PLANS AND PROGRAMS

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11 PLANS AND PROGRAMS

11.1 MANAGEMENT PLANS

11.1.1 Environmental Management Programs

In this section, the environmental management programs proposed for the abiotic, biotic and socioeconomic environment are shown. These plans are intended to prevent, mitigate, correct and / or compensate for the impacts identified through the environmental assessment, which are the product of the activities that will be developed in the construction and operational stages of the project.

11.1.1.1 Abiotic Medium

Below are the environmental management programs proposed for the abiotic medium. Table No. 11.1 and Table No. 11.2 show the equivalence of the programs authorized by the ANLA through Resolution 0032 of 2012 and those proposed here for the constructive and operative stage, respectively, which include the requests made by the Authority and the relevant adjustments because of the present study.

Table No. 11.1 Equivalence of the environmental management plans authorized by Resolution 0032 of 2012 and those proposed in this study for the construction stage

Code Plan Resolution 0032	Name of the plan and / or environmental management program (Resolution 0032)	Code Plan in the present study	Name of the proposed plan and / or environmental management program
SHEET MC-1	Environmental management of the camp installation	SHEET PMA-1	Environmental management of temporary and permanent infrastructure works (concrete, pavements, piloting, metal mechanic, among others).
SHEET MC-2	General environmental management of vehicles, machinery and equipment, including fuel and lubricants management.	SHEET PMA-2	Environmental management of vehicles, machinery, equipment, ships and naval devices.
SHEET MC-4	Environmental management of the filled and paved road activities	SHEET PMA-3	Environmental management of the stripping activities, landfills and paved road of the land

SHEET MC-7	Environmental management of storage activities and handling of construction materials	SHEET PMA-4	Environmental management of construction materials
SHEET MC-8	Environmental management of the construction activities of concrete, pavements and metal mechanics and electrical works	Note: Included in PMA-1 sheet	
SHEET MC-11	Environmental management of hazardous waste and non-hazardous solid waste on land PMA	SHEET PMA-5	Comprehensive management of hazardous and non-hazardous solid waste (On land, dock and boats)
SHEET MC-12	Environmental management of effluents on land	SHEET PMA-6	Environmental management of water resources
SHEET MC-13	General environmental management of motorboats, auxiliary vessels and naval artifacts	Note: Included in PMA-2 sheet	
SHEET MC-14	Environmental management of fuels and lubricants, aboard motorboats, auxiliary vessels or naval devices	SHEET PMA-7	Fact Sheet Environmental management of fuels, oils and lubricants (On land, dock and boats)
SHEET MC-15	Environmental management of hazardous waste and solid waste, on board motorboats, auxiliary vessels or naval devices	Note: Included in PMA-5 SHEET	
SHEET MC-16	Environmental management of the effluents generated on board motorboats, auxiliary vessels or naval devices	Note: Included in PMA-6 SHEET	
SHEET MC-17	Environmental management of the rehabilitation and improvement of the access road to the port area	Note: Included in PMA-3 SHEET	

SHEET MC-18	Environmental management of the construction and operation activities of the marginal service dock (construction and operation phase of the port project), on the north bank of the Nueva Colonia canal.	Note: Included in PMA-1 SHEET	
SHEET MC-19	Environmental management of the demolition activities of the administrative module, the jetty and the warehouse, existing in the land plot where the port project will be developed, with the management and final disposition of debris generated by this demolition	Note: Included in the program in section 11.4 Dismantling and abandonment plan	
SHEET MC-20	Environmental management of the piling work on barge, melting and installation of plans for dock and bridge and installation of the conveyor belt.	Note: Included in PMA-1 SHEET	
SHEET MC-21	Environmental management of the construction of the bridge over the León River and installation of the conveyor belt.	Note: Included in PMA-1 SHEET	

Source: Elaborated by Aqua&Terra Consultores Asociados S.A.S, 2015

Table No. 11.2 Equivalence of the environmental management plans authorized by Resolution0032 of 2012 and those proposed in the present study for the operational stage

Code Plan Resolution 0032	Name of the plan and / or environmental management program (Resolution 0032)	Code Plan in the present study	Name of the proposed plan and / or environmental management program
SHEET MO-1	Environmental management of solid bulk unloading activities	SHEET PMA-11	Environmental management of the loading and unloading activities of authorized cargo types.

SHEET MO-2	Environmental management of vessels, tugboats and auxiliary vessels	Note: Included in SHEET PMA-2	
SHEET MO-3	Environmental management of fuels and lubricants	Note: Included in SHEET PMA-7	
SHEET MO-4	Environmental management of maintenance dredging activities	Note: Included in SHEET PMA-9	
SHEET MO-5	Rainwater Environmental management	Note: Included in SHEET PMA-6	
SHEET MO-6	Environmental management of the water system for cleaning and bathroom	Note: Included in SHEET PMA-6	
SHEET MO-7	Environmental management of hazardous waste and non-hazardous solid waste	Note: Included in SHEET PMA-5	
SHEET MO-8	Environmental management of effluents on land	Note: Included in SHEET PMA-6	
SHEET MO-9	Environmental management of particulate, gas and noise emissions	Note: Included in SHEET PMA-11	

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

Additionally, three (3) environmental management programs were created that complement the programs proposed by the ANLA through Resolution 0032 of 2012, see Table No. 11.3.

Table No. 11.3 Environmental management plans added for the present study

Code Plan in the present study	Name of the proposed plan and / or environmental management program
SHEET PA-8	Environmental management for dredging deepening, maintenance and disposal of dredged material

SHEET PA-9	Operation for the control of atmospheric emissions and noise
SHEET PA-10	Handling of terrestrial signaling

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

- Factsheets of the Environmental Management Plan of the Abiotic Medium

Below are the environmental management sheets for the port project, applicable to the different stages for the management of the Abiotic Medium.

- *SHEET PMA-1. Environmental management of temporary and permanent infrastructure works (concrete, pavements, piloting, metal mechanical, among others).*

ENVIRONMENTAL MANAGEMENT PLAN	**PMA-1**
ENVIRONMENTAL MANAGEMENT OF TEMPORARY AND PERMANENT INFRASTRUCTURE WORKS (CONCRETE, PAVEMENT, PILOTAGE, METAL MECHANICAL, AMONG OTHERS).	
OBJECTIVES	1. Define the environmental measures to be implemented for the installation of the temporary infrastructure of the camp, storehouse, hold area and temporary collection places for materials. 2. Establish the requirements and procedures for the management of construction activities of civil, metal-mechanical and electrical works, meeting the established technical and environmental regulations. 3. Implement environmental measures and actions to minimize environmental impacts in the construction activities of the bridge and jetty over the León River, the viaduct and the dock in Bahía Colombia.
GOALS	Goal 1: Achieve a 100% of environmental management activities for the installation of temporary infrastructure Goal 2: Achieve 100% of the environmental management activities in the construction and operation of the permanent infrastructure (bridge and pier on the León River, the

	viaduct and the dock in Bahía Colombia).		
IMPACT	**ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT**	**ACTIVITY**	**ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED**
Alteration of the air quality through gases and particulate material	Moderate	Transport, manufacture and pile driving	Air
	Moderate	Concrete manufacturing for civil works	Air
	Moderate	Navigation of smaller vessels of support	Air
	Moderate	Construction and operation of temporary installations	Air
	Moderate	Construction of infrastructure and facilities associated with the terminal operation	Air
	Moderate	Activities for the placement of pavement (Road surfacing, granular sub-bases, granular and stabilized bases)	Air
Alteration of noise levels	Moderate	Transport, manufacture and pile driving	Air
	Moderate	Construction and operation of temporary installations	Air
	Moderate	Construction of infrastructure and facilities associated with the terminal operation	Air
	Moderate	Activities for the pavement placement (affirmed, granular sub-bases, granular and stabilized bases)	Air

Resuspension and redistribution of sediments (Continental and marine)	Moderate	Transport, fabrication and pile driving	Soil
Landscape Alteration	Severe	Transportation, fabrication and pile driving	Landscape
	Moderate	Armed and melted plates	Landscape
	Moderate	Anchor and construction of bridge and jetty	Landscape
	Moderate	Construction and operation of temporary installations	Landscape
	Moderate	Construction of infrastructure and facilities associated with the operation of the terminal	Landscape
Changes in the physicochemical and microbiological characteristics of seawater	Moderate	Construction - Transportation, fabrication and pile driving	Water

APPLICATION STAGE			
Previous Activities	**X**	**Operation**	**X**
Construction	**X**	**Closure**	

TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X		**X**	

ACTIONS TO BE DEVELOPED

1. Environmental management of the construction camp installation

The main recommendations aimed to minimize the environmental deterioration factors, during the installation, permanence and dismantling of the temporary infrastructure, are:

a) For the installation of temporary infrastructure, the contractor must take into account during the planning phase, the area required for its establishment, considering that every camp must have at least an area for offices, temporary storage centers, warehouse area for minor tools, area for the temporary storage of solid

waste and hazardous waste, dressing areas, sanitary services areas, machine yard and storage site for fuel.

b) Prior to the installation of the camp, there must have a photographic record of the site to intervene in order to serve as a baseline for the ecological restoration (compensation plan) of the area once it is dismantled.

c) The camp should be located as close as possible to the access road, in an already intervened area, where no work is planned. The conception of the project proposes the installation of portable units such as the use of offices and necessary facilities during the construction of the terminal.

d) In case the stripping is necessary, this will be done only in the area strictly necessary for the construction of the camp.

e) All the necessary elements and equipment must be available to comply with the Environmental Management, Industrial Safety and Occupational Health programs for liquid and solid waste, fuels and lubricants, construction materials, machinery and vehicles parking yard.

f) For the dismantling of the camp, the initial conditions of the site and the rules for the handling and disposal of debris, solid and liquid waste should be kept in mind

2. Environmental management of construction activities for civil, metal-mechanical and electrical works

a) Management measures prior to construction

- Verify that all personnel participating in the works are familiar with their activities and are aware of the aspects, impacts and risks that may arise during their execution, committing to comply with the procedures and work instructions and the Management Environmental Plan, carrying out their work in a safe and clean way.

- A meeting will be convened, prior to the commencement of the works, with the municipal, environmental, maritime and port authorities and other interested persons, with the purpose of providing project information and socializing the actions of control and operational coordination in the area. construction of the bridge and dock on the León river, the viaduct (three lanes of traffic, an independent pedestrian footbridge, two linear load corridors and conveyor belt) and the dock in Bahía Colombia, where interactions with river traffic can occur.

- Additionally, through the Harbor Authority of Turbo, it will be informed, by means of the promulgation of a memo and a notice to the navigators, Maritime and Port Community, the restrictions of the fluvial traffic in the area of bridge construction over the León River and the installation of the conveyor belt, derived from its execution.

b) Concrete works

- Concrete works must be carried out with cleanliness and order, avoiding the generation of spills or drips. Concrete mixers should be placed in a hardened area and bordered by a ditch that allow the collection of materials that fall accidentally and prevent their dispersion.

- The work area must be adapted, allocating spaces for the collection of rods, framing and concrete plant, having the appropriate containers and supports.

- Install work tables to facilitate the elaboration of the forms and the handling of the wood, the rods and wires for the structure.

- Have containers for waste management, both solid and water used in the washing of tools and equipment used for the application of concrete.

- Use the forms properly to ensure the confinement of the concrete and minimize the risk of contributions of this material to the river, the sea or the area of work on land.

- Handle and inject the concrete with saving and prevention criteria avoiding spills of material. In case of spillage of concrete mixture, it should be collected immediately and moved to the site intended for the disposal of debris. The area where the spill is present should be cleaned, in such a way that there is no evidence of the spill presented.

- There will be a concrete and prefabricated plant in situ for the assembly of concrete and prefabricated. When concrete mixing is required at the construction site, it must be done on a metallic platform or on a geotextile of a caliber that guarantees its isolation from the soil to avoid contamination and deterioration: it will be strictly forbidden to carry out the mixing directly on soil.

- The washing of concrete mixers on the construction site or in nearby bodies of water is prohibited. Notwithstanding the foregoing, washing can be done in the camp areas, if it has the structures and control systems necessary to perform this task (perimeter ditches and sedimentation pools), being necessary to capture the volumes of water needed, from the León River itself.

- Near the place where the concrete mix will be made, it must have the necessary elements to handle a spill, among these are shovels, buckets or containers, water, brooms, to attend the emergency immediately and not to alter the conditions of the area. In the event of a spill of this type of material, there must be a report of what happened and necessary corrective measures should be taken.

- Perimeter drainage works and culverts for rainwater management will be built on the access road from the village of Nueva Colonia to the port terminal for which environmental management measures are established on the PMA-6 sheet.

c) Pavements:

- When the sealing activities are carried out for the joints of rigid pavements, the irrigation of adhesives and when working with flexible pavements, the heating of the league will be done on a portable grill. The fuel used may not have direct contact with the ground and must comply with established environmental and industrial safety regulations.

d) Metal mechanical works:

- The work area should be adapted, allocating spaces for the collection of sheets, angles, beams, truss, rods and other irons to be used.

- Likewise, the areas for cutting and welding, turning, sand-blasting, with their barrier and protection systems must be adapted according to each process.

- In the areas where the sandblasting is carried out, work separation screens will be used to protect the rest of the workers. The material should be made of an opaque or robust translucent material. The lower part should be at least 50 cm from the ground to facilitate ventilation. It should be marked with the words: "danger - welding zone", to warn the rest of the workers.

- In the sand-blasting areas, screens will be installed in green cloth, with sufficient height to minimize the escape of particulate material.

e) Laying and installation of the control, communications and electricity systems:

In addition to the general measures, for the development of the making and installation of the control, communications and electricity systems, order and cleanliness is recommended by the personnel who will carry out the connections of the electrical, communications and control systems.

When the connections of the different systems of energy, communications and control are being made, all remaining cables, pieces of electrical tape and other waste should be collected. Likewise, the area where the wiring reels and the corridor where the wiring is laid should be indicated, keeping the area clean, since the dirt accumulates in these places.

3. Environmental management of the construction activities of the viaduct, dock, jetty and onshore terminal.

a) Demarcate and signalize in the area of work and operation from the marginal service dock:

- On land to prevent the entry of outsiders and the intervention of areas other than those projected.

- On the banks of the Nueva Colonia canal, upstream and downstream, to warn and prevent the captains of tugboats and boat masters, about the intervention of the riverbank and waters adjacent to the marginal service dock, during its construction and operation.

b) During the construction and operation of the marginal service dock:

- Ensure compliance of the procedures and instructions of the work and operation and with the PMA programs, from the performers of the constructive and operational activities.

- Establish and maintain operational monitoring, with topographic and bathymetric control, to avoid the loss of depth of the Nueva Colonia canal in the construction and operation site of the marginal service dock or reduction of its sill.

- Establish and maintain communications procedures, operational and response to the interactions of construction activities and operation, with river traffic, especially the tugboat with their train of barges and banana convoys, entering or leaving the port infrastructure

c) Piling driving

- The driving equipment must be on the ground if conditions permit It and when the work is carried out on the channel, it must be mounted on a platform or on the same driving piling

- Avoid the fall of lubricants from piling drivers, paints, solvents and other liquid compounds that may be harmful to the environment.

- The metallic piling will be handled with cranes and welded in aligned benches, leveled and with bases strong enough to avoid future unevenness during the construction process.

d) During construction:

- Comply with the procedures and instructions for the construction of the bridge and dock over the León River, the viaduct (three lanes of traffic, an independent pedestrian walkway, two linear load corridors and conveyor belt) and the dock in Bahía Colombia and with the WFP sheets, from these activities performers.

- Maintain an available vessel to prevent any smaller vessel without a VHF radio from entering the work zone, when interventions are being made in the riverbed of the León River.

- Establish and maintain operational monitoring, with HSE control in all construction activities.

