Conduct picketing to mark the area to be removed; - Use a team experienced in this suppression activity; - Properly dispose of organic waste and vegetation from the suppression activity; - Store the organic layer on top of the soil in an appropriate place for later reuse in the landscape design of the industrial area; - Promote, as a compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal or greater than that occupied by the vegetation to be suppressed - Implement the Flora Monitoring Program; - Implementing the Terrestrial Fauna Monitoring Program; - Carry out the supervision and environmental control of the suppression; - Prohibit the use of fire for vegetation suppression • Mark the area of implementation of the port on the Paraguay River to avoid accidents with boats; • To inform local fishermen about the period and care during the works of the port through the Dissemination and Communication Program • Signal the port implementation area on the Paraguay River to avoid boat accidents. 	-	A	It can be stated that, through the application of mitigation measures, the impacts generated by the construction of the river port will be minimal and temporary.

Table 27 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Earth movements and works in the site and for water intake and effluent discharge pipelines, routes and transmission line construction.	Removal of vegetation and alteration of associated habitats in the project area, including riverine habitat.	Vegetation and land habitat loss	N	D	L	C	CP	P	I	S	M	M	P M	-	<ul style="list-style-type: none"> Follow the guidelines of the Environmental Management Program for Construction - CAP, regarding the criteria and operational controls that will be carried out in the suppression of vegetation, which are: <ul style="list-style-type: none"> -Picking to mark the area to be removed; -Use a team experienced in this suppression activity; -Properly dispose of organic waste and vegetation from the abatement activity; -Store the top organic layer of the soil in an appropriate place for later reuse in the landscape design of the industrial area; -Promote, as compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal to or greater than that occupied by the vegetation to be suppressed; -Implement the Flora Monitoring Program; -Implement the Terrestrial Fauna Monitoring Program; -Carry out the supervision and environmental control of the suppression; -Prohibit the use of fire for vegetation suppression. 	-	A	It can be stated that by adopting mitigation measures, vegetation removal will be minimum, and any removal of natural vegetation will be adequately compensated with native trees, especially with the vegetation of the region, not interfering significantly with the local biota, since the area already suffers from a high degree of human intervention.

Table 28 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Dust generation due to earth movements and works in the site and for water intake and effluent discharge pipelines, routes and transmission line construction.	Removal of vegetation and alteration of associated habitats in the project area, including riverine habitat.	Dust generation due suppression of local vegetation	N	D	L/R	C	CP	P	I	II	M	M	M	-	Humidify the internal circulation routes and the work yard during the execution of services, when necessary; Cover the trucks transporting earth, rocks and all powdery material with tarpaulins; Perform small animals rescue, before suppression, in order to avoid or minimize the loss of populations occurrence such as arthropods and other animals with limited mobility; and Regenerate degraded areas and implement corridors in order to favor the displacement of fauna species.	-	A	The actions adopted by PARACEL preserve the areas of native vegetation, riparian permanent persevered areas and legal reserve of its own lands, in addition to the legal requirement, minimizes the impact.

Table 29 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Water intake and effluent emissary works.	Interventions in the riverbed and land areas near the river	Change in aquatic ecosystems	N	D	L	P	I	T	I	I	B	P	M	-	<ul style="list-style-type: none"> Plan the execution of earthmoving works and land preparation preferably outside of the rainy periods; Build a temporary structure for the containment of sediments; Supervise the works during the project period; Monitoring the quality of surface water in the construction phase 	-	A	Se it can be assumed that, through the implementation of mitigation measures, the water quality of the Paraguay River will not change significantly in relation to turbidity and suspended solids, therefore, that aquatic communities are not expected to be affected. In addition, it should be noted that this activity is temporary.

Table 30 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Vehicle movements.	Increasing vehicle traffic.	Higher risk of running over animals	N	D/I	L/R	P	I	T	I	S	B	P	M	-	<ul style="list-style-type: none"> Inform and make drivers aware of defensive driving, traffic legislation and local legislation through the Road Safety Program, in order to minimize the risk of accidents, including those involving wildlife. 	-	A	There will be no risk of animals being run over due to the movement of vehicles for the construction of the company, as the company's own employees and third parties will receive training on preventive defensive driving, traffic legislation and local legislation through the Road Safety Program.

Table 31 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Opening accesses and roads and workers pass increase	Hunting risk	Risk of harassment to flora and fauna by workers	N	D/I	L/R	P	MP	P	I	II	M	M	M	-	Intensify surveillance activities in partnership with local authorities and neighbors to avoid animals hunt. Perform environmental education program to give conscious to fauna and flora preservation.	-	A	It can be stated that the risk on local fauna will be minimized by the implementation of the proposed mitigation measures.

Table 32 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Pulp mill construction	Replacement of Habitat with pulp mill and its infrastructure	Impact to Natural and modified habitat	N/P	D/I	L	C	I	P	I	II/III	M	M	M	-	Implementation of the Restoration, Compensation and Management Program of Biodiversity in the Industrial Site, including revegetation, reforestation and restoration of natural habitat.	M	A	The industrial plant and associated civil structures of the PARACEL pulp mill will have a local impact on the vegetation, however, there will be no impact on the connectivity of the remaining environment because it is located in a strongly anthropized area, used for cattle rising and as a compensation measure there will be an increase in the native area of approximately 150% in relation to the current situation.

Table 33 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Mobilization of work.	Hiring of temporary workforce.	Generation of direct and indirect temporary jobs	P	D/I	L/R/E	C	I	T	R	III	A	G	-	A	<p>•Promote an information dissemination campaign for the hiring workforce for the construction phase through the Dissemination and Communication Program, giving priority to the hiring of local people through the Local Labor Development and Linkage Program.</p>	A	A	<p>It can be stated that PARACEL will generate jobs for the construction of the project and this impact can be enhanced by the insertion of other companies that provide services in the region, mitigating the effects of displacement migration and generating direct and indirect jobs in the region of Concepción.</p>

Table 34 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Mobilization of work.	Pressure on local infrastructure due to the increase in the population represented by the workforce in the construction phase.	Interference on infrastructure	N	D/I	L/R	C	MP	T	I	III	M	P	M	-	<ul style="list-style-type: none"> Disseminate the existing options of educational institutions in the municipality to workers who decide to migrate with their families, as well as to support, if possible, the competent educational bodies in the technical training of the population; Provide an outpatient and inpatient structure for own and external employees; Promote a zero accident practice that minimizes dependence on the region's health infrastructure; Implement and operate on the construction site the basic sanitation system composed of: water supply service, wastewater collection and treatment, and solid waste collection and treatment service; Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation Provide for improvements in the public service system, together with the responsible public agencies, to meet the additional demand of the population of the region through the Community and Stakeholder Relations Program; Implement the mechanisms for transporting workers between the municipalities involved and the construction site; Identify the effects generated by the definition of the design of the construction site and accesses, seeking to minimize the effects on the ADA population, with emphasis on vulnerable groups through the Social Management Program for ADA communities; Carry out a dissemination work with the subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in the Environmental Education Program with own employees and third parties; Address issues such as health, hygiene and safety in the Environmental Education Program with the community; Request public agencies to supervise safety, to inhibit illegal acts; Implement a Program for Social Monitoring 	-	A	There will be interference in the local infrastructure considering that there is already a deficit in public health, sanitation, transport and security services in the region. However, the implementation of PARACEL's mitigation measures and partnerships with the public authorities responsible under the Community and Stakeholder Relations Program and the Social Monitoring Program will make it possible to compensate for the additional demand generated by the increase in population in the region.

Table 36 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Implementation of the pulp mill, consisting of buildings, towers and chimneys	Change of landscape and land use.	Impact on morphology	N	D	L	C	I	P	I	III	B	P	P M	-	Implement the landscape project that favors the integration of the plant with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and the reuse of the land in gardens within the plant in accordance with the Landscape Rehabilitation Subprogram of the Environmental Management Program for Construction (PAC).	-	A	The implementation of the pulp mill will inevitably alter the landscape and local land use, which can be minimized by implementing the landscaping project.

Table 37 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Possibility of affecting cultural heritage sites.	Earthmoving activities.	Interference with cultural heritage	N	D	L	P	I	P	I	S	B	P	M	-	Take actions to ensure that the construction activities of the pulp mill do not affect or destroy the cultural property considered as protected heritage through the ADA's Program for the Safeguarding and Enhancement of Cultural Heritage.	-	A	It is possible to affirm that there will be no interference with the cultural heritage, taking into account that the area where the project will be implemented is significantly anthropized. Furthermore, all mitigation measures will be taken so that there is no possible interference with the cultural heritage in accordance with the law in force.

Table 38 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Demand for products and services by the company and the workforce employed.	Growth of activities producing goods and services.	Increasing tax collection and Boosting the local economy	P	D/I	L/R/E	C	I	P	I	II	A	G	-	A	Prioritize the acquisition of services and goods in the construction phase of the venture, preferably in Concepción and the region through the Promotion and Development of Local Suppliers Program.	A	A	The implementation of the pulp mill will generate an increase in tax collection at the municipal, departmental and national levels, which will be enhanced through the Promotion and Development of Local Suppliers Program. However, it is up to the government to reverse the taxes collected in improvements to the municipality and region.

Table 39 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Mobilization of workforce.	Demand for workforce.	Worker influx increase	N/P	D/I	L/R	P	MP	P	R	II/III	M	M	M	M	<ul style="list-style-type: none"> • Give priority to hire local people through the Local Labor Development and Linkage Program; • Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation, the provide camps for the workers; • Carry out a dissemination work with the subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations with own employees and third parties; • Carry out the social perception monitoring through the Social Monitoring Program in order to identify in time inconveniences in the fulfillment of the objectives established, and to allow taking corrective actions in a timely manner; • Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Contractor and Worker Awareness and Monitoring Program on compliance with regulations; • Provide in the contract with service providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contracted work is completed; in addition, monitor demobilizations of hotels, rental properties and lodging; • Promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of contracting for the mill's operational phase, through the Local Labor Development and Partnership Program, signing partnerships with associations and educational institutions. 	M	A	By giving priority to hire local people through the Local Labor Development and Linkage Program, accommodate properly the workers from outside Concepción, carry out the demobilization in accordance with the legal procedures of the contracting regime and promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, the negative impacts due to workers influx will decrease and by the end of the construction ate least the people will be better qualified.

Table 40 – Construction Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact														
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures
Socioeconomic	Mobilization of work.	Pressure on local infrastructure due to the increase in the population.	Impacts to community health and safety	N	D and I	and R	C	MT	T	I	III	M	S	M	-	Perform Relationship Plan with the Community and other Social Actors Plan; Perform Community Health and Safety Program.	H	The implementation of PARACEL's mitigation measures and partnerships with the public authorities responsible under the Community and Stakeholder Relations Program and the Social Monitoring Program will make it possible to compensate for the additional demand generated for health and safety by the increase in population in the region.
	Mobilization of work.	Pressure on local infrastructure due to the increase in the population.	Impacts to vulnerable groups	N	D and I	and R	C	MT	T	I	III	M	S	M	-	Carry out a dissemination work with the workers and subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., with own employees and third parties Perform Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations Support to the strengthening of community identity Perform Equal Opportunities and Non-Discrimination Program Perform Women's Empowerment Program	H	The implementation of PARACEL's mitigation measures will make it possible to minimize impacts to vulnerable people.

Table 41 – Impacts of the Deactivation Phase.

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Demobilization of temporary work	Termination of the company's construction work	Reduction in the number of jobs	N	D/I	L/R	C	I	P	I	II	M	P	M	-	<ul style="list-style-type: none"> Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Contractor and Worker Awareness and Monitoring Program on compliance with regulations; Provide in the contract with service providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contracted work is completed; in addition, monitor demobilizations of hotels, rental properties and lodging; Maintain the commitment to prioritize the hiring of local labor for the operational phase of the mill; Promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of contracting for the mill's operational phase, through the Local Labor Development and Partnership Program, signing partnerships with associations and educational institutions 	-	A	The reduction of the workforce after the completion of the works is inevitable, however, it will be minimized by the implementation of these mitigation measures.

Table 42 – Operation Phase Impacts.

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Operational activities for the manufacture of pulp.	Noise generation from the pulp mill.	Noise related disturbances	N	D	L	C	I	P	I	II	B	P	M	-	<ul style="list-style-type: none"> • Use machines and equipment with low noise level; • Wherever possible, soundproof the equipment by aiming for a low noise level; • Implementing the Noise Monitoring Program 	-	A	It can be affirmed that the operation of the mill will be imperceptible in terms of increasing the noise level, however, it does not rule out the possibility of complaints, since the perception of noise is subjective and can vary from person to person. However, disturbances to the community in relation to the noise generated by the company will be mitigated, as the measures will be implemented and monitored

Table 43 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Operation of the pulp mill.	Inappropriate generation and disposal of solid waste	Change in soil and/or surface water and groundwater quality	N	D/I	L	P	MP	P	I	I/III	M	P	M	-	<ul style="list-style-type: none"> Apply best practices in solid waste management, in accordance with applicable laws and regulations; Implement the Solid Waste Management Program (SWMP); To train operators for the correct disposal of the waste generated; Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of; Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity; Implement the Groundwater Quality Monitoring Program. 	-	A	It can be assumed that through the implementation of mitigation measures the quality of the soil and/or the groundwater will not be affected.

Table 44 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Use of chemical products	Inappropriate storage and handling causing chemical leaks or spills.	Change in air, soil and/or surface water and groundwater quality	N	D/I	L	P	MP	P	I	I/III	A	M	M	-	Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance plans and inspections; Train operators involved in the handling, storage and transport of chemical products; Implement and operate the system for collecting and handling spills and leaks.	-	A	It can be stated that with the implementation of mitigation measures there will be no change in the quality of air, soil and/or surface and ground water in the event of improper storage and handling causing chemical leaks or spills.

Table 45 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Water consumption during mill operation.	Availability of water from the Paraguay River.	Conflicting water usage	N/P	D	L	P	LP	P	I	II	B	P	M	-	<ul style="list-style-type: none"> • Monitor the Water Treatment Plant (WTP) to ensure the availability of water in accordance with the standards of potability for human consumption and for use in mill operations; • Follow the best water management practices, seeking continuous improvement of processes with the aim of minimizing water consumption. 	-	A	There will be no conflicting use of the Paraguay River, given that water intake for industry operations is estimated at 0.09% of the average river flow, and about 80% of this volume will return to the Paraguay River as effluent. In addition, PARACEL will follow best practices in water management, seeking to continuously improve processes in order to minimize water consumption.

Table 46 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Pulp mill operation.	Discharging of liquid effluents generated in the Paraguay River.	Change in river quality	N	D	L/R	P	MP	P	I	II/III	M	P	M	-	<ul style="list-style-type: none"> - Use the best available technologies (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load); - Implement an effluent treatment plant based on the best available practical technology (modern and safe), the activated sludge system and tertiary treatment; - To properly operate the effluent treatment plant so that the discharge of treated liquid effluents complies with current legislation; - Carry out a periodic inspection of the emissary system and its diffusers; - Carry out the Effluent Treatment Plant (ETP) Monitoring Program; - To carry out the Surface Water Quality Monitoring Program. 	-	A	It can be stated that, through the mitigation measures implemented, the water quality of the Paraguay River will not change significantly even under the minimum flow conditions of the river.

Table 47 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Operational activities for pulp production.	Generation of atmospheric emissions.	Change in air quality	N	D	L	C	I	P	I	I/III	M	P	M	-	<p>Follow best practices for air emissions management, as listed below:</p> <ul style="list-style-type: none"> - Use of low odor recovery boiler; - High dry solids content (minimum 80%) in the black liquor burned in the recovery boiler, which minimizes SOx emissions - Use of high efficiency electrostatic precipitators for the recovery boiler, biomass boiler and lime kilns; - Collection of concentrated non-condensable gases from the digester and evaporation, and their incineration in the recovery boiler or biomass boiler (protected flame incineration); - Extensive collection of diluted non-condensable gases from the digester, brown pulp line, evaporation, with treatment in the recovery boiler; - Treatment of gases from the solution tank in the recovery boiler itself; - Efficient cleaning of bleach plant relief gases; and - Real-time gas monitoring systems and control system, rapid identification and correction of operational disturbances. <p>To adopt a cleaner energy matrix in its production process, based on the use of renewable fuels, producing pulp with minimum carbon emissions; Implementing highly efficient emission control equipment, such as electrostatic precipitators; Install chimney with defined height in the atmospheric dispersion model; Implement an Atmospheric Emissions Monitoring Program; Monitor the sources of atmospheric emissions through on-line measurements; Implement an Air Quality Monitoring Program; Implementing the Complaints, Grievances and Concerns Management Program.</p>	-	A	<p>It can be said that the air quality in Concepción and the region studied will be in accordance with the air quality standards established by the legislation even after the operation of the mill, according to the study of atmospheric dispersion. In extraordinary situations (starts, stops and regime exits), not covered by the modeling, odor events may occur that will be punctual and without any risk to health, but that may generate a slight and temporary discomfort in some receptors. It should also be noted that the Program for the Management of Complaints, Claims and Concerns will be implemented. This will serve to monitor the resolution and closure of complaints.</p>

Table 48 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Physical	Operational activities for the pulp mill.	Generation of atmospheric emissions.	Fugitive emissions increase	N	D	L	P	I	P	I	I/III	M	M	M	-	Follow best practices for air emissions management, as listed below: - Burning of concentrated black liquor (> 80% dry solids); - Maintenance of higher temperatures and high content of dry solids in black liquor; - Control of the adequate rate of sulfur/sodium (S/Na) in the liquor; - Control of excess air, temperature and combustion air distribution; - Maintaining the load in the furnace at optimum operating levels; - Use of fuel oil with low sulfur content, whenever possible; - Optimized combustion; - SOx emissions will be minimal because eucalyptus wood has low sulfur content; - Implementing the Complaints, Grievances and Concerns Management Program.	-	A	It can be said that since PARACEL will adopt the Best Available Techniques in its processes, the fugitive emissions will be under control. In extraordinary situations (starts, stops and regime exits), odor events may occur that will be punctual and without any risk to health, but that may generate a slight and temporary discomfort in some receptors. So it should also be noted that the Program for the Management of Complaints, Claims and Concerns will be implemented. This will serve to monitor the resolution and closure of complaints.

Table 49 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Movement of vehicles.	Increasing vehicle traffic.	Higher risk of running over animals	N	D/I	L/R	P	CP	P	I	S	B	P	M	-	<ul style="list-style-type: none"> • Install signage plates on the main access routes to the plant area; • Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program. 	-	M	It can be stated that the risk of running over animals will be minimized by the implementation of the proposed mitigation measures.

Table 50 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Operation of the pulp mill.	Inappropriate generation and disposal of solid waste and spills.	Injury or death to fauna and flora due to improper waste disposal, including spills	N	D/I	L	P	MP	P	I	I/III	A	M	M	-	<ul style="list-style-type: none"> • Apply best practices in solid waste management, in accordance with applicable laws and regulations; • Implement the Solid Waste Management Program (SWMP); • To train operators for the correct disposal of the waste generated; • Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of; • Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity; • Implement the Groundwater Quality Monitoring Program. 	-	A	It can be assumed that through the implementation of mitigation measures the fauna and flora will not be affected.