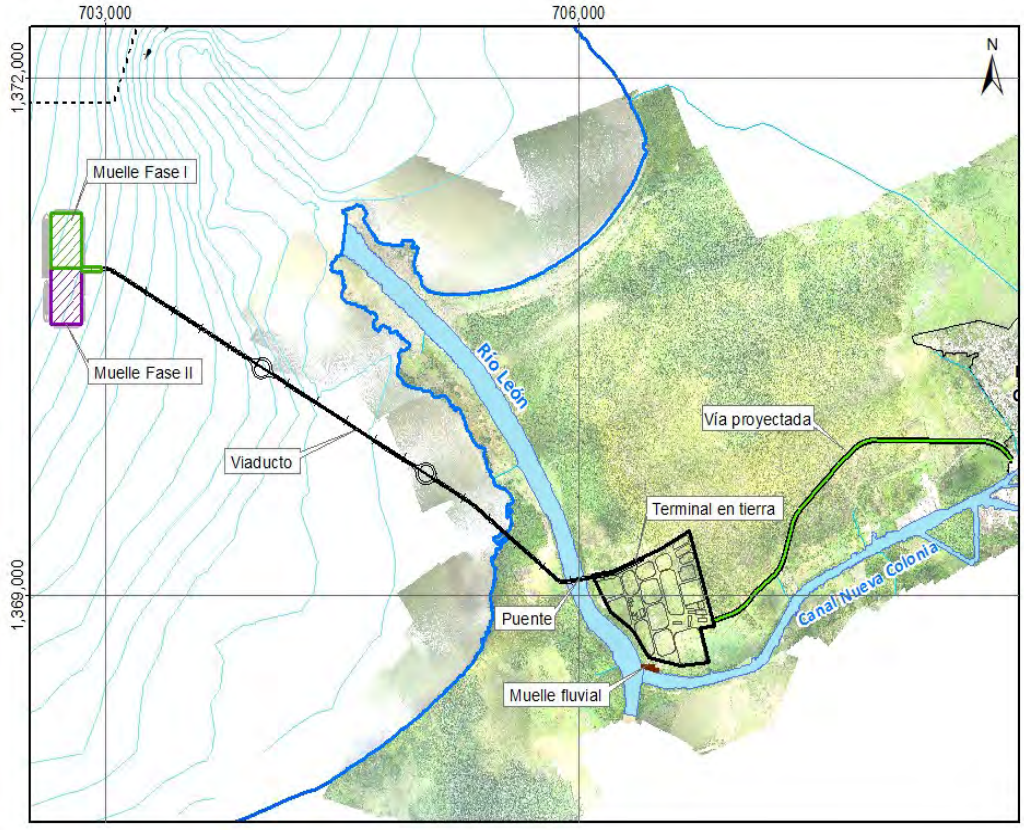
- In the event that an HSE incident occurs, the construction contractor will be responsible for responding to the emergency, activating its Emergency Response Plan and, if necessary, activating the Project Contingency Plan.

- Establish and maintain the Complaints and claims office, with the purpose of addressing any doubt, complaint or claim that may arise from the community in general, taking the actions that lead to place.

The following figure shows the location of the permanent infrastructure works, which apply for this environmental program: the onshore terminal, the bridge, the phase 1 dock, phase 2 dock, fluvial dock, the viaduct and access road between the Nueva Colonia district and the port terminal.

Figure No. 11.1 Location of permanent infrastructure works

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S., 2015



ESTIMATED SCHEDULE

This program will be activated from the previous activities and will be in force during the construction and operation phase of the port terminal.

PLACE OF APPLICATION

The onshore terminal, the bridge, the phase 1dock, phase 2 dock, fluvial dock, the viaduct and access road between the Nueva Colonia Village and the port terminal.

RESPONSIBLE FOR THE EXECUTION

Contractor personnel in charge of executing this activity.

REQUIRED STAFF

- Work engineer Resident
- Environmental Resident
- Social Resident
- Industrial safety and occupational health Resident
- Work Auxiliaries

FOLLOW UP AND MONITORING INDICATORS				
GOAL	**VALUE**	**INDICATOR**	**RESPONSIBLE**	**TYPE DE REGISTRATION**
Goal 1	100%	*(Environmental management activities executed for temporary infrastructure)* / *x 100 (Environmental management activities scheduled for temporary infrastructure)*	Contractor personnel responsible for executing this activity	Field format (Annex 11.1.1.1)
Goal 2	100%	*(Environmental management activities executed for permanent infrastructure)* / *x 100 (Environmental management activities scheduled for permanent infrastructure)*	Contractor personnel responsible for executing this activity	Field format (Annex 11.1.1.1)
ESTIMATED COSTS				
The associated costs will be part of the operational costs of the work.				

- • PMA-2 sheet. Environmental management of vehicles, machinery, equipment, ships and naval devices.

ENVIRONMENTAL MANAGEMENT PLAN	**PMA-2**
ENVIRONMENTAL MANAGEMENT OF VEHICLES, MACHINERY, EQUIPMENT, SHIPS AND NAVAL ARTIFACTS	
OBJECTIVES	1. Establish the requirements and procedures for the management of

GOALS	vehicles, machinery and construction equipment that lend their services to the project, complying with environmental, port and transport regulations. 2. Establish measures for the surveillance and control of motorboats, auxiliary vessels and naval artifacts that provide services to the project, complying with environmental, maritime and port regulations. 3. Establish the requirements and procedures for the environmental management of the user vessels, the tugboats, naval devices and auxiliary vessels at the service of the Solid Bulk Port Terminal of Bahía Colombia, complying with the environmental, maritime and port regulations. Goal 1: Perform preventive maintenance - routine to all machinery, equipment and vehicles (every 200 hours approximately according to hour meter) operating in the port terminal. Goal 2: Comply with 100% of the environmental measures established to minimize environmental impacts in the operation of machinery vehicles and equipment. Goal 3: Comply with 100% of the environmental measures established to minimize the environmental impacts on the operation of the user vessels, the tugboats, naval devices and auxiliary vessels that provide service to the terminal.		
IMPACT	**ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT**	**ACTIVITY**	**ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED**
Changes in the physicochemical and microbiological characteristics of continental water	Moderate	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal	Water
Alteration of air quality because of gases and particulate material	Moderate	Navigation of smaller support vessels	Air
	Moderate	Navigation, anchoring and approach route of boats and tugboats	Air
Alteration of noise levels	Moderate	Navigation, anchoring and approach route of boats and tugboats	Air

APPLICATION STAGE			
Previous Activities		Operation	X
Construction	X	Closure	

TYPE OF MEASURE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X		X	

ENVIRONMENTAL MANAGEMENT PLAN	PMA-2

ENVIRONMENTAL MANAGEMENT OF VEHICLES, MACHINERY, EQUIPMENT, SHIPS AND NAVAL ARTIFACTS

ACTIONS TO BE DEVELOPED

1. General environmental management of vehicles, machinery and equipment.

a) Vehicle documents and general condition:

- The project will only hire vehicles that have updated the Mechanical Technical Review Certificates and the Mandatory Traffic Accident Insurance, SOAT.

- Prior to the start of a maneuver or operation, the Environmental and Industrial Safety and Occupational Health Residents will verify the maintenance and conservation status of the vehicles, the machinery and equipment destined to attend the construction activities, ordering, if necessary, his retirement from the work area, when finding a novelty that cannot have a solution on the site.

b) Control and security measures for the operation of machinery, equipment and construction vehicles

- Vehicles and machinery will be equipped with optical and auditory signals (whistle) of reverse.

- The vehicles that transport material will have incorporated in their body the containers with appropriate liner, so that the load deposited in them is contained in its entirety in such a way as to avoid spillage, partial loss of material and runoff during transport; To avoid material dispersion or furtive emissions, it will be necessary to cover it with a resistant material that will be attached to the outer walls of the container complying with all the requirements of resolution 541 of 1994 from the Ministry of Environment and Sustainable Development.

- The vehicles and machinery used in the project will have the necessary devices to filter and

prevent the emission of harmful substances into the atmosphere such as: hydrocarbons, nitrogen oxides, particles, carbon monoxide and those that the Ministry of Environment and Sustainable Development have included in Decree 948 of 1995 and Resolution 601 of 2006.

- The vehicles that operate for the work must comply with the current traffic regulations

- The noise must be controlled by means of a preventive program for vehicles, dump trucks and machinery (such as mufflers and gas boxes in good condition and well-synchronized engines). In addition, when work is carried out at night, no equipment that produces noise outside the permitted sound levels for the area can be used.

- When working near power lines, minimum distances must be ensured

c) Driver training:

- Every driver or operator of vehicles, machinery and equipment, who enters the Project for the first time, must receive the training workshops and daily attend the 5-minute talks prior to the development of his activities, in compliance with the training program of the personnel.

- Constantly verify the competences of the drivers and operators of the vehicles, machinery and equipment, upon their entry, checking that they have the current Driving License or the Suitability Certificates, depending on the case.

d) Fuels and lubricants:

For this item, the environmental program PMA-7 must be fulfilled. Here are some general guidelines:

- The supply of fuel or lubricant in the work area will not be authorized: vehicles must fill their fuel tank and / or change oil at a service station near the Project.

- In case a vehicle, machinery or equipment needs to be supplied with fuel or lubricant, it must be removed from the work station and taken to the place intended to carry out this operation, developing the actions of taking fuel or lubricant recommended by the dealer or equipment supplier.

- The maintenance of heavy machinery will be carried out in specialized workshops just outside the terminal and only minor maintenance can be carried out in the workshop located in the terminal on the ground.

- If a vehicle, machine or equipment breakdown occurs during its operation at the worksite, where there is a fuel or lubricant incident of the vehicle, machine or equipment, the responsible Driver or Operator must follow the procedures established in the Risk Management Plan for this type of incident.

- The lubricant used, or its respective containers must be properly stored in tanks and stores provided for that purpose.

- Likewise, the contractor that supplies the vehicle, machinery or equipment will be responsible for carrying out this operation safely and cleanly. In case of spills, the Risk Management Plan will be implemented, making sure to leave the place clean and to give the contaminated material an adequate final disposition.

- In general, all measures should be taken to avoid fuel leaks and for no reason should there be a discharge to the León River.

2. General environmental management of motorboats, auxiliary vessels and naval artifacts
a) It will be verified that all the crews of the motor ships, auxiliary vessels or naval artifacts that render their services to the Project have their Navigation License and other documents up to date.

b) Likewise, motor ships, auxiliary vessels or naval artifacts must have the Certificates and Navigation Patent up-to-date and established, implemented and maintained on board the Safety Management Systems of the Operation of the Vessel and the Prevention of Pollution NGS and the Code for the Protection of Ships and Port Facilities PBIP.

c) Upon their enrollment to the crews of the motor ships, auxiliary vessels or naval artifacts at the service of the Project, personnel should be given training workshops and receive, daily, 5-minute talks, prior to the development of their activities, fulfilling the personnel training program.

d) The motor ships captains, patrons of the auxiliary vessels and foremen of the naval artifacts will be responsible for the fulfillment of the Technical Operating Regulations and the Environmental Management Plan on the part of their crews, keeping up to date the Emergency Identity Card onboard, as well as having implemented and maintained the Emergency Medical Plans, the Shipboard Marine Pollution Emergency Plans (Shipboard Marine Pollution Emergency Plans), and the Emergency Response Plan. Emergencies of the Project in what corresponds to them.

e) In case of an incident on board, they must execute their Emergency Card on board, notifying the Resident Engineer and the Environmental Inspector, Industrial Safety and Occupational Health, and, if the emergency exceeds the response capacity, the Emergency Response Plan of the Project will be activated, through the established notification processes.

f) Periodical reviews will be done by the Environmental, Industrial Safety and Occupational Health Inspector, to verify the documentation of both crews, as well as the units and their state of conservation, maintenance and operability.

g) If the motorboat, auxiliary vessel or naval device requires the discharge of oily waters or a logistic supply, it must be coordinated with the Operations Supervisor and comply with the respective Control Records, under the supervision of the Environmental Inspector, Industrial Safety and Occupational Health.

3. Operation phase - Environmental management of vessel, tugboats and auxiliary vessels
Every user vessel, tugboat, naval device or auxiliary vessel serving the Port Terminal, upon arrival must have up to date international or national statutory certificates, required by the DIMAR through the Harbor Authority of Turbo. (Resolution 0233 - DIMAR-DIGEN of August 24, 2004).
Likewise, they must have established, implemented and maintained the Codes: Management of

Operational Safety of the Ship and the Prevention of NGS Pollution and Protection of Ships and Port Facilities PBIP.
a) User vessels:
As it will be consigned in the Port Operations Technical Regulation of the Port Terminal, the terminal will not offer the reception services of bilge water, ballast water, waste oil and water supply. However, in exceptional cases, at the request of the Harbor Authority of Turbo or by an emergency condition, these services may be provided through a duly authorized Port Operator, with the licenses up to date of: Commercial Operation for Service Companies Maritime granted by DIMAR and Port Operator granted by the Ministry of Transportation, which has the technical and operational means to provide these services.
b) Tugboats, naval artifacts or auxiliary vessels at the service of the port terminal:

Hazardous waste and non-hazardous solid waste:
The provisions of the environmental program PMA-5 will be applied, with the following particularities derived from the operation of motorboats, auxiliary vessels or naval artifacts, which render their services to the Project.

Storage of solid waste:
The crews of the motor ships, auxiliary vessels or naval artifacts will temporarily store the solids generated on board in suitable containers and spaces; with a daily frequency, these will be transferred to land in the boarding zone area, until the temporary storage site.

Destination:

- Periodically the solid waste will be transferred by an authorized Port Operator, to the nearest solid waste disposal site and that has current authorization by the competent authority, complying with the provisions of Decrees 838 of 2005, 2676 of 2000 and 1609 of 2002

- The used oils will be removed from the tugboats, naval devices and auxiliary vessels at the service of the terminal, to be deposited in a slop tank, aboard a motor ship or naval artifact prepared for it.

- Likewise, unoccupied vessels, filters and other contaminated elements must be unloaded from tugboats, naval devices and auxiliary vessels serving the Port Terminal, and transported for temporary storage in a motorboat or naval craft, arranged and conditioned for that purpose.

- Once the storage capacity of these residues has been reached, they will be removed for their treatment and final disposal, by a specialized port operator, who must treat and dispose them in accordance with current regulations.

- The port operator that is going to carry out the operation of handling these oily waste and contaminated material, must submit to the Chief of Environment, Industrial Safety and Occupational Health of the project, the respective permits endorsed by the environmental authority.

Effluents:

A strict compliance will be given to the handling and disposition of liquid waste, by all the tugboats, naval devices and auxiliary vessels at the service of the terminal in accordance with the

PMA-6 environmental management sheet.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-2
ENVIRONMENTAL MANAGEMENT OF VEHICLES, MACHINERY, EQUIPMENT, SHIPS AND NAVAL ARTIFACTS	
ESTIMATED SCHEDULE	
This environmental program comes into force with the arrival to the machines project area, equipment, vehicles, motorboats, auxiliary vessels or naval artifacts, at the service of the Project.	
PLACE OF APPLICATION	
Sites where the different activities required for the construction and operation of the port terminal are developed. Motorboats, auxiliary vessels and naval artifacts, at the service of the Project.	

ENVIRONMENTAL MANAGEMENT PLAN	PMA-2
ENVIRONMENTAL MANAGEMENT OF VEHICLES, MACHINERY, EQUIPMENT, SHIPS AND NAVAL ARTIFACTS	
RESPONSIBLE FOR THE EXECUTION	
Contractor personnel in charge of executing this activity	
REQUIRED STAFF	

- Resident engineer of work

- Environmental Resident

- Industrial safety and occupational health Resident

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100%	*(Maintenance no. Made to machinery, equipment and vehicles)* / *(Maintenance number programmed to machinery, equipment and vehicles)* X 100	Contractor personnel responsible for executing this activity	Field format (Annex 11.1.1.1)
Goal 2	100%	*(No. of environmental measures executed for the operation of machinery and equipment vehicles)* / *100 (No. of environmental measures programmed for the operation of machinery and equipment vehicles)* x		Field format (Annex 11.1.1.1)
Goal 3	100%	*(No. of environmental measures executed for the operation of user vessels, tugboats, naval aids and auxiliary vessels)* / *X 100 (No. of environmental measures programmed for the operation of vessels, tugboats, artefacts naval and auxiliary vessels)*		Field format (Annex 11.1.1.1)

ESTIMATED COSTS

The associated costs will be part of the operational costs of the work.