Table 51 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Pulp mill operation.	Launching of liquid effluents generated in the waters of the Paraguay River.	Change in aquatic ecosystems	N	D/I	L	P	I	P	I	I	B	P	M	-	<ul style="list-style-type: none"> - Use the best available technology (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load); - Adequately operate the effluent treatment plant so that the discharge of treated liquid effluents is in accordance with current legislation; - Implement the Program for Monitoring Aquatic Communities on the Paraguay River. 	-	M	It can be stated that, since there will be no change in the quality of the Paraguay River due to the release of treated effluents from the PARACEL pulp mill, the aquatic communities are not expected to be affected.

Table 52 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Biotic	Pulp mill operation.	Replacement of Habitats with pulp mill.	Noise related disturbance on fauna	N	D	L/R	C	CP	P	I	II	M	M	M	-	- Acquire machines and equipment with low noise levels; - Acoustic enclosure for equipment with a high sound pressure level; - Install silencers, attenuators, sound energy absorbers, if necessary; - Perform a health and safety programs as a way to control and/or minimize the exposure of its employees and partners to industrial noise.	-	A	The actions adopted by PARACEL will minimize the impact.

Table 53 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact														
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures
Biotic	Accidental oil leakage or spill.	Change in the physical-chemical conditions of soil, water and/or air.	Impact of oil spills in river due to river transportation	N	D and I	and R	P	ST	P	I	II	M	H	M		Perform River transportation Management Program.	H	It can be said that, with the implementation of these mitigation measures, the risk of accidents will be minimal.

Table 54 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Manpower demand for the operation of the pulp mill.	Hiring of workforce for the operation of the pulp mill.	Generation of direct and indirect jobs	P	D/I	L/R/E	C	I	P	I	III	M	G	-	A	Promote a dissemination campaign to hire labor for the operation phase of the pulp mill through the Dissemination and Communication Program; Articulate with professional education organizations and institutions for the professional training of the local population through the Program for the Development and Linking of Local Labor.	A	A	Following the implementation of the enhancement measures, it can be assumed that PARACEL will promote the hiring of available labor in the municipality of Concepción and the region, as well as train the local population.

Table 55 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Pulp mill operation.	Risk of accidents in the mill.	Higher risk of accidents	N	D	L	P	CP	T	I	S	B	P	M	-	<ul style="list-style-type: none"> Follow the guidelines of the Risk Analysis Study, including: <ul style="list-style-type: none"> -Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance and monitoring plans; -Provide training to operators involved in the handling, storage and transportation of hazardous products; -Install firefighting and control systems In the event of an operational emergency, implement the Emergency Action Plan; Use the appropriate PPE (Personal Protective Equipment) on the pulp mill facilities; Implement the Program for Prevention and Management of Social, Environmental and Labor Contingencies. 	-	A	The risk analysis study concluded that no hazard was classified as Critical, and that most of the identified risks are classified as Negligible, Minor or Moderate, and accidents will be limited to the internal area of PARACEL's industrial plant, even though the planned prevention and mitigation measures must be implemented.

Table 56 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Demand for products and services.	Growth in the production of goods and services.	Increasing tax collection and Boosting the Economy	P	D/I	L/R/E	C	I	P	I	II	A	G	-	A	Encourage the purchase of services and products preferably in Concepción and the region through the Promotion and Development of Local Suppliers Program.	A	A	The company will generate an increase in tax revenue, in accordance with current tax law, which will be enhanced through the Promotion and Development Program for local suppliers.

Table 57 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Movement of vehicles.	Increasing vehicle traffic and Increasing running over animals.	Road transportati on increase	N	D/I	L/R	P	LP	P	I	S	M	M	M	-	<ul style="list-style-type: none"> • Consider river transportation for wood to prevent accidents and traffic on roads; • Install signage plates on the main access routes to the plant area; • Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program. 	-	A	It can be stated that the risk of personal accidents and running over animals on roads will be minimized by the implementation of road signs and drivers training about defensive driving, other than using river transportation for wood.

Table 58 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Pulp mill operation.	Risk of accidents and electromagnetic field.	Impacts from the Transmission line and substation	N/P	D/I	L/R	C	I	P	I	II/III	M	M	M	M	<p>Follow the guidelines of the Environmental Management Program for Construction (PAC) regarding noise, dust and erosion generation besides water resources sedimentation, impacts on fauna and flora due to transmission line and substation construction. Minimize impacts on land use and landscape by tracing the transmission lines on the path of existing roads. Improve economy by hiring local people for the construction. Perform workers training to prevent accidents, through Health and Safety Education Program. Minimize the impact of the electric and magnetic fields to be generated during the operation of the line, due to the release of the bondage strip of the line and implementation of the safety and service zone. Envisage flight diverters that will help migratory birds to have a visual image of vivid colors to avoid colliding with high voltage lines. Use safety systems and standards in the design of electrical constructions to ensure reasonable protection against accident risks that endanger the health of workers and third parties.</p>	M	M	<p>The Transmission line and substation implantation and operation will not cause any significant impact to the physical and to the biotic environments, neither to the communities because they will be placed on anthropized areas along existing road rights sides. The most relevant and permanent positive impact can be considered to occur in the global economy because of the increased supply of electricity that will be available to generate sustainable productive activities and new investments in the country's industrial development, which will ultimately result in greater well-being of the population and these benefits will already be permanent in nature.</p>

Table 59 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Maneuver, loading and unloading.	Risk of accidents.	Port operation	N	D	L	C	I	P	I	II	M	P	M	-	Perform good maneuver, loading and unloading procedure to prevent accidents due to river transportation. Require the best practices from the services providers. Perform an Emergency Manual in the Port.	-	A	It is difficult to foresee the intensity of these risks, but they can be efficiently minimized through the application of proceedings in port structures.

Table 60 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Port operation.	Risk of accidents.	River transportation increase	N/P	D	L	C	I	P	I	II	M	P	M	-	Priorate or balance wood from river transportation instead of road transportation.	-	A	There are more environmental benefits by using river transportation instead of road transportation and PARACEL should balance both ways.

Table 61 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Implementation of the pulp mill, consisting of buildings, towers and chimneys.	Change of landscape and land use.	Visual impact	N	D	L	C	I	P	I	III	B	P	P M	-	Implement the landscape project that favors the integration of the mill with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and reuse of the soil from earthworks in gardens within the industrial area in accordance with the Landscape Rehabilitation Program besides revegetation of riparian forests.	-	A	The implementation of the pulp mill will inevitably alter the landscape and local land use, which can be minimized by implementing the Landscape Rehabilitation Program.

Table 62 – Operation Phase Impacts. (cont.)

Component	Activity (Impact-Generating Factor)	Aspect	Impact	Characterization of the impact															
				Nature	Form of incidence	Spatial coverage area	Probability of occurrence	Moment/Time of occurrence	Time or length of time	Reversibility	Accumulation	Magnitude	Importance	Possibilities of mitigation	Possibilities of enhancement	Mitigation measures or enhancement	Degree of potentiation	Degree of resolution of measures	Forecast after implementation of measures
Socioeconomic	Pulp mill operation.	Affected elements from the mill and Communities consultation.	Increase communication with local Stakeholders	P	D/I	L/R/E	C	I	P	I	III	M	G	-	A	<ul style="list-style-type: none"> Perform Community and Stakeholder Relationship Program. Disseminate the project, informing the positive impacts that will be generated to the stakeholders through meetings and other means, in the Dissemination and Communication Program. Carry out a conscious dissemination with direct and subcontractor workers to orient them about: child and indigenous prostitution, drugs, sexually transmitted diseases, etc., in the Environmental Education Program. 	A	A	<p>By mapping the stakeholders, PARACEL can anticipate their needs, bring confidence and satisfaction regarding the implementation of the project, contributing to the good image and transparency of the company.</p> <p>It can be stated that the dissemination of the project to all stakeholders (community, employees, suppliers, government, customers, etc.) and the clarification of doubts that may arise about the project, through meetings and other means, will bring confidence and satisfaction regarding the implementation of the project, contributing to the good image and transparency of the company.</p>

10.2 Mitigation, Compensation and Enhancement

Based on the evaluation of impacts, measures are recommended to minimize, eliminate, compensate for negative impacts and, in the case of positive impacts, maximize them, always with measures to be implemented through environmental management programs.

The following are the proposed measures:

Design phase

- Disclose the project, informing the data about jobs that will be generated, as well as the strategy prioritization of hiring the local workforce, and data about capacity, technology to be used, the environmental control systems, information about the negative and positive impacts of the company, among others, such as future monitoring programs, which may require workforce, through meetings with the community and also through other parts, in the Dissemination and Communication Program;
- Implement the mill in a sustainable manner, reinforcing the company's commitment to the natural resources preservation and the reduction of environmental impacts through the Health, Safety, Environment and Social Management System Manual.