- *• PMA-3 sheet. Environmental management of landfill and land compaction activities.*

ENVIRONMENTAL MANAGEMENT PLAN	PMA-3
ENVIRONMENTAL MANAGEMENT OF FILLING AND AFFIRMED ACTIVITIES	
OBJETIVES	1. Implement environmental management measures for the interventions to be carried out on the access road for its rehabilitation and improvement and for the internal roads in the port terminal. 2. To establish the requirements and procedures for the environmental management of the filled and compaction activities, complying with the established technical and environmental norms.
GOALS	Goal 1: Comply 100% with the moisten of the internal roads and the road that connects the port terminal with the Nueva Colonia District Goal 2: 100% compliance with the environmental management measures of the intervention and rehabilitation on the access road to the project lot.

IMPACT	ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT	ACTIVITY	ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED
Alteration of the landscape	Moderate	Dismantling, cleaning, stripping and ground filling (construction viaduct, dock and jetty)	Landscape
Alteration of air quality by gases and particulate material	Moderate	Dismantling, cleaning, stripping and ground filling (Terminal Construction on land)	Air
	Moderate	Disassembly, cleaning, stripping and ground filling (Road Construction)	Air
	Moderate	Landfills (Road Construction)	Air
	Moderate	Activities for the placement of the pavement (affirmed, granular sub-bases, granular and stabilized bases)	Air
Alteration of noise levels	Severe	Disassembly, cleaning, stripping and land fill (Terminal Construction on land)	Air

	Moderate	Disassembly, cleaning, stripping and land fill (Road Construction)	Air
	Moderate	Landfills (Road Construction)	Air
	Moderate	Moderate Activities for the placement of the pavement (affirmed, granular sub-bases, granular and stabilized bases)	Air
Alteration of the organic or agrological soil	Moderate	Disassembly, cleaning, stripping and land fill (Terminal Construction on land)	Soil
	Moderate	Disassembly, cleaning, stripping and land fill (Road Construction)	Soil
Alteration in continental morphology	Moderate	Disassembly, cleaning, stripping and land fill (Terminal Construction on land)	Soil
	Moderate	Landfills (Road Construction)	Soil
Alteration of the landscape	Moderate	Disassembly, cleaning, stripping and land fill (Construction viaduct, Dock and jetty)	Landscape
	Severe	Disassembly, cleaning, stripping and land fill (Construction viaduct, Dock and Jetty)	Landscape
	Moderate	Disassembly, cleaning, stripping and land fill (Terminal Construction on land)	Landscape
	Moderate	Landfills (Road Construction)	Landscape

APPLICATION STAGE			
Previous Activities		**Operation**	**X**
Construction	**X**	**Closure**	

TIPO DE MEDIDA			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X		**X**	

ACTIONS TO BE DEVELOPED

1) Route that connects the terminal with Nueva Colonia Village

In order to facilitate the construction process of the works, the improvement of the existing road from the Nueva Colonia District to the port terminal should be carried out over a length of approximately 2.46 km and a 10.3m bench as the following figure shows:

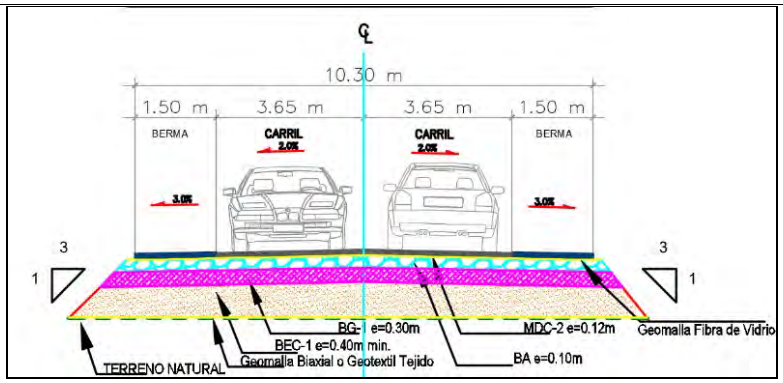


Figure No. 11.2 Typical section of road structure from Nueva Colonia to PUERTO BAHÍA COLOMBIA DE URABÁ

Source: Edifica, Geotechnical Study, June 2015

a) Drainage works:

- Transversal drainages will be made, along the route and drainage channels.

- The natural flow of drainage will not be interrupted, nor will the runoff system be overloaded.

- To protect the land from erosion and runoff water, it will be necessary to implement geotechnical protection works and temporary drainage control.

The following are the environmental measures that must be implemented for both the access route and the internal routes of the port terminal:

b) Storage and handling of the filling material:

- The filling materials will be placed in places that avoid their dragging by the runoff waters and they will be covered with a canvas or thick plastic, to avoid their dispersion due to the wind.

- The handling of material should be done with appropriate equipment, avoiding spills and runoff.

- The excavation material will be reused as much as possible in landfill activities within the project site and the remaining material will be delivered to authorized dumps.

- Borrow material from properly licensed sources will be used.

- The aggregates for sub-base and granular base must be collected in sheds or covered with plastic and each of the aggregates must be collected separately.

- Deposits of material must be located in remote areas of water courses, around which containment dams will be built to prevent the spreading of accidental spills.

c) Transportation of materials:

- The transport of materials must comply with the regulations in force on established weights and dimensions.

- Vehicles used to transport materials must have appropriate bodies, must be in perfect condition to contain all cargo safely, and avoid the loss of material whether dry or wet.

- The load must be well accommodated, and the material level must be maximum flush with the lower upper edges of the body.

- Each vehicle must be equipped with shovels, brooms and any tool that is useful for immediate cleaning in case of overflows and loss of material.

- The unloading doors must be kept secure throughout the journey.

- For the management measures for vehicles, machinery and equipment, see environmental management program PMA-2 (Environmental management of vehicles, machinery, equipment, ships and naval devices).

d) Signaling:

- Deviations must be specified and signaled (if necessary) during the execution of works to improve the road, in such a way that the vehicles that make use of the road could be allowed to transit, generating the minimum amount of traumatism to the users.

- Follow the guidelines of the PMA-11 sheet for terrestrial signaling management.

e) Control of emissions:

- During the dry season, vehicle traffic areas, access roads (to the sources of materials, storage areas and work sites) must be moistened and in the areas of the constructions that have the presence of material that can be resuspended. Said humidification will be advanced with the use of tank trucks that have a water spray system to ensure sufficient humidity to minimize the removal of particulate material to avoid generating flooded areas, as shown in Photograph No. 11.1. The schedule and frequency of irrigation will be determined depending on the works progress.

- The collection piling of construction materials should be located as far as possible in the opposite direction to the prevailing wind, to avoid the dragging of particles to neighboring populations. Stored materials that contain a high percentage of fines must be covered with geotextiles or other material that fulfills the same function.

- A speed limit will be established to maintain more time the road wetting and to minimize the generation and dragging of particulate material by the tires of the vehicles that pass through the project routes, thus avoiding the increase of respiratory diseases in the workers and inhabitants of the houses bordering the roads.

- The transport will be carried out in dumpsters or containers with the covering of the material by means of tarpaulins or any other resistant cover to avoid the dispersion of particulate material.

Photograph No. 11.1 Humidification of subgrade material when it is very dry
Source: PIO SAS, September 2015.

f) Staff training and vehicle status:
To start the daily activities, the personnel of each work front must have received the workshop of Environmental Training, Industrial Safety and Occupational Health and participate in the 5-minute daily chats.

ESTIMATED SCHEDULE

This sheet becomes effective from the beginning of the activities listed and will remain until its completion.

PLACE OF APPLICATION

Land where the construction works of the Solid Bulk Port Terminal of Bahía Colombia will be developed and the access route of the Port Terminal of Solid Bulks of great depth of Bahía Colombia.

RESPONSIBLE FOR THE EXECUTION

Contractor personnel in charge of executing this activity.

REQUIRED STAFF

- Engineer of work Resident

- Environmental Resident

- Industrial safety and occupational health Resident

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100%	*(No. of irrigation systems implemented for humidification)* _____ *x 100 (No. of irrigation systems programmed for humidification)*	Execution Contractor	Field format (Annex 11.1.1.1)
Goal 2	100%	*(No. of fronts on site complying with environmental management measures* _____*x 100 (Total number of work fronts in filling and affirmed activities)*	Execution Contractor	Field format (Annex 11.1.1.1)
ESTIMATED COSTS				
Associated Costs to the civil works of the project				

• PMA-4 sheet. Environmental management of construction materials.

ENVIRONMENTAL MANAGEMENT PLAN			PMA-4
ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION MATERIALS			
OBJETIVES	• To establish the requirements and procedures for the management of storage activities and management of construction materials, complying with established technical and environmental standards.		
GOALS	Goal 1: 100% compliance with environmental management measures for the storage and handling of construction materials.		
IMPACT	**ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT**	**ACTIVITY**	**AFFECTED ENVIRONMENTAL ELEMENT**
Alteration of the air quality by gases and particulate material	Moderate	Transport, manufacture and pile driving	Air
	Moderate	Concrete manufacturing for civil works	Air

	Moderate	Transport of material	Air
	Moderate	Construction and operation of temporary installations	Air
	Moderate	Construction of infrastructure and facilities associated to the terminal operation	Air
	Moderate	Transport of material	Air
	Moderate	Activities for the placement of the pavement (affirmed, granular sub-bases, granular and stabilized bases)	Air
	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Alteration of noise levels	Moderate	Transport, manufacture and piling driving	Air
	Moderate	Transport of material	Air
	Moderate	Construction and operation of temporary installations	Air
	Moderate	Construction of infrastructure and facilities associated to the terminal operation	Air
	Moderate	Transport of material	Air
	Moderate	Activities for the placement of the pavement (affirmed, granular sub-bases, granular and stabilized bases)	Air
Alteration of noise levels	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Resuspension and redistribution of sediments (Continental and marine)	Moderate	Transport, manufacture and piling driving	Soil
Alteration of the Landscape	Severe	Transport, manufacture and piling driving	Landscape
	Moderate	Armed and melting of plates	Landscape

	Moderate	Anchor and construction of bridge and jetty	Landscape
	Moderate	Construction and operation of temporary installations	Landscape
	Moderate	Construction of infrastructure and facilities associated to the terminal operation	Landscape
Changes in the physicochemical and microbiological characteristics of marine water	Moderate	Transport, manufacture and piling driving	Oceanography

APPLICATION STAGE			
Previous Activities		**Operation**	
Construction	**X**	**Closure**	

TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X		**X**	

ACTIONS TO BE DEVELOPED

A collection area of construction materials, prefabricated materials and assembly of the infrastructure of an area of approximately 4 ha will be defined. The main storage materials will be gravel, gravel, sand, aggregates, geotextiles, steel, excavated material, prefabricated concrete and prefabricated piling.

1. Legal aspects for the acquisition of materials:

The construction materials (gravel, gravel, sand, aggregates, geotextiles, steel, excavated material, prefabricated concrete, prefabricated piling) must come from the duly endorsed sites, with their environmental and mining permits and licenses in force.

2. Storage of construction materials:

a) There will be a concrete and prefabricated plant in situ on stabilized land, which will have an approximate area of 7 ha.

b) All the construction materials to be used in the work will be stored in the collection center provided for that purpose, located less than 100 meters from the León River and the Nueva Colonia canal.

c) Temporary storage sites for stony materials should be as far away as possible from the runoff

courses and the piling of material should be kept covered with tarps or plastics, to prevent their dispersion by the action of the wind.

d) A collection area of construction materials prefabricated and assembly of the infrastructure on a stable surface with wooden supports, will be defined to prevent the material from moving from one place to another. They will be stored in an orderly manner and it is recommended not to stack them at heights higher than 1.5 meters, to ensure the stability of the collection site, preventing the generation of work accidents.

3. Measures for the transportation of materials:

a) Vehicles that transport construction materials and excavation surpluses must use tents, plastics, tarpaulins or coverings that prevent the removal of particulate material by the action of the wind, the transported materials must remain fully covered throughout the route and until their discharge, and the carp must descend at least 30 cm from the edge of the cargo box (Resolution 541 of 1994 of the MAVDT).

b) The vehicles used to transport material must comply with the provisions of Resolution 541 of 1994 of the MAVDT, on the loading, unloading, transport, storage and disposal of loose materials, concrete and aggregates, in particular:

c) The cargo box should be covered in its entirety, with a canvas or tent in good condition, to avoid the fall or dispersion of the material.

d) The cargo box must be filled to their permitted capacity, to avoid spills or material fall.

e) Likewise, the dump or cargo box must be constituted by a continuous structure, which in its outline does not contain breaks, perforations, grooves and spaces, through which the material can escape.

f) For the programming of the transport of construction materials, from the supplier to the work front, the traffic rules, the vehicular traffic and the flow restrictions of the freight vehicles must be considered.

4. Disposition of construction materials:

No provision of material is contemplated in the process of construction of the port terminal. However, in case of requiring the disposal of excess material, it will be disposed in the closest dump to the construction work and the builder will be responsible for its management and adequate disposal.

5. Signaling

a) Avoid discomfort due to traffic caused by the entry and discharge into the work area by means of traffic controllers and establishing appropriate schedules and transportation routes.

b) On all work fronts, notices must be installed in visible points, indicating the location of the facilities and material disposal sites according to the signaling program FMAHA PMA-10.

ESTIMATED SCHEDULE
This program will be activated from the construction phase and will continue throughout the operation of the port terminal.
PLACE OF APPLICATION
Onshore terminal and access road of the project.
RESPONSIBLE FOR THE EXECUTION
Contractor personnel in charge of executing this activity.
REQUIRED STAFF
- Engineer of work Resident - Socio-environmental Resident - Industrial safety and occupational health Resident

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100%	(*Number of measures implemented for the management and storage of construction materials)* / *100* x *(No of programmed management measures for the handling and storage of construction materials)*	Contractor personnel responsible for executing this activity	Field format (Annex 11.1.1.1)

ESTIMATED COSTS
The associated costs will be part of the operational costs of the work.

• PAM -5 sheet. Integrated management of hazardous and non-hazardous solid waste (On land, dock and boats).

ENVIRONMENTAL MANAGEMENT PLAN	PMA-5

INTEGRAL HANDLING OF HAZARDOUS, NON-HAZARDOUS AND SPECIAL SOLID WASTE ON LAND, DOCKS AND BOATS

OBJETIVES	1. Prevent and mitigate the damage that may be caused to the environment because of the poor management and / or disposal of solid waste generated by the project.
GOALS	Goal 1: 100% guarantee the integral management of the solid waste generated during the construction, operation and closure phases of the project

IMPACT	ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT	ACTIVITY	ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED
Alteration of organic or agrological soil	Severe	Onshore terminal - Disassembly, cleaning, stripping and land filling	Soil
Alteration of organic or agrological soil	Moderate	Construction Road - Disassembly, cleaning, stripping and land filling	Soil

APPLICATION STAGE

Previous Activitie		**Operation**	**X**
Construction	**X**	**Closure**	**X**

TYPE OF MESURE

PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X	**X**		

ACTIONS TO BE DEVELOPED

1. Comprehensive management of hazardous, non-hazardous and special solid waste on land and in the wharf.

a) Staff training and awareness

During the construction, operation and closure of the project, special emphasis will be placed on the need to hold monthly training workshops on the integral management of waste, with all employees having a direct link to the port. Within the topics to be addressed in the training meetings with employees can be considered: prevention and reduction of waste at the source; waste segregation, collection and storage workshops; current environmental legislation; environmental risks of inadequate waste management; socialization of the organization chart and assignment of responsibilities; Waste or hazardous waste management; environmental benefits of proper management of hazardous and non-hazardous waste.

b) Separation and handling of non-hazardous and hazardous waste

In different places, such as docks or onshore terminal, the waste will be sorted in containers or cans, with a waterproof and removable cover, identified according to the corresponding color classification to be taken later to the temporary collection site and delivered for a final disposal.

Table 11.1 Color code for waste storage containers

TYPE OF RESIDUE	EXAMPLES OF WASTE	TYPE OF CONTAINER
ORDINARIES	Sweeping, dirty papers, napkins, food packaging, etc.	The containers will have different sizes to adapt to the generation sites of each type of waste; the location of the waste separation points may vary according to the need
ORGANIC	Remains of food from food areas and food warehouses, tree pruning and gardening.	
CARTON AND PAPER	Paper and paperboard not impregnated with oils or other substances	
PLASTIC AND GLASS	Plastic containers for beverages, disposable cups, plastic lids, cigarettes, mixers, bottles and glass containers, etc.	
HAZARDOUS SOLIDS	Oil impregnated cloths, batteries, dirty gloves, batteries, greases, mud and / or soils contaminated with hydrocarbons	Metallic containers and resistant red bags.
HOSPITALARIES	Needles, scalpels, organic tissues, gauzes, used cottons, tongue depressors, etc.	Guardians for the needles and red bins with pedal cap with red bag.

Source: Compilation and adjustment of the Colombian Technical Standard GTC-24

c) Requirements for waste containers

- The containers or bins must have all the characteristics of safety and hygiene, to prevent the entry of water, rodents or insects; they must be in good condition so that they do not allow liquids to escape through their walls or the bottom.

- The containers and bags must be labeled according to the color and type of waste

- The hazardous waste must be labeled according to Colombian Technical Standard NTC 1692, which corresponds to the transport of dangerous goods, definitions, classification, marking, labeling and marking, or following the regulation that modifies or substitutes it.

- Containers or cans can be located next to the offices, dock, onshore terminal or where they are considered necessary. If possible, containers should be close to the generation site.

- Containers should be maintained to avoid leachate percolation; It is also proposed to perform a wash to remove the residues adhered to its panels.

- Quarterly inspections will be carried out to verify the proper separation and management of solid waste.

d) Special handling for some waste

- Recyclable waste: Can be delivered to authorized third parties for recycling. Among the recyclable waste are cardboard, paper, plastic, glass, aluminum, ferrous metals among others.

- Organic Waste: Can be used to generate by-products in other activities, therefore it will be possible to study alternatives for use such as composting (according to the Technical Regulation of the Drinking Water and Basic Sanitation Sector (RAS 2000), title F), or another option that is considered viable.

- Waste oil filters: Hydraulic and oil filters or containers that have contained oil should be drained for at least 12 hours, before being placed in containers to prevent the accumulation of oils in them. The place where the oil filters drain must be waterproofed and must have a spill control system.

- Hazardous waste: Any container or residue of a material or substance classified as dangerous must be handled as a hazardous material, complying with the recommendations of the SAFETY DATA SHEETS and the matrix of incompatibilities. Likewise, the containers or other packages must be properly labeled with their corresponding number and code.

- Special waste: debris, concrete and loose aggregates construction and demolition products must be delivered for management and disposal to authorized third parties. The soil and subsoil of excavation may be used for the construction of jars or works required.

Batteries for light, medium and heavy vehicles will be returned to the supplier or must be handed over to authorized third parties that have valid environmental permits. Aerosol jars and paint jars that cannot be used as scrap for their high content of paint residues, will be stored in a hermetically sealed container, and authorized third parties will be delivered. Obsolete equipment and scrap must be stored and may be sold to third parties for use as raw material. These materials must be located in a collection center.

e) Collection centers

- Temporary Storage of Non-Hazardous Waste: If necessary, a temporary collection for non-hazardous solid waste will be implemented (at the dock or at the ground terminal), which must have the signaling or identification to distinguish the different sites for each type of waste to prevent it from accidentally mixing with other types of waste.

Weekly inspections will be made to the temporary storage site, to verify that its location, signaling, and other criteria are adequate. If the waste cannot be collected, it can be compacted. The waste must be delivered to authorized third parties for its management and disposal; The recyclable waste will be delivered to authorized third parties for recycling.

- Temporary Storage of Hazardous Waste: there should be a temporary collection center for hazardous waste. These must be registered and separated by type of waste following the provisions of Decree 4741 of 2005, to be later weighed before loading. The temporary collection site should be airy, have a roof to prevent the entry of rainwater and the direct action of the sun to prevent the proliferation of infectious vectors, there must be delimited (fences) and mesh enclosure. It must have the respective signage to prevent incidents, or that are mixed with another type of waste accidentally, in accordance to the provisions of Decree 4741 of 2005. Inspections will be conducted to verify their correct location, signaling, and other criteria that are relevant. This collection must have a perimeter channel for the collection of elements or liquids. This waste must be delivered to authorized third parties.

- Temporary Storage of special: special waste that is not reusable, such as soil or others, should be stored in a storage center which should have a waterproof surface and rainwater management.

- The collection centers should be located in an area where it is avoided contaminating the waters of the León River, the Nueva Colonia canal and / or the surrounding pipes.

- The collection centers should have easy access for the workers, users of the Project and for the waste loading.

f) Internal and external collection and transport

- The waste (hazardous and non-hazardous) must be transported to their respective temporary collection centers and subsequently delivered to authorized third parties for transport and final disposal.

- The frequency of collection of hazardous and non-hazardous waste will be established depending on the needs and generation of the type of waste or according to the frequencies of the authorized collectors.

- The collection of non-hazardous waste can be done by collecting vehicle.

- The frequency of collection will be done considering the capacity of the containers and what is established in the current environmental regulations.

- The non-hazardous waste that is generated as a result of the construction activities must comply with the provisions of Resolution 541 of 1994 and / or the one that modifies or replaces it, issued by the previous Ministry of the Environment, (today Ministry of the Environment and Sustainable Development), which regulates the loading, unloading, transport, storage and final disposal of debris, materials, elements, construction, demolition; these materials can be disposed in the front dumps; the organic layer, soil and excavation subsoil should be directed towards the areas in the process of restitution and / or soil collection.

- The transport of hazardous waste will be carried out by a company that has an Environmental License for the Management, Treatment, Final Disposal and / or use of hazardous waste, and it will be ensured that the transport is carried out in vehicles that meet the specifications Techniques of Decree 1609 of 2002 of the Ministry of Transport and / or the one that modifies or replaces it by which the handling and land transport of dangerous goods by road is regulated, in order to guarantee safety, minimize risks, protect life and the environment; and complying with the internal procedure for the transport of hazardous waste from its generation to its destination or final

disposal. Likewise, the guidelines established in the Contingency Plan of Decree 321 of 1999 or other provisions issued on the subject will be followed.

- The transport of hazardous and special waste generated within the project, will be delivered to an external hazardous waste manager with their respective delivery support and a record where it will specify the treatment and final disposal of the waste. While the manager makes the collection, the waste will be temporarily stored in a collection center, which will have separate and demarcated locations, to allow a safe handling of the materials located there. Following the location guidelines set forth in Decree 4741 of 2005 and / or the one that modifies or replaces it.

- It will be ensured that the transportation of the generated hazardous waste is carried out, complying with the packaging, labeling and marking, depending on its characteristics following the provisions of NTC 1692 and / or the one that modifies or replaces it.

- At all times it will be guaranteed that the operator complies with the provisions of Decree 2981 of 2013 regarding the collection and transport of non-hazardous waste.

g) Final provision

- The final disposal of hazardous and non-hazardous waste must be carried out by authorized third parties and those must provide a certificate of waste disposal.

- Every time a company is contracted for the management and / or final disposal of hazardous waste, it will be verified that it has the permits required by the environmental authorities for the development of these activities.

2. Comprehensive management of hazardous and non-hazardous solid waste on board the dredge and auxiliary boats

a) Non-hazardous solid waste

- The waste generated in the boats can be handled internally in the boat according to the classification,

Management and policies of each company. However, none of these may be less demanding on the actions proposed in this management program.

- If the discharge of waste from ships to dock on land is required for their disposal, the actions herein must be followed.
- The dredge and auxiliary boats must separate the solid waste inside the boat, and then deliver it to the specialized port operator responsible for each type of waste generated. Additionally, said operators must deliver to the Contractor the documentary records and certificates that indicate the delivery period, the amount, the type of waste and treatment, as established in Annex V of the International Convention for the Prevention of Pollution by Ships - CONVENTION MARPOL 73/78.

- The dredge and auxiliary vessels will be subject to inspection by officials of the DIMAR, Ministry of Environment and Sustainable Development and the Environmental Audit, pursuant to compliance with Annex V of MARPOL 73/78.

- It is allowed to pour to the sea traces of food previously shredded or crushed, when the motor ships are more

than 12 nautical miles from the nearest land and these residues must be discharged at a moderate rate and not instantaneously.

b) Hazardous solid waste

If during the maintenance of the dredge and auxiliary vessels, hazardous waste contaminated by hydrocarbons as disused parts of the system, there must be compliance of the provisions of Decree 4741 of 2005, which partially regulates the prevention and the handling of hazardous waste that includes:

- The dredge and auxiliary vessels should contact a specialized port operator to carry out the collection, treatment and final disposal of the hazardous solid waste generated within the motor ships.

- The specialized port operator must deliver a certificate to the ship or naval device, specifying the type of waste, quantity, treatment and final disposal of the waste, as established in Annex V of the International Convention for the Prevention of Pollution by Ships - MARPOL CONVENTION 73/78.

- The operations of reception of garbage and debris from the dredge and auxiliary vessels will be controlled as maritime activities by the Harbor Master's Office.

- Before starting the service of reception of garbage and waste of ships, the port operator must perform a risk assessment sufficient to ensure complete control of the operation. It should cover all operational risks and the respective means to avoid them.

- During the transfer of the product from the ship, the port operator and the receiving team must place a responsible person in the area of the waste collector to verify and control the presence of leaks or breakages and spills.

- The port operator must have at its disposition and prepared all the necessary equipment for the attention of emergencies related to the service including possible fires and product spills.

ESTIMATED SCHEDULE

This card comes into force from the beginning of the construction works of the project and will continue in force during the entire period of operation of the port.

PLACE OF APPLICATION

Onshore terminal, dock and boats.

RESPONSIBLE FOR THE EXECUTION

Employees, contractors, subcontractors and operators at the service of the project (in charge of the cleaning service, operator in charge of the collection and disposal of hazardous and non-hazardous waste)

REQUIRED STAFF

• Solid waste control operators.

• Contractors and authorized third parties for the final disposal of solid waste.

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100%	Percentage of employees trained monthly: % E.C. = (# Trained employees) _____X 100 (# total employees)	Contractor personnel responsible for executing this activity	Registration of attendance at workshops and training, photographic records and meeting minutes.
	N/A	Waste percentage: (Waste volume @ recyclable) / (Total volume @ Waste generated) x 100 (Waste volume @ hazardous) _____ X 100 (Total volume @ Waste generated) x	Contractor personnel responsible for executing this activity	Field formats, delivery records of recycled material and hazardous material. Historical record of waste delivered to the port operator. (Annex 11.1.1.1)

ESTIMATED COSTS

The associated costs will be part of the project's operating costs

• PMA-6 sheet. Environmental management of water resources.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-6
ENVIRONMENTAL MANAGEMENT OF WATER RESOURCE	
OBJETIVES	1. Establish the requirements and procedures to manage effluents on land, complying with environmental, maritime and port regulations. 2. Establish the requirements and procedures for the management and disposal of rainwater, complying with established technical and environmental standards.

GOALS	Prevent the mixing of rainwater with waste or other contaminated water. Channel the runoff water and control its discharge to the León River. 3. Prevent the accumulation of water in the yards and internal roads, aiming to prevent erosion processes or sedimentation generated by runoff water. 4. Guarantee the adequate operation of the system (pump, pipes, filter, valves, storage tank, faucets and toilets). Perform water consumption controls and encourage staff to save water. 5. Appropriately manage and dispose oily waste (bilge water), ballast and domestic wastewater originated by the dredger, motorboats and auxiliary vessels, in compliance with the provisions of MARPOL 73/78. <u>Goal 1:</u> Comply 100% with environmental measures for rainwater and wastewater management. <u>Goal 2:</u> Avoid 100% discharge of bilge water to bodies of water <u>Goal 3:</u> Comply 100% with scheduled monitoring.

IMPACT	SIGNIFICANCE OF THE IMPACT	ACTIVITY	ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED
Changes in the physicochemical and microbiological characteristics of continental water	Moderate	Operation and maintenance of infrastructure and facilities associated with the operation of the water terminal	Water
	Irrelevant	Demolition and dismantling of temporary infrastructure	Water

APPLICATION STAGE			
Previous Activities		**Operation**	**X**
Construction	**X**	**Closure**	**X**

TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X		**X**	

ACTIONS TO BE DEVELOPED

1. Environmental management of effluents - Construction phase

a) Domestic wastewater:

- During the construction of the project, the domestic wastewater generated by the personnel associated with the project will be managed with portable toilets units. Each Contractor and front of work will have to install sufficient number of batteries of portable toilets, in accordance with the fronts of work and considering that the norm demands one for every 15 men

- The installation and use of septic tanks, even with an infiltration field, will be prohibited.

- The sanitary procedures recommended by the provider must be complied. The sewage that is generated will be transferred to the collector vehicle of the operator that provides this service for its final disposal.

- The domestic wastewater generated, cannot be discharged to water or soil, these waters generated during the construction of the project must be managed with an environmental manager or the operator that provides the portable toilets service, which must comply with the Permits required in current legal environmental regulations.

- During the construction phase, the casino service will not be available for the staff of employees, workers, engineers, contractors, thus no spills associated with this activity will be generated. The contractors will have to contract this service and the wastewater that is generated, should be dealt with by an environmental manager, who must comply with the required permits in the current legal environmental regulations

Figure No. 11.3 Portable bathroom

Source: ECOBAÑOS. [Online] <http://www.ecobano.com.co/> [Accessed October 14, 2015]

b) Industrial wastewater:

- The maintenance of vehicles at fueling stations and lubricants on the construction site during construction will not be allowed, except in the case of heavy machinery such as cranes, so the generation of associated effluents is not expected. Solid wastes of a hazardous nature that are generated due to temporary maintenance at the construction site will be handled by an environmental manager and / or port operator that

complies with the environmental regulations for the management of such waste, whether for incineration or a security padding

- No industrial wastewater discharges will be generated from the concrete plant during construction

- The flow of water that will be used in the processes of the concrete production plant for the construction of the project, will be reused in the same process, in order not to generate industrial pouring in the construction stage, therefore, a closed recirculation system must be built.

- It is recommended that a recirculation of the water generated in the construction activities of civil and hydraulic works be carried out, to be reused in the curing of the concrete, washing of the minor tool and other activities form the construction that could use it.

c) Rainwater:

- Initially, the parking yards and the internal roads of the Terminal will not be paved and will be permanently subjected to construction processes such as reaffirming, leveling and preloading, which will require an adequate management of rainwater with provisional geotechnical protection works, consisting of ditches, trenchers, debris, control boxes, etc., to minimize runoff and erosion processes.

- For the design of temporary works, the high rainfall of the region and the distribution of the different areas within the terminal will be considered. Once built, they will require maintenance and follow-up to verify their functionality, to minimize the dragging of the backfill material from the yards and internal roads.

- During and after the downpours during construction, frequent inspections will be made to the parking lots and interior roads and silos area, to verify the presence of accumulations of water or other element, identifying its source and cause of stagnation to order its bailing or elimination according to the material in question.

2. **Environmental management of the effluents generated on board the motor ships, auxiliary vessels or naval artifacts**

a) Domestic water disposal:

- The boats governed by Annex IV of MARPOL 73/78, must have their International Certificate for the Prevention of Pollution by dirty water in force and must be equipped with an installation for the treatment of dirty water.

- The boats governed by Annex IV of MARPOL 73/78, once the tank is full to its maximum capacity, will move to the nearest land, to discharge the dirty waters in compliance with the provisions of the MARPOL 73 / 78 Annex IV "Rules to prevent contamination by dirty water from ships". It is important to consider in Rule 11, where it defines the expression "closest land" means, from the baseline from which the territorial sea is established, for which it must be taken into account the established for the Atlantic coast of Colombia in the first article of Decree 1436 of 1984.