Construction phase

- Implement the Erosive Process Control and Monitoring Program, which aims to:
 - Plan the implementation of earthworks and land preparation works preferably outside the rainy season, to reduce the possibility of erosion effects due to the susceptibility of the soil;
 - Minimize the exposure time of areas without vegetation cover, during the construction phase;
 - Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, such as in gardens inside the plant;
 - Build temporary drainage and sedimentation boxes around the earthworks to retain solids, preventing sedimentation into the water body.
- Send to MADES a diagram of the place where the well is to be drilled, in which possible points of interference will be presented, such as: other wells installed, existence of springs, water courses, possible sources of contamination, etc., all within a radius of 500 m from the point of interest, as well as their relative distances to the future well;
- Carry out a hydrogeological study before the construction of the wells;
- Carry out Groundwater Quality Monitoring;
- Coat the well with pipes to prevent the entry of unwanted water and not allow the collapse of the soil layers;
- Properly close the wells to avoid any contamination to the groundwater, at the end of the works;

- If it is necessary to drill wells for housing, PARACEL will inform MADES beforehand and take the same actions to avoid any contamination to the groundwater, from drilling to closing the wells phases;
- Certify that the company hired to collect wastewater from the chemical toilet is duly licensed, and that the wastewater is disposed in an environmentally appropriate way;
- Implement and operate a sanitary wastewater treatment plant to treat the wastewater generated during the construction phase after the chemical toilets have been deactivated;
- Follow the guidelines of the Management Water and Effluent Management Program, which aims to:
 - Manage sanitary sewage during the construction phase;
 - Perform audits and inspections of the sanitary wastewater treatment system during the construction phase;
 - Comply with the sanitary sewage emission regulations determined by Resolution 222/02 standards.
- Follow the guidelines of the Vehicular Emissions and Dust Control Program, regarding minimize the generation of dust, such as:
 - Humidify the internal circulation routes and the work yard during the execution of services, when necessary;
 - Cover the trucks transporting earth, rocks and all powdery material with protective tarpaulins.
- Follow the guidelines of the Noise Monitoring Program, such as:
 - Carry out maintenance on machine, truck and vehicle engines;
 - Carry out activities in the area predominantly in the daytime period;
 - Carry out noise monitoring during the construction phase.
- Follow the guidelines of the Waste Management and Monitoring Program, among which they stand out:
 - Manage the solid waste generated in the construction phase of the PARACEL pulp mill with the best practices, in accordance with Law # 3,956/2009 and Decree # 7,391/ 2017 (Integral Management of Solid Waste in the Republic of Paraguay), among which are:
 - Minimize waste generation through the 3R principle (Reduce, Reuse, Recycle);
 - Segregation of solid waste according to color standard;
 - Collection, packaging, storage and transport of solid waste in accordance with current legislation;
 - Environmentally appropriate final destination (reuse, recycling, composting, energy use, etc.) and/or environmentally appropriate final disposal of solid waste generated in the company.
- Dispose the materials (excavation soil), if necessary, in duly authorized external areas.

- Implement a Temporary Solid Waste Storage Center that will be managed by a company specialized in this service.
- Implement a Debris and a Sanitary (organic) Landfill;
- Implement the Monitoring and Containment of Erosive Processes Subprogram of the Environmental Management Program for Construction - PAC, which aims to:
 - Plan the implementation of earthworks and land preparation works preferably outside the rainy season, in order to reduce the possibility of erosion phenomena due to the susceptibility of the land;
 - Minimize exposure time for areas without plant cover in the construction phase;
 - Store the top organic layer of the soil in a suitable place, for later reuse in a landscaping project, in gardens within the mill;
 - Build temporary drains and sedimentation boxes around the earthworks to retain solids, preventing sedimentation in the water body.
- Follow the guidelines of the Noise Monitoring Program, such as:
 - Carry out maintenance on machine, truck and vehicle engines;
 - Perform activities in the area predominantly in the daytime period;
 - Performing noise monitoring during the construction phase.
- Implementation of the quay in the river port with the least number of pillars possible;
- Supervise the environmental performance of the works during the project period;
- Monitor the quality of surface water in the construction phase;
- Follow the guidelines of the Vegetation Suppression Program on Industrial Site, which are:
 - Conduct picketing to mark the area to be removed;
 - Use a team experienced in this suppression activity;
 - Properly dispose of organic waste and vegetation from the suppression activity;
 - Store the organic layer on top of the soil in an appropriate place for later reuse in the landscape design of the industrial area;
 - Promote, as a compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal or greater than that occupied by the vegetation to be suppressed
 - Implement the Biodiversity Monitoring Program on the Industrial Site;
 - Carry out the supervision and environmental control of the suppression;
 - Prohibit the use of fire for vegetation suppression.
- Mark the area of implementation of the port on the Paraguay River to avoid accidents with boats;
- To inform local fishermen about the period and care during the works of the port through the Dissemination and Communication Program

- Signal the port implementation area on the Paraguay River to avoid boat accidents.
- Follow the guidelines of the Vegetation Suppression Program on Industrial Site, which are:
 - Picking to mark the area to be removed;
 - Use a team experienced in this suppression activity;
 - Properly dispose of organic waste and vegetation from the abatement activity;
 - Store the top organic layer of the soil in an appropriate place for later reuse in the landscape design of the industrial area;
 - Promote, as compensation, the replanting with native species of areas within the property today impacted by livestock activity, in an area equal to or greater than that occupied by the vegetation to be suppressed;
 - Implement the Biodiversity Monitoring Program on the Industrial Site;
 - Carry out the supervision and environmental control of the suppression;
 - Prohibit the use of fire for vegetation suppression.
- Humidify the internal circulation routes and the work yard during the execution of services, when necessary;
- Cover the trucks transporting earth, rocks and all powdery material with tarpaulins;
- Perform small animals rescue, before suppression, in order to avoid or minimize the loss of populations occurrence such as arthropods and other animals with limited mobility;
- Regenerate degraded areas and implement corridors in order to favor the displacement of fauna species;
- Plan the execution of earthmoving works and land preparation preferably outside of the rainy periods;
- Build a temporary structure for the containment of sediments;
- Supervise the works during the project period;
- Monitoring the quality of surface water in the construction phase;
- Inform and make drivers aware of defensive driving, traffic legislation and local legislation through the Road Safety Program, in order to minimize the risk of accidents, including those involving wildlife;
- Intensify surveillance activities in partnership with local authorities and neighbors to avoid animals hunt;
- Perform environmental education program to give conscious to fauna and flora preservation;
- Promote an information dissemination campaign for the hiring workforce for the construction phase through the Dissemination and Communication Program, giving priority to the hiring of local people through the Local Labor Development and Linkage Program;

- Disseminate the existing options of educational institutions in the municipality to workers who decide to migrate with their families, as well as to support, if possible, the competent educational bodies in the technical training of the population;
- Provide an outpatient and inpatient structure for own and external employees;
- Promote a zero accident practice that minimizes dependence on the region's health infrastructure;
- Implement and operate on the construction site the basic sanitation system composed of: water supply service, wastewater collection and treatment, and solid waste collection and treatment service;
- Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation
- Provide for improvements in the public service system, together with the responsible public agencies, to meet the additional demand of the population of the region through the Community Relationship and Social Investment Program;
- Implement the mechanisms for transporting workers between the municipalities involved and the construction site;
- Identify the effects generated by the definition of the design of the construction site and accesses, seeking to minimize the effects on the DAA population, with emphasis on vulnerable groups through the Social Management Program for DAA communities;
- Carry out a dissemination work with the subcontracted companies to orient the workers on: child prostitution, drugs, sexually transmitted diseases, etc., in the Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations with own employees and third parties;
- Address issues such as health, hygiene and safety in the Community Health and Safety Program;
- Request public agencies to supervise safety, to inhibit illegal acts;
- Implement a for Social Management Program;
- Install signage plates on the main internal access roads to the pulp mill's implementation area;
- Perform maintenance on the engines of machines, trucks and vehicles used by the company;
- Informing and raising awareness among vehicle drivers about defensive driving through the Road Safety Program;
- Implement the landscape project that favors the integration of the plant with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and the reuse of the land in gardens within the plant in accordance with the Landscape Recompositing Program;
- Take actions to ensure that the construction activities of the pulp mill do not affect or destroy the cultural property considered as protected heritage through the DAA's Program for The Protection and Valorization of Cultural Heritage;

- Prioritize the acquisition of services and goods in the construction phase of the venture, preferably in Concepción and the region through the Promotion and Development of Local Suppliers Program;
- Give preference to companies, service providers and trade in the region through the Promotion and Development of Local Suppliers Program;
- Give priority to hire local people through the Local Labor Development and Linkage Program;
- Accommodate workers coming from outside the region in accommodation, hotel network and rental housing already existing in the region with basic sanitation, the provide camps for the workers;
- Carry out the social perception monitoring through the Social Monitoring Program in order to identify in time inconveniences in the fulfillment of the objectives established, and to allow taking corrective actions in a timely manner;
- Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Contractor and Worker Awareness and Monitoring Program on compliance with regulations;
- Provide in the contract with service providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contracted work is completed; in addition, monitor demobilizations of hotels, rental properties and lodging;
- Promote the training and qualification of people in the region for the pulp production, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of contracting for the mill's operational phase, through the Local Labor Development and Partnership Program, signing partnerships with associations and educational institutions.

Works Deactivation Phase

- Carry out the demobilization in accordance with the legal procedures of the contracting regime through the Program for Awareness and Monitoring of Contractors and Workers on compliance with regulations;
- Provide in the contract with the providers, a commitment that all hired employees will be encouraged and supported to return to their places of origin, once the contract work is completed; in addition, the providers will monitor demobilizations of hotels, rental properties and lodging;
- Maintain the commitment to prioritize the hiring local workforce for the operational phase of the mill;
- Promote training and qualification of people in the region for the pulp production sector, equipment maintenance, mechanical, electrical and instrumentation sectors, encouraging the possibility of hiring local people for the operation phase of the mill, through the Program for Development and Partnership to Hire Local Workforce, signing partnerships with associations and educational institutions.

Operation phase

- Use machines and equipment with low noise level;
- Wherever possible, use acoustical isolation for equipment targeting a low noise level;
- Implement the Noise Monitoring Program;
- Apply best practices in solid waste management, in accordance with applicable laws and regulations;
- Implement the Solid Waste Management Program (SWMP);
- To train operators for the correct disposal of the waste generated;
- Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of;
- Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity;
- Implement the Groundwater Quality Monitoring Program;
- Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance plans and inspections;
- Train operators involved in the handling, storage and transport of chemical products;
- Implement and operate the system for collecting and handling spills and leaks;
- Monitor the Water Treatment Plant (WTP) to ensure the availability of water in accordance with the standards of potability for human consumption and for use in mill operations;
- Follow the best water management practices, seeking continuous improvement of processes with the aim of minimizing water consumption;
- Use the best available technologies (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load);
- Implement an effluent treatment plant based on the best available practical technology (modern and safe), the activated sludge system and tertiary treatment;
- To properly operate the effluent treatment plant so that the discharge of treated liquid effluents complies with current legislation;
- Carry out a periodic inspection of the emissary system and its diffusers;
- Carry out the Effluent Monitoring Program;
- To carry out the Surface Water Quality Monitoring Program;
- Follow best practices for air emissions management, as listed below:
 - Use of low odor recovery boiler;
 - High dry solids content (minimum 80%) in the black liquor burned in the recovery boiler, which minimizes SO_x emissions

- Use of high efficiency electrostatic precipitators for the recovery boiler, biomass boiler and lime kilns;
 - Collection of concentrated non-condensable gases from the digester and evaporation, and their incineration in the recovery boiler or biomass boiler (protected flame incineration);
 - Extensive collection of diluted non-condensable gases from the digester, brown pulp line, evaporation, with treatment in the recovery boiler;
 - Treatment of gases from the solution tank in the recovery boiler itself;
 - Efficient cleaning of bleach plant relief gases; and
 - Real-time gas monitoring systems and control system, rapid identification and correction of operational disturbances.
- Adopt a cleaner energy matrix in its production process, based on the use of renewable fuels, producing pulp with minimum carbon emissions;
 - Implementing highly efficient emission control equipment, such as electrostatic precipitators;
 - Install chimney with defined height in the atmospheric dispersion model;
 - Implement an Atmospheric Emissions Monitoring Program;
 - Monitor the sources of atmospheric emissions through on-line measurements;
 - Implement an Air Quality Monitoring Program;
 - Implementing the Complaints, Grievances and Concerns Management Program.
 - Follow best practices for air emissions management, as listed below:
 - Burning of concentrated black liquor (> 80% dry solids);
 - Maintenance of higher temperatures and high content of dry solids in black liquor;
 - Control of the adequate rate of sulfur/sodium (S/Na) in the liquor;
 - Control of excess air, temperature and combustion air distribution;
 - Maintaining the load in the furnace at optimum operating levels;
 - Use of fuel oil with low sulfur content, whenever possible;
 - Optimized combustion;
 - SO_x emissions will be minimal because eucalyptus wood has low sulfur content;
 - Implementing the Complaints, Grievances and Concerns Management Program;
 - Install signage plates on the main access routes to the plant area;
 - Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program;
 - Apply best practices in solid waste management, in accordance with applicable laws and regulations;
 - Implement the Solid Waste Management Program (SWMP);

- To train operators for the correct disposal of the waste generated;
- Implementing a system to protect soil and groundwater contamination (waterproofing) in all areas where industrial solid waste is handled, processed, treated, and disposed of;
- Implement and properly operate a sanitary (organic) landfill and an industrial landfill, as well as the composting system and the production process for correcting soil acidity;
- Implement the Groundwater Quality Monitoring Program;
- Use the best available technology (BAT) in the production process to minimize the generation of liquid effluents (flow and organic load);
- Adequately operate the effluent treatment plant so that the discharge of treated liquid effluents is in accordance with current legislation;
- Implement the Program for Monitoring Aquatic Communities on the Paraguay River;
- Acquire machines and equipment with low noise levels;
- Acoustic enclosure for equipment with a high sound pressure level;
- Install silencers, attenuators, sound energy absorbers, if necessary;
- Perform a health and safety programs as a way to control and/or minimize the exposure of its employees and partners to industrial noise;
- Maintain high forests and riparian forests.
- Maintain representative samples interconnected.
- Monitor the Cerrado biodiversity;
- Promote a dissemination campaign to hire labor for the operation phase of the pulp mill through the Dissemination and Communication Program;
- Articulate with professional education organizations and institutions for the professional training of the local population through the Program for the Development and Linking of Local Labor;
- Follow the guidelines of the Risk Analysis Study, including:
 - ✓ Implement containment and waterproofing systems in the areas surrounding the chemical tanks, in addition to implementing maintenance and monitoring plans;
 - ✓ Provide training to operators involved in the handling, storage and transportation of hazardous products;
 - ✓ Install firefighting and control systems
- In the event of an operational emergency, implement the Emergency Action Plan;
- Use the appropriate PPE (Personal Protective Equipment) on the pulp mill facilities;
- Implement the Program for Prevention and Management of Social, Environmental and Labor Contingencies;
- Give preference to companies, service providers and trade in the region through the Promotion and Development of Local Suppliers Program;

- Encourage the purchase of services and products preferably in Concepción and the region through the Promotion and Development of Local Suppliers Program;
- Consider river transportation for wood to prevent accidents and traffic on roads;
- Install signage plates on the main access routes to the plant area;
- Inform and raise awareness among vehicle drivers about defensive driving through the Road Safety Program;
- Follow the guidelines of the programs of the mill site regarding noise, dust and erosion generation besides water resources sedimentation, impacts on fauna and flora due to transmission line and substation construction;
- Minimize impacts on land use and landscape by tracing the transmission lines on the path of existing roads;
- Improve economy by hiring local people for the construction;
- Perform workers training to prevent accidents, through Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations;
- Minimize the impact of the electric and magnetic fields to be generated during the operation of the line, due to the release of the bondage strip of the line and implementation of the safety and service zone;
- Envisage flight diverters that will help migratory birds to have a visual image of vivid colors to avoid colliding with high voltage lines;
- Use safety systems and standards in the design of electrical installations to ensure reasonable protection against accident risks that endanger the health of workers and third parties;
- Perform good maneuver, loading and unloading procedure to prevent accidents due to river transportation;
- Require the best practices from the services providers;
- Perform an Emergency Manual in the Port;
- Priorate or balance wood from river transportation instead of road transportation;
- Implement the landscape project that favors the integration of the mill with the environment, reducing the effect of the contrast of the buildings and structures with the natural landscape, such as the implementation of tree curtains and reuse of the soil from earthworks in gardens within the industrial area in accordance with the Landscape Recomposition Program besides revegetation of riparian forests;
- Perform Community Relationship and Social Investment Program;
- Disseminate the project, informing the positive impacts that will be generated to the stakeholders through meetings and other means, in the Dissemination and Communication Program;
- Carry out a conscious dissemination with direct and subcontractor workers to orient them about: child and indigenous prostitution, drugs, sexually transmitted diseases, etc., in the Awareness and Follow-Up Program for Contractors and Workers Regarding Compliance with Regulations, Supplier Code of Conduct.

11 INTEGRATED ANALYSIS OF ENVIRONMENTAL IMPACTS (CUMMULATIVE IMPACT ANALYSIS)

The integrated analysis of the environmental impacts presented in this point was elaborated with the purpose of highlighting the most significant impacts, that is, those with high importance of negative or positive nature, with the direct and indirect occurrence in the physical, biotic and socioeconomic environments in a joint way, making not only a synthesis of environmental impacts, but identifying the interrelations among them by accumulation or synergy and the importance of these in the construction and operation phases of the company.

All impacts were evaluated according to the Accumulation and Synergy, as described below:

- Simple (S): is not characterized by bioaccumulation or biomagnification processes; does not accumulate in time or space; does not induce or enhance any other impact; does not interact in any way with other impact(s); and does not increase in past and present actions (European Commission, 2001);
- Type I (I) accumulation: accumulation by bioaccumulation;
- Type II (II) accumulation: accumulation by repetition or overlap, accumulating in time and/or space;
- Type III (III) accumulation: accumulation by interactivity or synergy.

Among the impacts identified, it should be noted that assertive measures should be applied in relation to the main synergies with the population, referring to: adequate disposal of solid waste and effluents, control of atmospheric emissions, interference in infrastructure, change in morphology (landscape), dynamism of the economy and generation of jobs.

It should be noted that as regards the impacts related to the generation of waste, PARACEL will carry out the management of waste with the best practices, in accordance with Law # 3956/2009 and Decree # 7. 391/ 2017 (Integral Management of Solid Waste in the Republic of Paraguay), among which the following stand out: Minimizing the generation of waste by using the 3R principle (Reduce, Reuse, Recycle); Segregation of solid waste, in accordance with the color standard; Collection, packaging, storage and transportation of solid waste, in accordance with current legislation; and Environmentally appropriate final destination (reuse, recycling, composting, energy use, etc.) and/or environmentally appropriate final disposal of solid waste generated in the company. Most of the waste generated will be treated within PARACEL's pulp mill, with the implementation of a debris landfill, a sanitary landfill (organic), and an industrial landfill, as well as the composting system and the process of corrective soil acidity production, significantly reducing the pressure on the local population's garbage collection system and preventing its accumulation over the public system.

With regard to the impacts resulting from water consumption, the studies confirm the availability of water from the Paraguay River, which has a minimum flow ($Q_{7.10}$) of 1,093 m³/s and an average flow of 2,179 m³/s. Water intake for industry operation is

estimated at 0.09% of the average river flow, and about 80% of this volume (effluent) will return to the Paraguay River.