- Instructions should be given to all the personnel who carry out activities on board, on the care of using the sanitary services exclusively for this use, emphasizing the prohibition of pouring foreign substances or those unrelated to hand washing or elimination of excrete.

- If the dredge and auxiliary vessels require the discharge of this type of liquid waste, they must contract a specialized port operator duly authorized to carry out this operation.

- The permit and environmental authorization of the port operator that will carry out the operation of bilge water management or any other oily waste from auxiliary vessels and naval devices that serve the activities of the port terminal should be requested.

- The respective registers of the amounts delivered to said port operator must be attached for their handling and final treatment.

b) Handling and disposal of bilge and ballast water

- The contaminated bilge and ballast waters from the dredger, motorboats, auxiliary vessels or naval devices, which render their services to the Project, will be transferred to a slop tank aboard one of the ships or naval artifacts, arranged for its provisional storage, to be transported to a treatment and final disposal plant.

- Once the storage capacity of the tanks has been reached, the waters will be removed, for their treatment and final disposal, by a specialized and authorized port operator, who has the respective environmental, port and municipal permits.

- The discharge or pouring of hydrocarbons or oily mixtures into the sea shall be prohibited.

- The port operator that is going to carry out the operation of bilge or ballast water management or any other oily waste must submit to the Coordinator of Environment, Industrial Safety and Occupational Health of the Project the respective contracts or agreements signed by the port operator, before he can perform the activity.

- The costs generated by this operation will be assumed by the maritime agency or the owner representing the motor ship, auxiliary vessel or naval artifact.

- Encourage the proper management of contaminated water on board in compliance of MARPOL indications.

3**. Environmental management of effluents - Phase of operation**

a) Domestic wastewater:

- The installation and use of septic tanks, even with an infiltration field, will be prohibited.

- The system will be verified and maintained (treatment plant, toilets, urinals, piping, grease trap, sand filter and drying bed).

- Instructions will be given to the users of the system to keep the bathrooms and the cafeteria hygienic.

- The domestic wastewater system will be checked weekly to verify its condition, correct leaks, the presence of foreign materials or any other maintenance work required.

- The acquisition of biodegradable soaps will be recommended by the corresponding agency.

- The cleaning staff will be instructed in the frequent cleaning and disinfection tasks of dishwashers, toilets and urinals, verifying the quality of their work.

- Weekly inspections of water leaks will be made in the pipes of the port terminal, to reduce losses in water consumption.

- Instructions will be given to the users of the system about the prohibition of pouring materials other than excreta, with the corresponding recommendation to deposit the toilet paper in the bathroom wastebasket.

- Technical maintenance will be made to the treatment plant following the its operation manual.

- Initially, the casino service will not be available for the Port Terminal staff, the feeding will be provided by an external provider.

b) Facilities washing water:

- The facilities washing waters will be sent to the Wastewater Treatment Plant.

c) Water used for fire control:

- The water used for fire control will be collected in a tank or pool and poured into the Nueva Colonia canal, after passing through a sedimentation system and a grease trap.

d) Oily waters:

- The eventual oily waters generated because of the plants maintenance and equipment will be contained and collected in 55-gallon containers, later, they will be treated by an environmental manager who has valid legal environmental permits to manage those.

- It is proposed the implementation of a Skimmer and / or Hydrocyclone, to perform an effective separation of fats and oils from the liquid waste, in order to transport that effluent to a storage tank, which allows its extraction by a third party certified in the treatment of this type of waste, thus avoiding pouring into the soil or on the water bodies.

e) Environmental management of rainwater

- Once the consolidation process of the parking lots and internal roads is completed, the final rainwater system will be built, with its sewers, receiving channels, control boxes, grease and sand traps, etc.

- The whole system should be inspected weekly, ordering the required cleaning and complying with the other precautions to maintain the proper functioning of the rainwater collection system.

f) Environmental management of the water system for toilets and bathrooms during the operation

- The water system for toilets and bathrooms will be checked weekly to verify its condition, correct leaks, presence of foreign materials or any other maintenance task required.

- The cleaning staff will be instructed in the cleaning and disinfection of dishwashers, toilets and urinals,

verifying frequently the quality of their work.

- The water storage tank will be properly covered.

- Cleaning and maintenance tasks will be carried out weekly on the system filter.

- Cleaning and maintenance work will be carried out every six months on underground and elevated tanks.

- Sampling of drinking water will be carried out annually to determine its quality.

- Instructions will be given to the users of the system to save water and keep the bathrooms and the cafeteria in a hygienic condition.

4. Monitoring of water quality and continental sediments

During the construction phase of the project, continental water quality monitoring will be carried out in three (3) stations on a semiannual basis, where monitoring must be initiated before construction works begin, to analyze the variations in the Water column for the construction works of the project, which should be a comparison of compliance with current environmental regulations, Decree 1076 of 2015 by the Ministry of Environment and Sustainable Development.

For the operation phase of the port terminal, monitoring will take place every six months, to analyze the variations of the receiving body upstream and downstream of the pouring generated during this phase.

The frequency of the semi-annual monitoring in the construction and operation phases, one must be executed in the rainy season and the other in the dry season, to be able to compare them with the REDCAM information, which carries out the monitoring in these climatic times.

a) Location of monitoring stations

Table No. 11.4 shows the Magna Sirgas flat coordinates originating from Bogotá from the monitoring stations defined for the analysis of water quality and continental sediments in the study area of the Project and in Figure No. 11.4 the location of those stations is presented

Table No. 11.4 Location of sampling stations water quality and continental sediments

ID	Station Name	Coordinates plan Magna-Sirgas origin Bogotá	
		East	North
P1	Station upstream of the León River	706,648.2	1,368,501.9
P2	Station in front of the jetty	706,422.3	1,368,536.0
P3	Station upstream of the León River	705,959.8	1,369,149.3

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

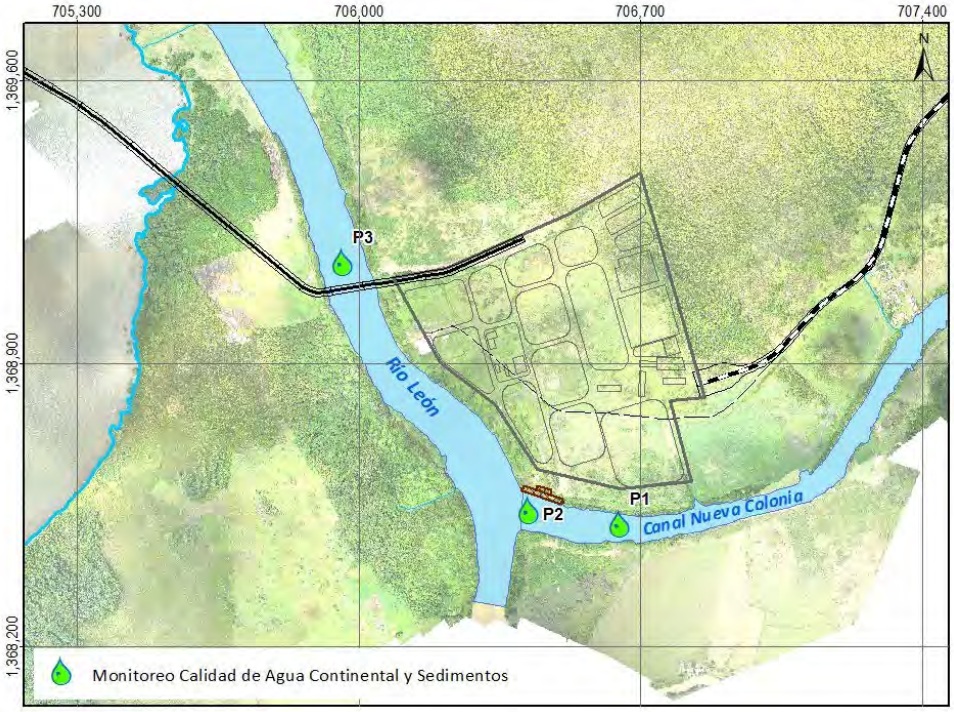


Figure No. 11.4 Location of sampling stations for water quality and continental sediments
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

b) Parameters to be monitored into the water column and continental sediments

An integrated type sampling will be carried out in the depth and in the cross section in the three (3) stations distributed over León River and the Nueva Colonia Channel for the continental water quality, for the continental sediments the first five will be taken (5). cm from the bottom. The stations were defined with the objective of verifying the influence that the construction and operation of the port terminal can have on the water quality of the León River.

Table No. 11.5 and Table No. 11.6 show the parameters that must be monitored.

Table No. 11.5 List of physicochemical and bacteriological parameters of continental water

Characterization	Parameter	Unit
Physics	Temperature	°C
	Total suspended solids	mg/L

		Total Dissolved solids	mg/L	
		Sedimentable solids	mL/L–h	
		Electrical conductivity	µS/cm	
		Hydrogen Potential -ph	pH Units	
		Turbidity	UNT	
		Real Color	m^{-1}	
	Chemistry	Dissolved oxygen (OD)	mg/L	
		Chemical Oxygen Demand (COD)	mg/L O_2	
		Biochemical Oxygen Demand at five (5) days (BOD5)	mg/L O_2.	
		Total Nitrogen Kjeldahl	mg/L NTK	
		Total Phosphorus	mg/L P	
		Greases and oils	mg/L	
		Total Alkalinity	mg/L $CaCO_3$	
		Acidity Total	mg/L $CaCO_3$	
		Calcium hardness	mg/L $CaCO_3$	

		Total hardness	mg/L $CaCO_3$
		Total phenols	mg/L
		Arsenic	mg/L
		Barium	mg/L
		Cadmium	mg/L
		Zinc	mg/L
		Chrome	mg/L
		Copper	mg/L
		Mercury	mg/L
		Nickel	mg/L
		Silver	mg/L
		Lead	mg/L
		Selenium	mg/L
	Bacteriological	Total Coliforms	NMP/100 mL
		Fecal Coliforms	NMP/100 mL

Source: Resolution 0112 of January 28, 2015 and Laboratory SGS Colombia S.A.S, 2015

Table No. 11.6 List of chemical parameters analyzed from continental sediments

Characterization	Parameter	Unit
Chemistry	Chrome	mg/L
	Zinc	mg/L
	Copper	mg/L
	Nickel	mg/L
	Greases and oils from the bottom sediment layer	mg/L
	Phenols from the sediment bottom layer	mg/L
	Hydrocarbons from the sediment bottom layer	mg/L

Source: Resolution 0112 of January 28, 2015

5. Monitoring of water quality and marine sediments

During the construction and operation phase of the project, seawater quality monitoring will be carried out at seven (7) stations on a semiannual basis where monitoring must begin before the execution of construction activities begins, in order to carry out analyzes of the variations of the water column by the construction works of the project, which should be carried out a comparison of compliance with the current environmental regulations, Decree 1076 of 2015 by the Ministry of Environment and Sustainable Development.

The frequency of the semi-annual monitoring in the construction and operation phases, one must be executed in the rainy season and the other in the dry season, in order to be able to compare them with the REDCAM information, which carries out the monitoring in these climatic times.

For the deepening dredging activities, water quality and marine sediment monitoring will be done before (1 month before), during (50% of the dredged volume) and after the deepening dredging (1 month later), to analyze the variations of the marine water column and sediment quality, by the resuspension of the dredged material and in the dump area.

For maintenance dredging activities, water quality and marine sediment monitoring will be done before (1 month before) and after maintenance dredging (1 month later).

a) Location of monitoring stations

It is presented in the Magna Sirgas flat coordinates of Bogotá origin of the monitoring stations defined for the analysis of the water quality and marine sediments in the study area of the Project and in the location of these stations.

Table No11. 7 Location of sampling stations water quality and marine sediments

ID	STATION NAME	COORDINATES PLANAS MAGNA SIRGAS Origin BOGOTÁ	
		EAST	NORTH
P4	Viaduct Station	703,792.94	1,371,083.51
P5	Maneuvering Area Station 1	702,783.75	1,370,390.87
P6	Maneuvering Area Station 2	702,487.86	1,371,110.59
P7	Maneuvering Area Station 3	702,943.68	1,371,628.00
P8	Access Channel Station Phase I	701.577,00	1.374.197,10
P9	Control point station	696,387.84	1,372,825.31
P10	Landfill	697,792.41	1,375,464.03

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

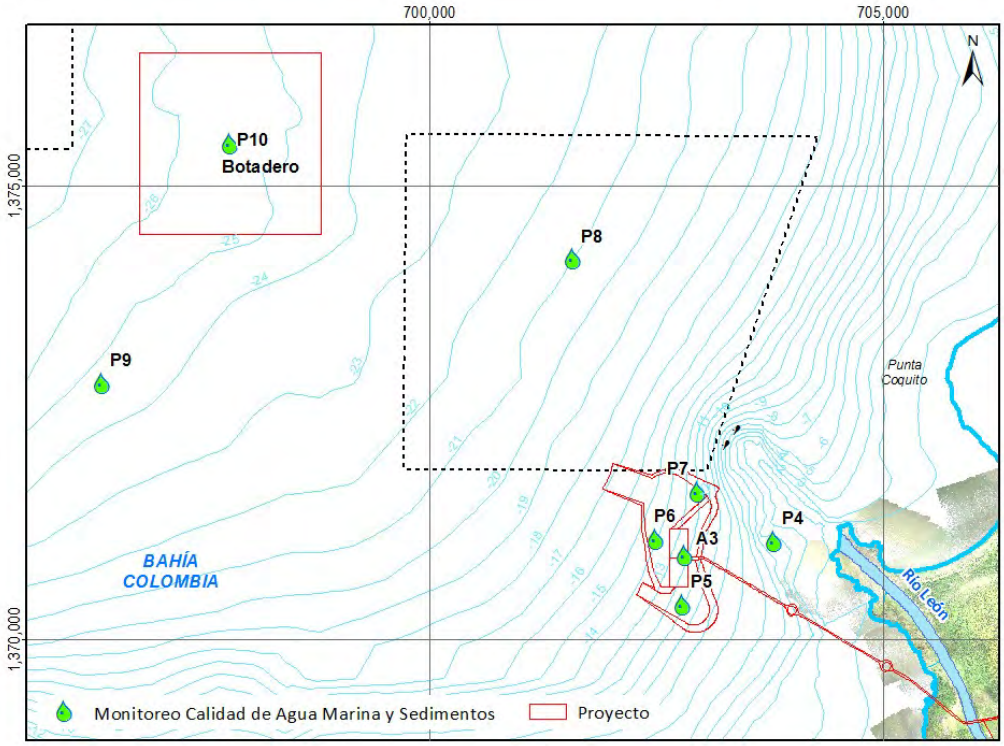


Figure No.11. 5 Location of sampling stations for water quality and marine sediments

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

b) Parameters to be monitored in the water column and marine sediments

An integrated depth sampling will be carried out in seven (7) stations distributed in Bahía Colombia for the quality of the seawater, for the marine sediments the first five (5) cm of the bottom will be taken. The stations were defined with the objective of verifying the influence that deepening dredging can have on the maneuver and access channel activities, the dredging of maintenance and the disposal of dredged material in the dump in terms of water and sediment quality marine

The parameters to be monitored for the physicochemical and bacteriological characterization of the water column and physicochemical of the marine sediments in Bahía Colombia are presented

Table No. 11.8 List of physicochemical and bacteriological parameters to be analyzed of the seawater column

Characterization	Parameter	Unit
Physics	Temperature	**°C**

		Total suspended solids	mg/L
		Total Dissolved solids	mg/L
		Sedimentable solids	mL/L–h
		Electrical conductivity	uS/cm
		Hydrogen Potential - pH	PH Units
		Turbidity	UNT
		Real Color	m^{-1}
		Dissolved oxygen (DO)	mg/L
		Dissolved oxygen (DO)	mg/L O_2
		Biochemical Oxygen Demand at five (5) days (BOD5)	mg/L O_2
		Total Kjeldahl Nitrogen	mg/L NTK
		Total Phosphorus	mg/L P
		Greases and oils	mg/L
		Total Alkalinity	mg/L $CaCO_3$
		Total Acidity	mg/L $CaCO_3$
		Calcium hardness	mg/L $CaCO_3$
		Total hardness	mg/L $CaCO_3$
		Total phenols	mg/L
	Chemistry	Arsenic	mg/L
		Barium	mg/L
		Cadmium	mg/L
		Zinc	mg/L
		Chrome	mg/L
		Copper	mg/L
		Mercury	mg/L
		Nickel	mg/L
		Silver	mg/L
		Lead	mg/L
		Selenium	mg/L
		Chlorophyll a	mg/L CHLa
		Chlorophyll b	mg/L CHLb

	Polycyclic Aromatic Hydrocarbons	mg/L HAP
	Active Substances to Methylene Blue (SAAM)	mg/L
Bacteriological	Total Coliforms	NMP/100 mL
	Fecales Coliforms	NMP/100 mL

Source: Resolution 0112 28 of January 2015

Table No. 11.9 List of physicochemical parameters to be analyzed of marine sediments

Characterization	Parameter	Unit
Physics	Temperature	°C
	Hydrogen Potential - pH	PH Units
Chemistry	Greases and oils	mg/L
	Arsenic	mg/L
	Barium	mg/L
	Cadmium	mg/L
	Zinc	mg/L
	Chrome	mg/L
	Copper	mg/L
	Mercury	mg/L
	Nickel	mg/L
	Silver	mg/L
	Lead	mg/L
	Selenium	mg/L
	Total Hydrocarbons	mg/L
	Phenols	mg/L
	Total Hydrocarbons	mg/L HAP
	Total Organic Carbon	mg/L COT
	Volatile Acid Sulphide	mg/L S^{-2}
	Total Phosphorus	mg/L
	Total Nitrogen	mg/L

Source: Resolution 0112 of January 28, 2015

6. Quality monitoring of Water pouring

During the operation phase of the project, the dumping will be monitored in two (2) stations on a quarterly basis the first year of operation, and on an annual basis as of the second year of operation, for which a compliance comparison should be made. with the current environmental regulations, Resolution 0631 of 2015 issued by the Ministry of

Environment and Sustainable Development.