The generation of liquid effluents (referring to flow and organic load) is minimized by adopting the Kraft pulp production process based on the best available technologies (BAT). In addition, effluents from the PARACEL pulp mill will be treated at the ETP, which will have the biological treatment system adopted for activated sludge. The activated sludge process is a proven technology commonly used in the pulp and paper industries worldwide. After the biological treatment, the effluents will undergo a tertiary treatment for the removal of phosphorus, color and COD, through a physicochemical process with the application of aluminum sulfate and polymer in flocculation tanks, and will then be directed to a dissolved air flotation (DAF) system. Or as an alternative to the physicochemical flotation system, the tertiary treatment can be carried out by injecting ozone into the effluent.

The minimization of effluent generation and adequate treatment based on the best available technologies reduce the accumulation of the PARACEL plant's impact with other companies in the region, as well as with the population's wastewater treatment.

The minimization, control and monitoring of air emissions will be based on the technologies already established and used with great success, which are listed below:

- Use of low odor recovery boiler;
- High dry solids content of at least 80% in the liquor burned in the recovery boiler, which minimizes SO_x emissions;
- Use of high efficiency electrostatic precipitators for the recovery boiler, biomass boiler and lime kilns;
- Collection of concentrated non-condensable gases from the digester and evaporation, and their incineration in the recovery boiler or biomass boiler (protected flame incineration);
- Extensive collection of diluted non-condensable gases from the digester, brown pulp line, evaporation, with treatment in the recovery boiler;
- Treatment of gases from the solution tank in the recovery boiler itself;
- Efficient cleaning of bleach plant relief gases; and
- Real-time gas monitoring systems and control system, rapid identification and correction of operational disturbances.

As mentioned, the Kraft pulp production process based on Best Available Techniques (BAT) will be adopted at the PARACEL pulp mill, allowing the reduction, control and monitoring of greenhouse gas emissions.

Minimization, control and monitoring of air emissions based on established technologies reduce the accumulation of the PARACEL plant's impact with other companies in the region.

As can be seen, the other impacts identified with greater synergy with the population are concentrated in the socioeconomic environment and especially in the construction phase for which mitigation measures were proposed, which are actions aimed at reducing or minimizing these impacts.

Within the framework of the social evaluation of the PARACEL pulp mill, located in Zapatero Cue, District of Concepción, Department of Concepción, Paraguay, the analysis of cumulative impacts was carried out and it was presented in a separate document called “Cumulative Impact Assessment (CIA)”, as established in IFC Good Practice Handbook “Cumulative Impacts Assessment and Management: Guidance for the Private Sector in Emerging Markets”. This standard (IFC, 2012) indicates that cumulative impacts are limited to those impacts that are generally considered important according to scientific criteria and based on the concerns expressed by affected communities.

This means that other existing constructions must be considered, projects planned or defined in the area of influence of the project, for which the projects identified in the characterization of the baseline of the social evaluation, where emphasis was given to the development projects promoted by the Government, are taken into account, and relevant (private) industrial projects in the area, identified either in the interview process or through the media and official government institutions such as the Ministry of Industry and Trade (MIC), the Ministry of Environment and Sustainable Development (MADES) and the Ministry of Public Works and Communications (MOPC).

Following the IFC Manual (IFC, 2015), it defines six (6) steps for a Rapid Cumulative Impact Assessment, as summarized below:

- Step 1 - Determination of valued environmental and social components (VECs), spatial and temporal boundaries.
- Step 2 - Evaluation of other activities
- Step 3: Establishing the current condition of the VECs
- Steps 4 and 5: Evaluation of cumulative impacts and significance on VEC
- Step 6: Management measures that are part of the Social and Environmental Management Plan of the venture

For the study we have considered the projects identified in the DIA of the enterprise that integrates four (4) Municipalities or Districts of Concepción, Belén, Loreto and Horqueta.

A time limit has been established for the start-up of the projects in the period 2020-2025 (5 years), where both the PARACEL pulp mill and the other ventures could be in operation.

In order to define the valued social-environmental components (VECs), the impacts on which assertive measures must be taken with respect to the main synergies with the population were taken, referring to: population expectations, interference in urban infrastructure, changes in morphology (landscape), adequate disposal of solid waste and effluents, control of atmospheric emissions, dynamization of the economy and generation of jobs.

Planned and ongoing initiatives have been identified in the project's DIA. These were also complemented with other projects known through official institutions of the National Government such as the MIC, MADES, MOPC, the DNCP or the

Municipality, and their websites. Other undertakings were mentioned by the communities in the framework of the interviews carried out. As follows:

PLANNED PROJECTS

- Project "Sanitary sewerage system and wastewater treatment plant for the city of Horqueta
- Project "Environmental adaptation of the sanitary sewage system of Concepción - ESSAP S.A."
- Project "Improvement of local roads in Concepción"
- Project "Improvement of the physical connectivity of the department of San Pedro - Punta Riel - Belén section"
- Project "Habilitation and maintenance of the Pozo Colorado - Concepción section".
- Improvement of the electrical system of Concepción (Section SE Horqueta - SE Concepción)
- Improvement of the dredging of the Paraguay - Paraná Waterway

PROJECTS IN OPERATION

- Projects "Drinking Water System and Complementary Activities of ESSAP in the City of Concepción" and "Improvement of the Potable Water System for Regional Development in the Republic of Paraguay - ESSAP S.A Ciudad de Concepción".
- Project "Frigorífico Concepción"
- Project "JBS - Belen"

Once the projects have been correlated, the strong synergy between industrial projects, i.e. PARACEL and the slaughterhouses in the DIA area, can be seen. This could occur because this type of enterprise, in the operational stage, has a strong positive impact on employment generation and on the development of the local, regional and extra-regional economy, and negative impacts due to the pressure on public/non-public services and infrastructure, associated with the people employed and induced by the projects in the DAI and the increase in truck traffic in the area of influence.

The minimization of cumulative impacts, from PARACEL, would be to strictly attend all the measures indicated in the Social and Environmental Management Plan; however, it could also require the articulation with other companies or with local, regional and/or national institutions for the due attention to the impacts on road infrastructure and public/non-public services, and to contribute to the development of local capacities, in order to avoid the migration of people/workers (unskilled, technicians and professionals) between companies and/or productive sectors.

12 CONCLUSION

In order to analyze the environmental feasibility to install PARACEL pulp mill in Concepción, Department of Concepción, an Environmental and Social Impact Assessment report (ESIA) was prepared. This study performed a systemic approach of the new mill, taking into account its main characteristics, as well as the physical, biotic and socioeconomic environment at its areas of influence. Later, in the analysis of the environmental impacts, the possible impacts, at the same environments, resulting from the implementation and operation of the industrial plant were pointed out, as well as their respective mitigation and enhancement measures.

The mill will have a total capacity of 1,500,000 tons per year of bleached pulp for paper. The pulp production will be through the kraft process, involving the areas of wood preparation, fiber line, drying and packing, chemical recovery (evaporation, recovery boiler, lime kilns/causticizing), chemical plant and utilities (biomass boiler, water treatment plant - WTP, boiler water treatment plant - BWTP and effluent treatment plant - ETP), in addition to raw water intake, effluent emissary pipeline, fuel system, laboratory and waste treatment plant, including debris, organic and industrial waste landfills, composting areas and soil acidity corrector production plant and the river port.

This pulp mill will also produce electricity through the burning of black liquor and biomass which are renewable sources of energy, with a total nominal capacity of 220 MW of cogeneration for the production of bleached pulp. The energy consumption of the bleached pulp plant will be about 120 MW. Therefore, there will be a surplus to export to the grid of 100 MW if the plant when manufacturing bleached pulp.

It should be noted that, with respect to the environmental control systems, the plant will adopt the Best Available Technologies (BAT) in order to reduce, control, and monitor the liquid effluents, air emissions, and solid waste generated, as well as apply the Best Practice Environmental Management (BPEM).

Throughout the environmental study, detailed studies were carried out for the physical, biotic, and socioeconomic environments, identifying the area's current sensitivities and environmental vulnerabilities.

An evaluation of the environmental impacts was made, based on the characterization of the project and the environmental diagnosis, considering the synergic and cumulative impacts, and the consultant responsible for the study found:

- In the design phase, there were found 3 impacts on the socio-economic environment, which 2 are positive and negative at the same time, and 1 is positive;
- In the construction phase, there were found 7 negative impacts on the physical environment, 5 negative impacts on the biotic environment and 8 impacts on the socio-economic environment, being 4 negative, 2 positive and 2 both positive and negative;
- In the phase of deactivation of works, 1 negative impact on the socioeconomic environment was identified;
- In the operation phase, there were found 7 impacts on the physical environment, being 6 negative and 1 both positive and negative, 6 negative impacts on the biotic environment and 1 positive/negative; and

10 impacts on the socioeconomic environment, being 3 negative, 4 positive and 3 positive and negative.

Most of the negative impacts identified are concentrated in the physical environment, mainly during the construction phase, for which mitigation measures have been proposed, which consist of actions aimed to reduce or minimize these impacts.

All negative impacts identified in the operation phase of the pulp mill are mitigable.

In addition to the mitigation measures, basic environmental programs were proposed to control and monitor the identified impacts in the four phases foreseen for the project (design, construction, deactivation of works and operation).

On the other hand, it was identified that the positive impacts are related to the socioeconomic environment and they are fundamentally related to the increase in direct and indirect employment, the increase in tax collection and the dynamism of the local economy, in the construction and operation phases of the pulp mill.

Thus, it should be noted that the positive impacts are extremely relevant in the social context for the municipalities of Concepción, Loreto, Belén and Horqueta, and they will be important milestones in the development of these cities. And according to the social perception study, it was possible to verify that for the community of Piquete Cue and houses located near the DAA, besides the existing micro-territories located on the access roads to the mill area, as well as in the municipalities of Loreto, Belén and Horqueta, the arrival of any company can provide development and better living conditions in its department, is considered a positive attitude.

Finally, according to the analyses carried out during this Environmental and Social Impact Assessment, it can be stated that no environmental impact identified, in the opinion of the team that developed this ESIA, would threaten the environmental feasibility of the company's implementation. And the identified environmental aspects of greater vulnerability are susceptible to mitigation, which requires that environmental control measures must be considered in the executive project and be implemented successfully.

For this reason, the PARACEL pulp mill and its associated infrastructure that will produce bleached pulp for paper can be implemented in the region studied, since it is a sustainable company and viable from the economic, social, environmental, technical and legal points of view, which will contribute to the social and economic growth of the region, the department of Concepción and Paraguay country as a whole.

ANNEX I
RECORD OF PUBLIC CONSULTATIONS AND STAKEHOLDER
ENGAGEMENTS

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
1.	July 3, 2019	Preliminary visits to authorities	Paracel	MADES technical team	In-person	Project presentation
2.	Oct 4, 2019	Preliminary visits to authorities	Paracel	Head of Police Department - Concepcion	In-person	Project presentation
3.	Nov 13, 2019	Preliminary visits to authorities	Paracel	Head of Concepcion Port	In-person	Project presentation
4.	Multiple site visits November 2019- March 2020	Field Visit to Indigenous Communities (Indigenous Report)	Paracel	Mbya Guaraní, Pai Tavyterá and Comunidad de Redención communities (Concepción, Cerro Apu'ua, Cerro Sarambi)	In-person	Multiple engagement events detailed in the Indigenous Report with these IP located near Concepcion. Each community was engaged with in separate meetings at least once.
5.	Dec 11, 2019	Preliminary visits to authorities	Paracel	Head of Municipality of Loreto	In-Person	Project presentation
6.	Dec 12, 2019	Preliminary visits to authorities	Paracel	Secretary General of Concepcion county	In-Person	Project presentation
7.	Dec 13, 2019	Preliminary visits to authorities	Paracel	Head of Communications – Municipality of Concepcion	In-Person	Project presentation
8.	Dec 13, 2019	Preliminary visits to authorities	Paracel	Secretary General Municipality of Horqueta	In-Person	Project presentation
9.	Dec 13, 2019	Preliminary visits to authorities	Paracel	Head of Municipality of Belen	In-Person	Project presentation
10.	Dec 16, 2019	Preliminary visits to authorities	Paracel	MOPC, technical team	In-Person	Project presentation
11.	Dec 16-18, 2019	Preliminary visits to local stakeholders	Paracel's social consultant	8 local stakeholders	In-Person	Each stakeholder was engaged with separately.

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
12.	Jan 13, 2020	Preliminary visits to local stakeholders	Paracel's social consultant	Head of Communications – Municipality of Concepcion	In-Person	
13.	Jan 14-15, 2020	Field Visit for Pöyry PEIS	Paracel's social consultant	Residents of Piquete Cue	In-person	Information collected from 13 households
14.	Jan 16, 2020	Field Visit for Pöyry PEIS	Paracel's social consultant	Residents of Belen	In-person	Information collected from 28 personal interviews
15.	Jan 17, 2020	Field Visit for Pöyry PEIS	Paracel's social consultant	Residents of Horqueta	In-person	Information collected from 30 personal interviews
16.	Jan 20, 2020	Field Visit for Pöyry PEIS	Paracel's social consultant	Residents of Loreto	In-person	Information collected from 30 personal interviews
17.	Jan 20-24 and 27-30, 2020	Field Visit for Pöyry PEIS	Paracel's social consultant	Residents of Concepcion city, Horqueta, C. San Ramon, C. San Luis, C. San Antonio, C. Primavera, Costa Pucu, Jhugua Gonzalez, Jhugua Zarzo, Co'ê Porã, Curuzu Ñu, Laguna Plato, Mbocayaty, Purity Mongelós, Colonia Cnel. Mongelós, Paso Itá, Colonia R.L. Petit, Saladillo.	In-person	Information collected from 44 group interviews. Each group was engaged with separately.
18.	Jan 21-27, 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Residents of Concepcion	In-person	Information collected from 62 personal interviews.
19.	Jan 22-24 and 29-30, 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Institutional representatives of Concepcion, Horqueta, Loreto and Belen	In-person	Information collected from 20 personal interviews.
20.	Jan 23, 2020	Workshop	Paracel	Local stakeholders (see folder 19.12.7)	In-person	Workshop with stakeholders
21.	Jan 25 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Institutional representatives of Colonia R.L.Petit	In-person	23 attendees

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
22.	Jan 25 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Institutional representatives of Costa Pucu	In-person	10 attendees
23.	Feb 6, 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Social and women organizations representatives of Belen	In-person	14 attendees
24.	Feb 8, 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Institutional representatives of Loreto	In-person	12 attendees
25.	Feb 8, 2020	Field Visit for Pöyry ESIA	Paracel's social consultant	Institutional representatives of Horqueta	In-person	9 attendees
26.	Feb 11, 2020	Preliminary visits to authorities	Paracel	ANDE technical team	In-Person	Project presentation
27.	Feb 12, 2020	Preliminary visits to authorities	Paracel	INDI	In-person	
28.	Feb 20, 2020	Preliminary visits to authorities	Paracel	Minister of Labor	In-Person	Project presentation
29.	Apr 14, 2020	Preliminary coordination meeting	Paracel	ANDE technical team	In-Person	
30.	May 4, 2020	Preliminary coordination meeting	Paracel	ANDE technical team	Zoom	
31.	June 22 – July 27, 2020	Information exchange weekly meeting prior ESIA submittal	Paracel	MADES technical team	Zoom	Pöyry ESIA presentation
32.	July 24, 2020	Field visit for plantations ESIA	Paracel's social consultant	Local health authorities	In-person	
33.	Aug 13, 2020	Preliminary visits to authorities	Paracel's social consultant	Head - Municipality of Sgto. J.F.Lopez (Puentesíño)	In-person	Project presentation
34.	Aug 17, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Loreto: Virgen del Camino, Huguá Po'i	In-person	Project presentation. Personal interviews

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
35.	Aug 18, 2020	Preliminary visits to authorities	Paracel's social consultant	Head – Municipality of Paso Barreto	In-person	Project presentation
36.	Aug 18, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Loreto: Hugua Po'i	In-person	Project presentation. Personal interviews
37.	Aug 19, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Loreto: Jhugua Guazú, Laguna Cristo Rey	In-person	Project presentation. Personal interviews
38.	Aug 19, 2020	Preliminary visits to authorities	Paracel	Director of SNPP - Concepcion	In-Person	Project presentation
39.	Aug 19, 2020	Preliminary visits to authorities	Paracel	Gov authorities - Concepcion	In-Person	Project presentation
40.	Aug 20, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Paso Barreto: Isla Hermosa Loreto: Laguna Cristo Rey	In-person	Project presentation. Personal interviews
41.	Aug 21, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Horqueta: Paso Mbutu	In-person	Project presentation. Personal interviews
42.	Aug 27, 2020	Coordination meeting	Paracel	Association of industrialists and merchants of Concepcion	Zoom	
43.	Aug 28, 2020	Visits to stakeholders	Paracel	UIP	Zoom	Project presentation
44.	Sep 8, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Sgto. J.F.Lopez (Puentesíño)	In-person	Project presentation. Personal interviews
45.	Sep 8-9, 2020	2-day Virtual Meeting	Paracel	Potential Suppliers	Zoom	Recording of meetings available on YouTube
46.	Sep 9, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Sgto. J.F.Lopez (Puentesíño)	In-person	Project presentation. 2 group meetings
47.	Sep 11, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Paso Barreto	In-person	Project presentation. Personal interviews

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
48.	Sep 12-14, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Loreto: Anderí, Hugua Po'i, Virgen del Camino Paso Barreto	In-person	Project presentation. Personal interviews
49.	Sep 15, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Horqueta: Paso Mbutu, Estibo de Plata	In-person	Project presentation. Group meeting
50.	Sep 16-17, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Arroyito – Horqueta: Calle 15 Loreto: Santísima Trinidad	In-person	Project presentation. Personal interviews
51.	Sep 17, 2020	Coordination meeting	Paracel	ANDE technical team	Zoom	
52.	Sep 18, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Paso Barreto	In-person	Project presentation. Group meeting
53.	Sep 19-21, 2020	Field visit for plantations ESIA	Paracel's social consultant	Several stakeholders in Paso Barreto: Colonia Jorge Sebastián Miranda Bella Vista: Ayala Cue Horqueta: Domínguez Nigó	In-person	Project presentation. Personal interviews
54.	Sep 22, 2020	Coordination meeting	Paracel	ANDE technical team	Zoom	
55.	Sep 25, 2020	Coordination meeting	Paracel	ANDE technical team	Zoom	
56.	Sep 30, 2020	Virtual Meeting	Paracel	Civil Organizations	Zoom	Recording of meeting available on Google Drive
57.	Sep 30, 2020	Virtual Meeting	Paracel	Unions	Zoom	Recording of meeting available on Google Drive
58.	Oct 1, 2020	Virtual Meeting	Paracel	Environmental NGOs	Zoom	Recording of meeting available on Google Drive
59.	Oct 1, 2020	Virtual Meeting	Paracel	Universities	Zoom	Recording of meeting available on Google Drive