To check the efficiency of the treatment, it will be necessary to monitor the wastewater before entering the treatment plant (WWTP) and in the effluent (dumping point of the discharge), at the same times and with the same frequency in the that the discharges are monitored at the point of discharge, to make a comparison with the fulfillment of the previous norm.

The monitoring will be carried out in accordance with the "Guide for the monitoring of pouring, superficial and underground waters" published by the IDEAM,

A flow rate of the pouring must be realized by means of the application of diverse methods within which a meter can be mentioned or by volumetric measurement by landfill, channel Parshall, among others.

Before the monitoring, the cleaning of the sampling equipment must be carried out, verify that there is a sufficient number of containers and ensure that the proper implements are available for the preservation and transportation of the samples. It is also important to verify that the equipment is properly calibrated.

a) Location of pouring monitoring stations
The monitoring will be carried out in two (2) stations to identify faults in the system and calculate the efficiency of the PTAR plant:
- Before entering the WWTP
- After water treatment in the WWTP, at the point of discharge, before incorporation into the receiving water body, in this case Canal Nueva Colonia.
It is presented in Table No. 11.10 the Magna Sirgas flat coordinates originating from Bogota of the monitoring stations of the pouring generated in the Project and in Figure No. 11.6 the location of these stations is presented.

Table No. 11.10 Location of the pouring sampling stations

ID	STATION NAME	COORDINATES PLANAS MAGNA SIRGAS Origin BOGOTÁ	
		EAST	NORTH
MV 1	Before entering the WWTP	706.624,9	1.368.629,3
MV 2	After treatment in the WWTP	706.615,4	1.368.590,8

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

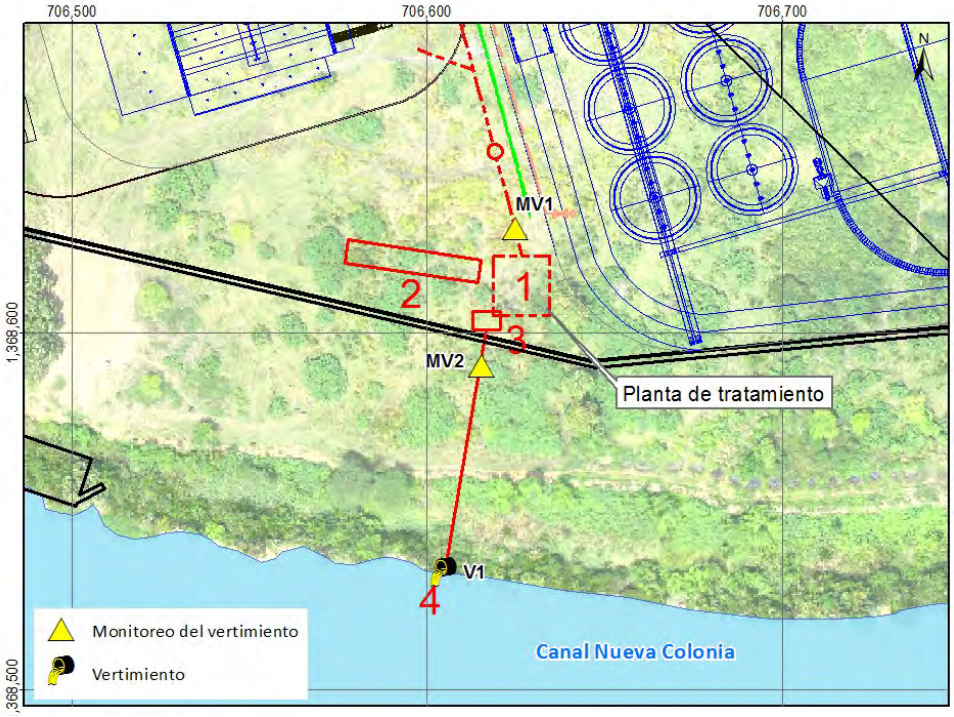


Figure No. 11.6 Location of the pouring sampling stations
Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015

b) Parameters to monitor

The parameters for domestic wastewater with a BOD load of less than 625.00 Kg / day will be analyzed, established in Article 8, Chapter V of Decree 0631 of March 17, 2015. There are mentioned the maximum permissible limits for the different parameters applicable to the evaluated residual water. Some of the parameters mentioned in the standard may be excluded if it is demonstrated, through tests and mass balances, that they are not present in the water.

The BOD load was estimated by multiplying the per capita contributions suggested in Table E.2.6 of Title E of the RAS 2000 by the project population during the operation phase. Considering that the suggested load is 50 g / inhabitant. BOD day and that the estimated population during the operation of the project will be 1189 inhabitants, we have a load of 59.45 kg / day.

A manual composite sampling will be carried out, consisting of the mixture of point samples that will be taken with a frequency of 6 hours in a period of 24 hours in two (2) stations. The stations were defined with the aim of verifying compliance with the dumping standard.

Table No. 11.8 and Table No. 11.9 present the parameters that must be monitored for the physicochemical and bacteriological characterization of the pouring

Table No. 11.11 List of the physicochemical and bacteriological parameters of the pouring

Parameters to analyze in domestic wastewater (ARD) with a load less than 625.00 kg / day BOD	
Parameter	**Units**
pH	PH Units

Chemical Oxygen Demand (COD)	mg/L O_2
Biochemical Oxygen Demand (BOD	mg/L O_2
Total suspended solids (SST)	mg/L
Solids sedimentables (SSED)	mL/L
Greases and oils	mg/L
Active Substances to Methylene Blue (SAAM) - Surfactants	mg/L
Total Hydrocarbons (HTP)	mg/L
Orthophosphate	mg/L
Total phosphorus	mg/L
Nitrates	mg/L
Nitrates	mg/L
Amoniacal Nitrogen	mg/L
Total Nitrogen	mg/L

Source: Resolution 0631 of 2015

ESTIMATED SCHEDULE

The actions will apply from the beginning of the construction phase and during the operation of the Port Terminal "Puerto Bahía Colombia de Urabá".

Construction phase

- Monitoring of continental and marine waters and sediments (10 stations): **Semiannual (rainy season and dry season)**

Note: the first monitoring during the construction must be done before starting the construction of the project works, as a baseline, at least 1 month before.

Operation phase

- Monitoring of continental and marine waters and sediments (10 stations): **Semiannual (rainy season and dry season)**

- Monitoring of the discharge of the WWTP: **quarterly the 1 year**, the other years of operation, annual frequency

Deepening dredging

- Frequency: Before (1 month before), During (50% of dredging) and After (1 month after)

Maintenance dredging

- Frequency: Before (1 month before) and After (1 month after)

APPLICATION PLACE

Area of intervention and operation of the Port Terminal "Puerto Bahía Colombia de Urabá".

RESPONSIBLE FOR THE EXECUTION

Contractor personnel in charge of executing this activity.

Port operator

REQUIRED STAFF

Environmental resident

- Industrial safety and occupational health Residents

- Environmental inspector

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100 %	Volume of ARD and ARnD handled _____ Volume of wastewater generated	Execution contractor Port operator	Information register
Goal 2	100 %	Pouring Volume of bilge water into water = 0	Port operator	Laboratory report
Goal 3	100 %	Continental Waters *(Parameters that comply with the standard) / (Parameters monitored)* Marine Waters *Parameters that comply with the standard) / (Parameters monitored)*	Execution contractor Port operator	Laboratory report

		Residual waters *Parameters that comply with the pouring standard) /* *(Parameters monitored)*		

ESTIMATED COSTS

a) Monitoring costs in the construction phase (40 months):

Semi-annual frequency (rainy and dry season)

- Monitoring of continental and marine waters and sediments (10 stations):

Global cost = $ 60,000,000 with monitoring l * 6 semi-annual monitoring = $ 360,000,000

b) Monitoring costs in operation (20 years)

Quarterly frequency (1 year) the other years of annual operation

- Monitoring of wastewater generated in the WWTP: $ 8,000,000 * 22 = $ 176,000,000

Semi-annual frequency (rainy and dry season)

- Monitoring of continental and marine waters and sediments (10 stations):

Global cost = $ 60,000,000 with monitoring * 40 semi-annual monitoring = $ 2,400,000,000

c) Monitoring costs during deepening dredging (7 stations located in the marine area)

Frequency: Before, during and after dredging:

Global cost $ 50,000,000 * 3 = 150,000,000

d) Monitoring costs during maintenance dredging (7 stations located in the marine area)

Frequency: Before and After dredging

Global cost: $ 50,000,000 * 2 = 100,000,000

Note: The costs of the other actions are contemplated in the civil works of the project.

• PMA-7 sheet. Environmental management of fuels, oils and lubricants (On land, dock and boats).

ENVIRONMENTAL MANAGEMENT PLAN			PMA-7
ENVIRONMENTAL MANAGEMENT OF FUELS, OILS AND LUBRICANTS (GROUND AND DOCK)			
OBJETIVES	1. Prevent soil contamination by spills of fats, oils or fuels during the supply of these and the performance of repairs.		
GOALS	Goal 1: To guarantee the fulfillment of 100% of the actions of environmental management foreseen during the tasks of fuel supply, lubrication and maintenance of the machinery on land and artifacts at the service of the project.		
IMPACT	**ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT**	**ACTIVITY**	**ELEMENT / ENVIRONMENTAL COMPONENT AFFECTED**
Alteration of soil physicochemical properties	Irrelevant	Terminal construction on land - Maintenance of construction equipment	Soil

APPLICATION STAGE			
Previous Activities		**Operation**	**X**
Construction	**X**	**Closure**	**X**

TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X		**X**	

ACTIONS TO BE DEVELOPED

ENVIRONMENTAL MANAGEMENT PLAN	PMA-7

ENVIRONMENTAL MANAGEMENT OF FUELS, OILS AND LUBRICANTS (GROUND AND DOCK)

1**. Environmental management of fuels and lubricants**

a) On the part of vehicles, machinery, equipment and boats:

- The vehicles, machinery and equipment used during the construction and operation of the onshore terminal and the seaport, upon arrival at the area of operations must be in optimal condition, without presenting any type of leakage in their systems of storage and distribution of fuel and lubricant.

- During the construction and operation, the vehicles must fill the fuel tank and / or change the oil at a service station near the terminal; if a vehicle, machinery or equipment is required to supply fuel or lubricant, it must be removed from the work station and driven to the site intended to carry out this operation, developing the supply actions of fuels or lubricants recommended by the concessionaire or the equipment supplier. In the same way, during the construction it will be possible to fill tanks and change oils to vehicles in the work areas if these vehicles cannot be transported long distances. For this, it will be possible to have an island of maintenance and temporary filling, which should have a waterproof surface and gutters against spills, to which tank cars will arrive with fuel for filling tanks.

- Likewise, the contractor that supplies the vehicle, machinery or equipment will be responsible for carrying out this operation safely and cleanly. In case of spills, he will execute the Spill Contingency Plan, making sure to leave the place clean and give the contaminated material an adequate final disposition.

- During construction and operation, vehicles must have an anti-spillage kit, which will have at least: sawdust or absorbent materials, shovel and plastic bags.

- The Inspector of Environment, Industrial Safety and Occupational Health, will verify that this operation is carried out safely and cleanly.

- In general, all measures should be taken to avoid fuel leaks and for no reason should there be dumping to the river León, the sea or the ground.

- Containers of lubricants and elements impregnated with oils or fuels should be handled as indicated in the PMA-5 sheet Comprehensive management of hazardous and non-hazardous solid waste (On land, dock and boats).

- The handling, storage and transport of dangerous substances such as fuel and lubricating oils must be carried out following the provisions of Decree 1609 of 2002. Additionally, labeling and marking must comply with the provisions of NTC 1692.

- During the construction and operation, the vessels must comply with the requirements regarding the handling of fuels and oils of MARPOL 73/78.

b) Additional management measures for tugboats, naval devices or auxiliary vessels serving the terminal:

- The supply of fuel and lubricants for the motor ships, auxiliary vessels and artifacts participating in the Project will be received by a port operator duly endorsed by the environmental, energy, maritime and port authorities.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-7

ENVIRONMENTAL MANAGEMENT OF FUELS, OILS AND LUBRICANTS (GROUND AND DOCK)

ESTIMATED SCHEDULE

The measures will be applicable from the beginning of the multipurpose port construction works and may be maintained during the operation and closure phase.

PLACE OF APPLICATION

Onshore terminal and dock

RESPONSIBLE FOR THE EXECUTION

Contractor Personnel in charge of the operation and maintenance of the machinery used during the construction of the work.

REQUIRED STAFF

a. Resident engineer

b. Social-environmental Resident

c. Industrial safety and occupational health Resident

FOLLOW UP AND MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPOSIBLE	TYPE OF REGISTRATION
Goal 1	100%	$\frac{(No.\ of\ vehicles, machinery\ and\ equipment\ co}{(Total\ number\ of\ vehicles, machinery\ and\ eq}$	Contractor personnel responsible for executing this activity	Compliance checklist
Goal 2	0	Number of environmental incidents (spills of fuel, lubricants and other liquids used for the maintenance of machinery) occurred each month = 0	Contractor personnel responsible for executing this activity	Historical record of accidents occurred, photographic record, act of execution of the risk management plan for spills

ENVIRONMENTAL MANAGEMENT PLAN				PMA-7
ENVIRONMENTAL MANAGEMENT OF FUELS, OILS AND LUBRICANTS (GROUND AND DOCK)				
ESTIMATED COSTS				

The associated costs will be part of the construction costs of the project.

• PMA-8 sheet. Environmental management for the dredging of deepening, maintenance and disposal of dredged material.

ENVIRONMENTAL MANAGEMENT PLAN			PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL			
OBJETIVES	1. Plan the deepening and maintenance dredging activities to avoid accidents, spills, and interference in the mobility and transit of vessels in the bay. 2. Verify compliance with environmental legal requirements regarding dredging activities. 3. Prevent and / or mitigate the impacts generated by the dredging activity. 4. Carry out inspection of the compliance of the signaling of the marine intervention area and the internal signaling of the dredge		
GOALS	Goal 1: Execution in 100% of the volume scheduled to be dredged during the deepening and maintenance. Goal 2: Provision of 100% of the dredged material in the dump authorized for the project. Goal 3: Execution of 100% of the bathymetries and environmental programmed monitoring.		
IMPACT	ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT	ACTIVITY	ELEMENT / ENVIRONMENTAL COMPONENT

ENVIRONMENTAL MANAGEMENT PLAN		PMA-8	
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL			
			AFFECTED
Alteration of air quality by gases and particulate material	Moderate	Extraction of seabed material (deepening dredging)	Atmospheric
Alteration in the morphology of the sea bottom	Moderate	Extraction of seabed material (deepening dredging - maintenance dredging)	Soils, geology and geomorphology
	Moderate	Disposal in dump of dredged material (deepening dredging - dredging maintenance)	
Resuspension and redistribution of sediments (Continental and marine)	Moderate	Extraction of material from the seabed (deepening dredging - maintenance dredging)	Soils, geología y geomorfología
	Moderate	Disposal of the dredged material (deepening dredging - maintenance dredging)	
Changes in the physicochemical characteristics of marine sediments	Moderate	Disposal of the dredged material (deepening dredging - maintenance dredging)	Oceanography
Changes in the physicochemical and microbiological characteristics of marine water	Moderate	Extraction of material from the seabed (deepening dredging - maintenance dredging)	Oceanography
	Moderate	Disposal of the dredged material (deepening dredging - maintenance dredging)	

ENVIRONMENTAL MANAGEMENT PLAN		PMA-8	
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL			
APPLICATION STAGE			
Previous Activities		**Operation**	**X**

ENVIRONMENTAL MANAGEMENT PLAN			PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL			
Construction	X	Closure	

TYPE OF MESURE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X			

ACTIONS TO BE DEVELOPED

1. Incorporation and mobilization of personnel, vessels and other equipment to be used

The contractor for the execution of the dredging activities, before starting the work, must inform the dredging plan before the General Maritime Authority- DIMAR for its approval.

The Dredging Contractor must be registered as a port operator with the Ministry of Transportation, and must submit to the Superintendence of Ports, the National Infrastructure Agency, the National Environmental Licenses Authority and the Port Authority of the municipality of Turbo the plan of dredging and its annexes.

In addition, the personnel (officers, crew and operators) of the dredgers, tugboats, barges and auxiliary vessels must have their Licenses and Permits granted by the General Maritime Directorate - DIMAR to exercise their activity and, in the case of foreign personnel, they must have the corresponding Work Visa.

Before the start of the dredging activities, it is necessary that the boats and equipment to be used in the maneuvers carry out an operational inspection to verify their correct operation and fulfillment of requirements.

It is necessary that the personnel required for the development of said activities accredit experience related to the trade.

The machinery and equipment to be used, must have implemented the Comprehensive Safety and Pollution Prevention System following the regulations of the General Maritime Directorate (DIMAR) to ensure safety at sea and damage to the environment. And they must also have the Emergency Plan against marine pollution by Hydrocarbons on board and emergency response with their procedures to respond mainly to the following risks: personal injuries, man overboard, fire or explosion, spillage of fuels or lubricant, collision, uncontrolled drifting, damage to the hull, grounding, sinking and / or abandonment.

The staff of the dredge should be informed about the measures of the environmental management plan, to avoid any eventuality that could affect the environment and the physical integrity of the personnel.

2. Activities prior to the dredging works (deepening and maintenance)

Verify that the memo issued by the Harbor Master's Office let know the navigators and

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

communicate to the maritime user community of Bahía Colombia in the Gulf of Urabá, the start of the dredging activities.

A procedure for communications and control of maritime traffic must be protocolized and socialized, between the Maritime Traffic Control Station, the dredge and units propelled by the contractor, the practical pilots advisors of ships Captains older than 200 GRT, the captains and heads of ships and small boats, which allows them to know the users of the bay and to the dredge the operational situation of all in real time, coordinating with sufficient advance and distance the crosses of the ships, tugboats, fishing boats, banana convoys and other boats, through the dredging area in a safe and coordinated manner.

A programming of the dredging operations will be carried out, to program operation windows that minimally affect the traffic of vessels in the anchorage area in Bahía Colombia.

Maritime traffic regulation programs must be approved and brought to the attention of the competent maritime authority. Any change in the spatial or temporal programming of the deepening and maintenance dredging will be reported to the responsible maritime authority.

Coordinate and install the signage of the area to be dredged in accordance with the Maritime Signaling regulations adopted by the DIMAR.

3. Volume and areas to be dredged

This dredging activity will be executed depending on the commercial needs of the port. In this way, initially the port will have access to vessels that comply with the draught in natural conditions such as: Container ships with a capacity of less than 4000 TEU, bulk ship of 40,000 DWT and general cargo ship of 35,000 DWT. Once the port has access to larger vessels, this activity will be executed in its entirety, considering that the duration of the dredging and disposal takes approximately 140 days.

Below are the dredging areas, when required by the port terminal according to the above:

a) Deepening dredging

It is estimated to dredge approximately 2,800,000 m3 in the maneuvering area of the large draft vessels and access channel that arrives at the dock in Bahía Colombia in the Gulf of Urabá, for a total area of 119.8 ha. Dredging levels defined for container vessels that will dock to the western dock will have a depth of -16.7 m, for the rest of bulk vessels, vehicles and general cargo the required depth dredging is -13.7 m.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

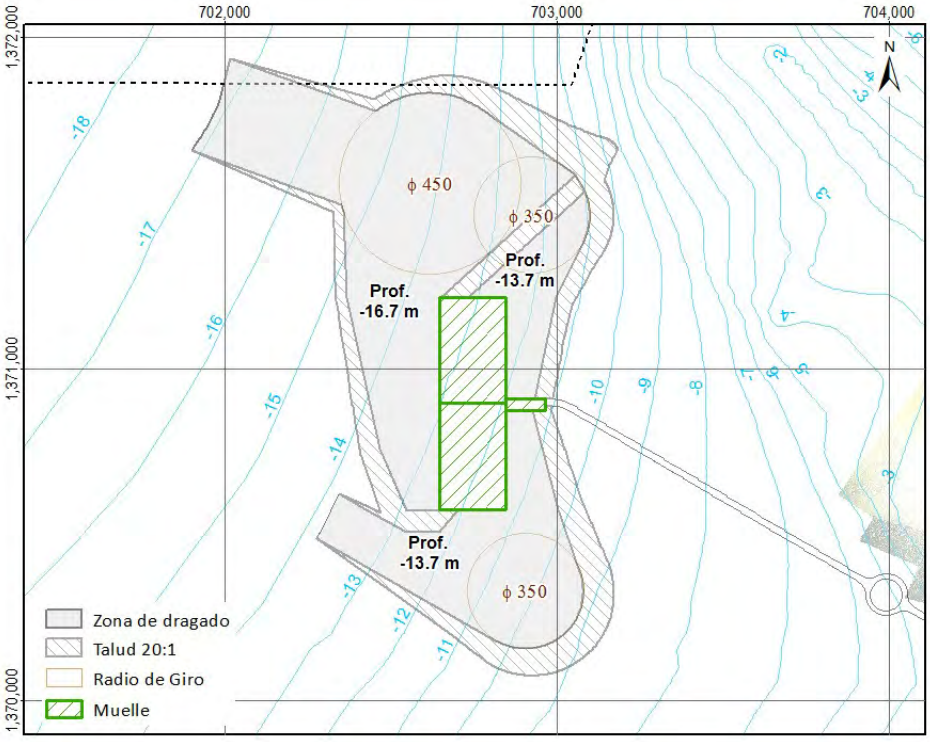


Figure No. 11.7 Areas and volume to be dredged in Bahía Colombia

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

b) Maintenance dredging

According to the sedimentation rate in the area of influence of the project in Bahía Colombia, the maintenance dredging required is minimal since the volume of sedimentation in the southwest sector of the anchorage is around 1 million cubic meters (1,000. 000 m3) between 2001 and 2012, which can be considered as a low sedimentation rate, therefore there is no date for maintenance dredging. Control bathymetries that allow the definition of maintenance dredging will be carried out and previously communicated to the National Authority of Environmental Licenses - ANLA and the General Maritime Directorate - DIMAR.

4. Dredging method

a) The duration of the deepening dredging is about 140 days, once the needs of its start are met.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8

ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL

The dredging operation, both the deepening and the maintenance, must be carried out with maximum suction efficiency, to minimize the resuspension of solids at the material extraction site. It is important to note that the overflow procedure will be carried out during the execution of dredging activities, since the material is very light, and the performance of the dredge is not optimal.

The mechanical elements of the suction of the dredger (pumps, heads, hoses, ducts) must remain in perfect working order and work at the necessary power, to minimize the resuspension of solids in the water column.

The dredge must be well positioned on the dredging areas before starting the activity, complying with the Dredging Plan either the deepening or the maintenance. Additionally, the operation of pumping the material to the hopper of the dredge, the transfer to the dump area and its discharge in said area will also be verified.

In case of dredged material leaks in areas other than the final disposal areas, caused by faults in the pipes or their units, dredging should be suspended until necessary repairs are made.

It is also recommended during dredging activities to maintain permanent contact with the maritime traffic control room, with practical pilots, captains or skippers on board ships sailing in the area, with the purpose of guaranteeing maritime safety of the operations in Bahía Colombia.

Quality monitoring of seawater, bottom and hydrobiological sediments will be carried out before (1 month before), during (50% of the dredging) and after the deepening dredging (1 month after the dredging), for the dredging of maintenance it is proposed that monitoring is done before (1 month before) and after dredging (1 month later), in both cases it is proposed that the monitoring be carried out in the seven (7) stations located in the intervened area of dredging, dump and control point . The location is presented in the PMA - 06 environmental management of water resources.

It is proposed that the dredged material be made first in the areas where the PF-9 M1 station and the Pf-10 M2 station are located near the dock phase I and phase II, since they were stations with presence of mercury (3, 2 mg / kg and 2 mg / kg, respectively) the other stations are below the limit of detention of the analytical technique used by the laboratory, which were classified according to the levels of contamination of dredged material in the Spanish standard - CEDEX Category IIIa and Category II, which correspond to materials with moderate concentrations of pollutants, so they can be discharged into the sea in a controlled manner and soft insulation management techniques.

Next, the sequence of activities for the development of dredging works is presented, both for deepening and for maintenance:

- Location and reference of the dredging area

- Initial official bathymetry in the dredging area.

- Mobilization of the equipment to the dredging area.

- Monitoring of environmental conditions before dredging, both for deepening and for maintenance, which must be before mobilization (1 month before).

- Start of dredging operations with the transfer of the dredger to the authorized area of disposal of

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

the material (authorized dump).

- Realization of intermediate bathymetries to control the efficiency and progress of the project (internal use).

- Monitoring of environmental conditions during the deepening dredging (50% of dredging).

- Final official bathymetry in the dredging area to determine the quantities executed.

- Final official bathymetry in the disposal area of dredged material (dump).

- Demobilization of equipment.

- Termination of work.

- Monitoring of environmental conditions after the dredging activity both the deepening and the maintenance (1 month later).

5. Equipment to be used

a) Dredging is proposed with trailing suction dredgers ((Trailing Suction Hopper Dredger - TSHD), TSHD), designed for deep water, equipped with flexible tubes and suction pumps that suck material from the seabed (fines, sands, or even gravel), they deposit it in their warehouses (cántaras) and transport it to the place of discharge and evacuate it (see Figure No. 11.8).

b) Maneuvering tugboats, which will be used for maneuvers of the dredge, barge and other types of smaller vessels. These tugs have a length of 27.4 m, width of 12.2 m, a draft of 5.5 m and a speed of 12 knots.

c) Support vessel, which will be used as support during dredging, which has a length of 23 m, width 9 m, draft 2 m and a speed of 9 knots.

d) Two boats are required to transport personnel, food and the completion of the bathymetries.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

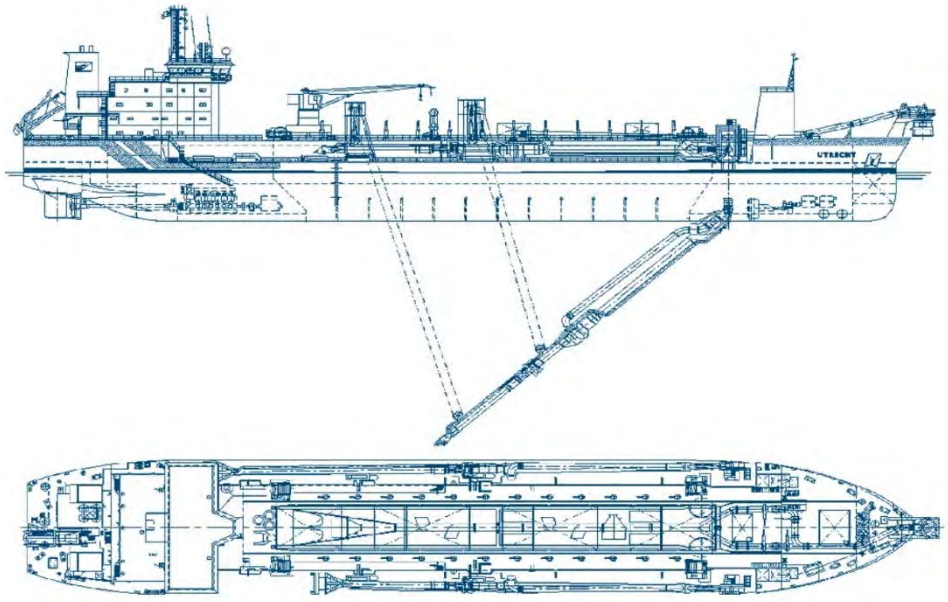


Figure No. 11.8 Suction Drawer Running - TSHD

Source: [Online] <https://betterarchitecture.files.wordpress.com/2013/08/trailing-suction-hopper-dredger1.jpg> [Accessed, October 14, 2015].

6. Control of stability of submarine slopes

a) During the deepening or maintenance dredging activity, work starts on the upper part of the slope, to have better support and avoid instability in the foot of the submarine slope.

b) To ensure a high degree of stability of the slopes, the slopes will be managed in accordance with the technical designs of the dredging for the port terminal "Puerto Bahía Colombia de Urabá (1V slopes: 20H).

c) With the control bathymetries for internal use, the progress and the status of the slopes will be verified.

7. Final disposal of dredged material

Deposit at 4 km (2.1 mn):

Figure No. 11.9 shows the coordinates and the site designated as a dump for the dredged material, which is located 4 km from the dredging area in Bahía Colombia. The dredge must navigate to this sector for the discharge of the dredged material. The approximate total volume for disposal in the

dump is 2,800,000 m3.

It is proposed that the material dredged from stations PF - 9 M1 (depth 12.0 - 12.6 m) and Pf-10 M2 (depth 15.75 - 16.35 m) with presence of mercury, first deposit this material on the seabed and later on they are covered with the rest of the dredged material from the other areas of greater depth that recorded lower concentrations of pollution, covering the sediments in their entirety and avoiding the exposure of the sediments to the aquatic biota, decreasing the probability of affectation to the marine environment.

It is important to highlight that the proposed dump for the disposal of the material is being requested in the current Modification of Environmental License, since in Bahia Colombia to date it does not have an authorized dump for public use by the General Maritime Directorate - DIMAR, The selected dump area has depth belts between 24 and 26 meters with a dimension of 1.4 km in length and 1.4 km in width and a dispersion halo of 0.3 km in the round as shown in Figure No. 11.9 and the location coordinates are presented in Table No. 11.12. The selected area is one of the sectors of greater depth in the area to avoid affecting the navigation and coastal dynamics. On the other hand, this area was also selected because there were no fishing grounds and it does not interfere with the anchorage authorized by the DIMAR for the vessels that arrive in Bahía Colombia, which are vessels related to the plantain and banana export activity.