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
60.	Oct 6, 2020	Virtual Meeting	Paracel	Media	Zoom	Recording of meeting available on Google Drive
61.	Oct 6, 2020	Virtual Meeting	Paracel	Government Authorities	Zoom	Recording of meeting available on Google Drive
62.	Oct 7, 2020	Open Virtual Meeting	Paracel	Nationwide Public	Zoom	Recordings available on YouTube
63.	Oct 8, 2020	Project presentation to local authorities	Paracel	Head of Environmet – Municipality of Horqueta	In-person	
64.	Oct 8, 2020	Project presentation to local authorities	Paracel	Head – Municipality of Arroyito	In-person	
65.	Oct 8, 2020	Project presentation to local authorities	Paracel	Secretary General - Municipality Sgto. J.F.Lopez (Puentesíño)	In-person	
66.	Oct 8, 2020	Project presentation to local authorities	Paracel	Secretary General - Municipality Belén	In-person	
67.	Oct 9, 2020	Project presentation to local authorities	Paracel	Risk Management Director - Municipality Concepción	In-person	
68.	Oct 9, 2020	Project presentation to local authorities	Paracel	Head – Municipality of Loreto	In-person	
69.	Oct 9, 2020	Project presentation to local authorities	Paracel	Secretary General - Municipality San Alfredo	In-person	
70.	Oct 9, 2020	Project presentation to local authorities	Paracel	Authorities – Municipality of Paso Barreto	In-person	
71.	Oct 20, 2020	Visits to stakeholders	Paracel	Parish Priest of Puentesíño	In-person	

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
72.	Oct 20, 2020	Mill site visit	Paracel	Potential suppliers	In-person	
73.	Oct 20, 2020	Project Presentation	Paracel	Residents of Arroyito	In-person	Recordings available on YouTube.
74.	Oct 20, 2020	Coordination meetings	Fundación Natán	INDI		
75.	Oct 21, 2020	Project Presentation	Paracel	Residents of Paso Barreto	In-person	Recordings available on YouTube.
76.	Oct 21, 2020	Project Presentation	Paracel	Residents of Loreto	In-person	Recordings available on YouTube.
77.	Oct 22, 2020	Project Presentation	Paracel	Residents of Belén	In-person	Recordings available on YouTube.
78.	Oct 22, 2020	Project Presentation	Paracel	Residents of Concepción City	In-person	Recordings available on YouTube.
79.	Oct 23, 2020	Project Presentation	Paracel	Residents of Horqueta	In-person	Recordings available on YouTube.
80.	Oct 27, 2020	Mill site visit	Paracel	Potencial suppliers	In-person	Recordings available on YouTube.
81.	Oct 27, 2020	Coordination meetings	Fundación Natán	INDI		
82.	Week of November 9, 2020	Field Visit to Concepción	ERM's Paraguay Consultant	Concepción (Laguna Plato, Callejón San Ramón, Universidad Nacional de Concepción, Asociación de Comerciantes de Concepción, Municipalidad de Concepción, Villa Redención, Calaberita, Sawhomayaha IP Community, as well as individuals).	In-person	Interview format. Minutes available.
83.	Nov 4, 2020	Field Visit to IP	Fundación Natán	Heads (Caciques) of Indigenous Communities	In-person	Report provides photographic evidence of engagement and signed consents.
84.	Nov 5, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Redencion	In-person	Report provides photographic evidence of engagement and signed consents.
85.	Nov 6, 2020	Coordination meetings	Fundación Natán	Local Gov. authorities		

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
86.	Nov 6, 2020	Coordination meetings	Fundación Natán	Local Stakeholders		
87.	Nov 10, 2020	Mill site visit	Paracel	Potential suppliers	In-person	
88.	Nov 10, 2020	Open Virtual Meeting	Paracel	Nationwide Public	Zoom	Recordings available on YouTube
89.	Nov 10, 2020	Visits to stakeholders	Paracel	Dean of the Faculty of Exact Sciences and their Technologies of the UNC	In-person	
90.	Nov 11, 2020	Visits to stakeholders	Paracel	Vice-dean of the Faculty of Agricultural Sciences of the UNC	In-person	
91.	Nov 11, 2020	Visits to stakeholders	Paracel	ACIC (Association of industrialists and merchants of Concepcion)	In-person	
92.	Nov 11, 2020	Coordination meetings	Fundación Natán	Local Gov. authorities		
93.	Nov 11, 2020	Coordination meetings	Fundación Natán	County Gov. authorities		
94.	Nov 11, 2020	Coordination meetings	Fundación Natán	Local stakeholders		
95.	Nov 12, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarita	In-person	Report provides photographic evidence of engagement and signed consents.
96.	Nov 24, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarendyju	In-person	Report provides photographic evidence of engagement and signed consents.
97.	Nov 24-25, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Vy'a Renda	In-person	Report provides photographic evidence of engagement and signed consents.
98.	Nov 24, 2020	Visits to stakeholders	Paracel	FEPAMA	Zoom	Project presentation
99.	Nov 26, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarita	In-person	Report provides photographic evidence of engagement and signed consents.

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
100.	Nov 27-28, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Redencion	In-person	Report provides photographic evidence of engagement and signed consents.
101.	Nov 27, 2020	Coordination meetings	Fundacion Natan	Local Gov. authorities		
102.	Week of Dec 7, 2020	Field Visit to IP in Plantation Areas	ERM's Paraguay Consultant	Two Mbya Guaraní communities and three Pai Tavyterá communities in Vy'a renda, Takuarendyju, Tacuarita and Cerro Akangue.	In-person	Interview format. Minutes available.
103.	Dec 8, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarendyju	In-person	Report provides photographic evidence of engagement and signed consents.
104.	Dec 8, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Vy'a Renda	In-person	Report provides photographic evidence of engagement and signed consents.
105.	Dec 9, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Jeguahaty	In-person	Report provides photographic evidence of engagement and signed consents.
106.	Dec 9, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Sati	In-person	Report provides photographic evidence of engagement and signed consents.
107.	Dec 9, 2020	Forestry site visit	Parcel	Potential Suppliers	In-person	
108.	Dec 10, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Cerro Akangue	In-person	Report provides photographic evidence of engagement and signed consents.
109.	Dec 10, 2020	Public Consultation	Parcel	Nationwide Public	Zoom and In-person	In-person and online event with over 100 attendees.
110.	Dec 10-11, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Redencion	In-person	Report provides photographic evidence of engagement and signed consents.

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
111.	Dec 12, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Mberyvo Jaguaraymi	In-person	Report provides photographic evidence of engagement and signed consents.
112.	Dec 12-13, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Apyka Jegua	In-person	Report provides photographic evidence of engagement and signed consents.
113.	Dec 13, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Sati	In-person	Report provides photographic evidence of engagement and signed consents.
114.	Dec 13, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Guyra ñe'engatu amba	In-person	Report provides photographic evidence of engagement and signed consents.
115.	Dec 14-15, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Yvyty rovi cerro po'i	In-person	Report provides photographic evidence of engagement and signed consents.
116.	Dec 15, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Apyka Jegua	In-person	Report provides photographic evidence of engagement and signed consents.
117.	Dec 15, 2020	Coordination meeting	Paracel	DINAC	Zoom	Project presentation
118.	Dec 16, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Sati	In-person	Report provides photographic evidence of engagement and signed consents.
119.	Dec 16, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Guyra ñe'engatu amba	In-person	Report provides photographic evidence of engagement and signed consents.
120.	Dec 17, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Vy'a Renda	In-person	Report provides photographic evidence of engagement and signed consents.
121.	Dec 17, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Jeguahaty	In-person	Report provides photographic evidence of engagement and signed consents.

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
122.	Dec 17, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Mberyvo Jaguaraymi	In-person	Report provides photographic evidence of engagement and signed consents.
123.	Dec 17, 2020	Forestry site visit	Paracel	BNF	In-person	
124.	Dec 17, 2020	Visits to authorities	Paracel	IPS	Zoom	Project presentation
125.	Dec 18, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Redencion	In-person	Report provides photographic evidence of engagement and signed consents.
126.	Dec 18, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarendyju	In-person	Report provides photographic evidence of engagement and signed consents.
127.	Dec 18, 2020	Field Visit to IP	Fundación Natán	Indigenous Community of Takuarita	In-person	Report provides photographic evidence of engagement and signed consents.
128.	Dec 21, 2020	Project follow-up monthly meeting	Paracel	Voluntary members of the committee	Zoom	First meeting
129.	Dec 22, 2020	Coordination weekly meeting	Paracel	MTESS	Zoom	
130.	Dec 30, 2020	Coordination weekly meeting	Paracel	MTESS	Zoom	
131.	Jan 5, 2021	Visits to authorities	Paracel	Traffic National Agency	Zoom	Project presentation
132.	Jan 7, 2021	Visits to stakeholders	Paracel	ACIC (Association of industrialists and merchants of Concepcion)	Virtual	
133.	Continuous	WhatsApp Channel	Paracel	Nationwide Public	WhatsApp	Over 110 community members are part of a dedicated WhatsApp channel to ask questions about the Project

No.	Date	Type of Engagement	Organizer	Stakeholders Engaged	Venue	Comments
	Continuous	Email	Paracel	Nationwide Public	N/A	Paracel receives CVs and inquiries from people interested in applying for a position, and keeps a log of emails and responses on an Excel spreadsheet that has been shared with ERM for review. To date, Paracel has received 369 emails to date (Jan 7).
	Continuous	Social Media	Paracel	Nationwide Public	N/A	Paracel has dedicated YouTube, Facebook, Twitter and Instagram accounts as part of their Communication and Disclosure Strategy
	Continuous	Media Appearances	Paracel	Nationwide Public	N/A	Paracel representatives have spoken on TV programs and on the radio. Articles about Paracel have also been printed.