Table No. 11.12 Coordinates of the location of the dump in Bahía Colombia

VÉRTICE	FLAT COORDINATES MAGNA SIRGAS Origin BOGOTÁ	
	EAST	NORTH
B1	698.497,53	1.376.155,75
B2	698.497,53	1.374.755,75
B3	697.097,53	1.374.755,75
B4	697.097,53	1.376.155,75

Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015.

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8

ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL

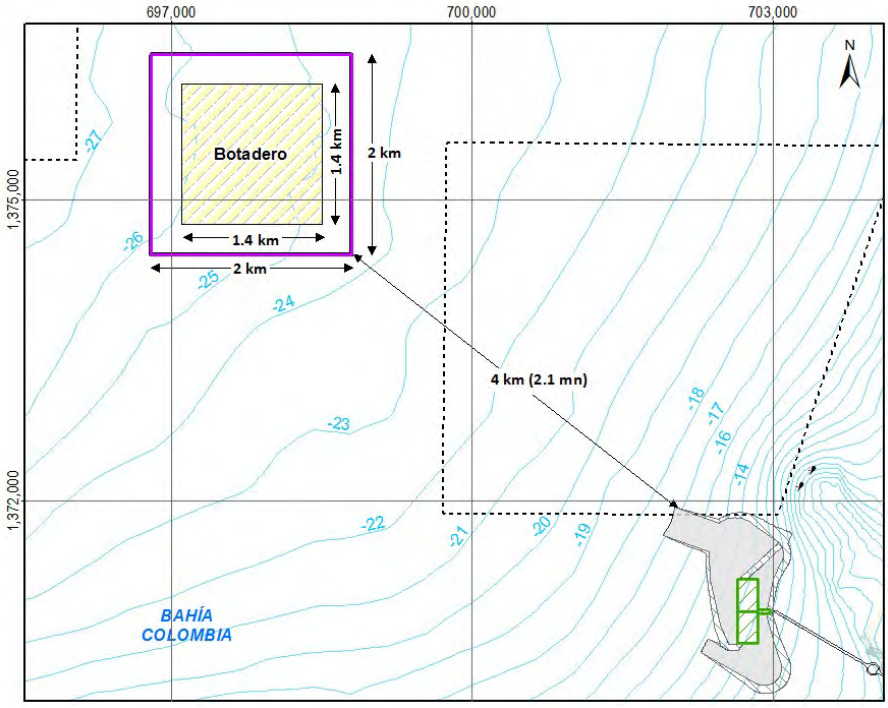


Figure No. 11.9 Disposal area for dredged material (dump) in Bahía Colombia
Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S, 2015.

Other considerations that must be made are presented below:

a) The control of the discharge of the dredged material within the dump area will be carried out by the dredging inspector. In addition, the inspector must verify the positioning system of the dredger and that the equipment is located within the deposit area, to proceed with the opening of the dredge gates.

b) Pre-dredging and post-dredging bathymetries will be carried out in the dump area.

c) Quality monitoring of seawater, bottom and hydrobiological sediments in the dump will be carried out; before (1 month before), during (50% of the dredged volume) and at the end of the deepening dredging (1 month later). To carry out the maintenance dredging, it is proposed to monitor the same parameters, before and at the end of the dredging activity in the dump. See sheet PMA-6 Environmental management of water resources.

8. Verification of the correct signaling of the intervention area and the inside of the dredge

Verification of signage and handling of external traffic

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8

ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL

a) Before starting the dredging activities, it will be verified that the signals in the marine intervention area are installed and in compliance with the provisions of the DIMAR.

b) To facilitate maritime traffic through the project's intervention zones, there will be a Practical Pilot on board, who will be in constant communication with the Harbor Master's Office located in the municipality of Turbo (maritime traffic control center) to coordinate the maneuver that is required.

c) In the same way, a procedure of communications and control of maritime traffic must be agreed between the Harbor Master's Office and the dredges and units propelled by the contractor, the Pilots Practical Advisors of the ships Captains, the captains and skippers of ships and minors vessels that allow them to know the users and the dredge the operational situation of all in real time, coordinating with sufficient advance and distance the crosses of the ships, tugboats, fishing boats, banana convoys, and other vessels, by the dredging area (deepening and maintenance) in a safe and coordinated manner.

d) The maritime traffic control in coordination with the Pilots, should regulate the speed of transit of the different boats that are mobilized in Bahía Colombia, in such a way that the safety of the navigation is guaranteed and the IMPACT´s on the hydrodynamic behavior of other motor ships and boats are diminished.

Verification of the signaling inside the TSHD dredger associated with the project

a) In the dredger's interior installations, the perfect state of the dredging signaling must be verified, such as the lights themselves, informative signs, preventive signals and demarcations of the work areas.

b) In the interior of the dredge facilities there must comply with all signals whether national or international, depending on the origin of the dredge, to alert the risks or dangerous conditions to staff or visitors of the project. If a contingent event occurs, an accurate response and evacuation will be achieved.

c) All the signs used must remain in good condition.

EXECUTION SCHEDULE

The dredging activities of deepening and later the dredging of maintenance, will be executed depending on the commercial needs of the port. In this way, initially the port will have access to vessels that comply with the draft in natural conditions.

The proposed activities should be planned before the deepening and maintenance dredging activities begin, here are some:

Verification of compliance with environmental and marine regulations.

Programming of bathymetries before, during and after dredging

Quality monitoring of seawater, bottom and hydrobiological sediments before (1 month before),

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8

ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL

during (50% of the dredged volume) and after deepening dredging (1 month later).

Quality monitoring of seawater, bottom and hydrobiological sediments before (1 month before) and after maintenance dredging (1 month later).

PLACE OF APPLICATION

- Dredging intervention area in the area of vessel maneuvers and access channel.

- Navigation of the dredger to the dump area that is authorized in Bahía Colombia in the Gulf of Urabá.

RESPONSIBLE FOR THE EXECUTION

Contractor personnel in charge of executing the deepening and maintenance dredging activities.

REQUIRED STAFF

Dredging Director

Environmental Responsible

Responsible for industrial safety and occupational health

Dredging inspector (supervisor)

FOLLOW UP AND MONITORING INDICATORS

GOALS	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTRATION
Goal 1	100%	Dredged volume with overflow / programmed volume of dredging with overflow x100	Contractor of dredging	Contractor of dredging
Goal 2	100%	Volume deposited in the dump / volume programmed to deposit in the dump x100	Contractor of dredging	Contractor of dredging
Goal 3	100%	Batimetrias executed / Batimetrias programmed x 100 Monitoring executed (water, sediments and hydrobiological) / Scheduled monitoring (water, sediments and hydrobiological) x100	Contractor of dredging	Contractor of dredging

ESTIMATED COSTS

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

The costs of this program will be borne by the contractor in charge of the dredging.

The associated costs of marine water quality monitoring, bottom sediments and hydrobiological are presented in the environmental management program of the water resource (PMA - 6 sheet) by the operator of "Puerto Bahía Colombia de Urabá".

a) During the development of operations, the Environment, Industrial Safety and Occupational Health Inspector will carry out periodic reviews of the state of the cargo, conditions and elements of safety on board and on land, verifying that the spoons or clams have the system covered and that Specialized vehicles, or the conveyor belt system, hoppers and storage silos have available capacity.

Liquid bulks

a) The port terminal will not receive tanker ships with liquid cargo of petroleum or its derivatives.
b) The operation of loading and unloading liquid bulk ships, will be carried out with the specialized systems of tankers and the cargo will be made with an external specialized mobile or fixed pumping system, typical of the liquid cargo ship.
c) The handling of the loading and unloading of liquid bulk that will arrive at the port by means of ships will be carried out with the ship's own system or external pumping system, later, they will be driven by means of the transport system by pumping by means of pipelines (pipeline) or they will be transported by tank car to the respective terminal storage tanks on land and finally shipped in tanks.

RoRo Cargo and general cargo

d) Ships with general cargo may be operated on docks 1B, 1C and 1D.
e) The operation of general cargo vessels is planned with the ship's own cranes (3 services), for the general cargo operation on the side of the ship and mobile cranes, which must have the capacity required to reduce spills and accidents in the port that affect the environment.
f) The unloading of ships with RoRo cargo type import, will be carried out by means of a group of drivers, who will have the responsibilities of moving it from on board the ship to the storage area in the terminal.

3. Transport by the viaduct to Onshore terminal:

Solid bulks

The viaduct will have three (3) lanes for the transit of vehicles for the transfer of cargo and two (2) lanes for linear loading, in the case of solid bulk will be transported by two means:

g) Specialized vehicles, which are cover with a tent to avoid the dispersion of particulate material in the atmosphere
h) *A conveyor belt,* located in one of the lanes, which will be covered throughout its route. It will

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL	

carry the load to storage in the silos.

Liquid bulks

The viaduct will have three (3) lanes for the transit of vehicles for the transfer of cargo and two (2) lanes for linear loading, in the case of liquid bulk will be transported by two means:

i) The **polyduct**, located in one of the lanes, which consists of a transport system for pumping over pipes, where a flow distributor will be connected to the maritime dock and this in turn to the ship and vice versa.
j) Tank car, the ship will be unloaded to the tank car by means of the specialized systems of the tankers, later the tank car will travel by the viaduct to the storage tanks in the terminal on land.

RoRo cargo and general cargo

The viaduct will have three (3) lanes for the transit of the vehicles, which will carry the cargo from the terminal on the ground to the dock and vice versa, which will be delivered or stored in the warehouse area or to the ship, according to the type of load.

3. Cargo and release of trucks:

Solid bulk cargo in silos and trucks

k) a) The unloading of the solid bulks will be carried out in specialized facilities on land, which must have filters or technology to avoid air pollution with particles. In addition, vertical silos and specialized warehouses interconnected by conveyor belt systems that have load delivery systems for vehicles must be maintained. The silos must be equipped with bag filters or electrostatic precipitators as presented in the PMA 9 Handbook for the control of atmospheric emissions and noise.
l) To carry out grain shipments, the silo-truck loading system must be aligned and ready. The Environmental, Occupational Safety and Health Inspector will review the conditions of the cargo box and the Port Operator will guide the driver of the vehicle so that it is located in the loading station. Once in position, the Port Operator will communicate to the control room to activate the automatic loading system.
m) The Occupational Health, Safety and Environmental Inspector should verify that once the truck or dump truck is loaded, they should be properly covered with a tent before leaving the Port Terminal, with the purpose of preventing leaks and wind drag of the bulk that is transported.
n) Once the solid bulk discharge operation has been completed, the Port Operator will restore the material, collect the rigging, machinery and equipment, close the warehouses and clean the port plate and storage area on the ground.
o) The Environment Inspector verifies the status of the areas once the Port Operator informs you that they are ready.

Liquid bulks unloading

ENVIRONMENTAL MANAGEMENT PLAN	PMA-8

ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL

p) To prevent spills, a tank containment wall will be built in such a way that it contains 110% tank capacity plus a 10 cm free edge, to avoid contamination to the soil and water in case of occur spills.
q) For the liquid bulks that will enter the terminal on land in tank trucks, the tank trucks will have to be unloaded in an area called "unloading", which will be made under the tank car, through a system of receipt pumps, the product will be conducted to the storage tanks. From there, the bulk will be pumped through the system of the pipeline or transferred by means of tank cars to the maritime dock, in order to avoid spills that affect the ecosystem.
r) The filling of the tank cars will be carried out on the filling island, established for that purpose, minimizing the risk of contamination to water and soil.
s) In case of carrying out the discharge of the liquid bulk through the pipeline, this should be done by means of a pumping system installed in the storage area of the tanks in the Onshore terminal.

RoRo unloading and general cargo

t) One (1) forklift of 25 t, one (1) forklift of 16 t, two (2) forklifts of 7.5 t, two (2) forklifts of 5 ton, will be available at the Onshore terminal, as well can use forklifts of 3.5 t capacity with forks or with gripping devices, which must have the required capacity to prevent spills and accidents in the port.

u) For the operation of heavy and extra-sized cargo, the use of one (1) super post panamax mobile harbor crane is planned, to avoid accidents and possible spills that affect the environment.
v) The unloading of any rolling vehicle (cars, tractor units, backhoe, etc.), for such operation of loading and unloading of import and export vehicles, must be carried out by means of a group of certified drivers, who will transport the vehicles from on board the ship to the storage site at the Onshore terminal. Said personnel must have a current defensive driving certificate for said activity, minimizing the risk of accidents and avoiding environmental damage due to possible accidents.

STIPULATED TIMELINE

During the operation of the port terminal “Puerto Bahía Colombia de Urabá”

APPLICATION PLACE

a) Onshore terminal
b) Dock phase I y phase II
c) Viaduct

EXECUTION MANAGER

Port operator Responsible for “Puerto Bahía Colombia de Urabá”.

REQUIRED STAFF

ENVIRONMENTAL MANAGEMENT PLAN			PMA-8	
ENVIRONMENTAL MANAGEMENT FOR THE DREDGING OF DEPTH, MAINTENANCE AND DISPOSAL OF DREDGED MATERIAL				
a) Environmental resident. b) Resident of industrial safety and occupational health				
MONITORING AND TRACKING INDICATORS				
TARGET	VALUE	INDICATOR	MANAGER	RECORD TYPE
Target 1	100%	$\frac{\text{Load and unload activity authorized complying with environmental manager}}{\text{Total activities to upload and download proposals}}$	Port operator	Field format (Annex 11.1.1.1)
ESTIMATED COSTS				
Costs associated to the port operator.				

1.1.1.1 *Biotic environment*

Table No. 11.21 shows the equivalence of the programs authorized by the ANLA Resolution 0032 of 2012[1] and those proposed for the biotic environment, which include the requests made by the Authority and the respective adjustments according to the needs of the project.

Table No. 11.1 Equivalence of environmental management plans authorized by Resolution 0032 of 2012 and those proposed in this study

[1] COLOMBIA. AUTORIDAD NACIONAL DE LICENCIAS AMBIENTALES – ANLA. Resolución 0032 (25/01/, 2012). Op. cit.

Resolution plan code 0032	Name of the plan and / or environmental management program (Resolution 0032)	Code Plan in the present study	Name of the proposed plan and / or environmental management program
Worksheet MC-3	Environmental management for land clearing and cleaning activities	Worksheet PMB-01	Environmental management of the vegetal cover and the activities to TOPSOIL STRIPPING
Worksheet MC-5	Environmental management of forest use on the property and the corridor of the future gateway	Worksheet PMB-02	Environmental management of forest utilization
Worksheet MC-6	Rescue of wildlife during forest utilization	Worksheet PMB-03	Environmental management of wildlife and habitats protection
Worksheet MC-9	Recovery of vegetation cover and landscape management on the property and the gateway corridor		This plan joins the PMB-01
Worksheet MC-10	Managemente of forest compensation	Worksheet PMB-04	Compensation for biodiversity loss
		Worksheet PMB-05	Environmental management of the hydrobiological communities

Source: Developed by Aqua&Terra Consultores Asociados S.A.S, 2015

- Worksheets of Ambient Management Plan for the Biotic Environment

Worksheet PMB-01 Environmental management Program of vegetation cover and TOPSOIL STRIPPING

ENVIRONMENTAL MANAGEMENT PLAN	PMB-01
ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING	
OBJECTIVES	1. **Execute the necessary environmental management measures to carry out the removal and final disposal of plant material and organic soil to be removed by the project activities.** 2. Minimize the environmental impacts associated with obtaining, handling and disposing of the plant material obtained by the activities of the removal of the vegetation cover and TOPSOIL STRIPPING. 3. Implement environmental management and control measures to avoid the affectation or unnecessary cutting of plant material.
TARGET	Target 1: Implement environmental education through training and talks aimed at workers Target 2: Ensure that only the plant cover provided for the construction of the project

ENVIRONMENTAL MANAGEMENT PLAN		PMB-01	
ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING			
	works and the development of complementary activities that merit said activity are removed. Target 3: Use the organic material product of the TOPSOIL STRIPPING for the later restoration of areas intervened by the project. Target 4: Properly dispose of the plant material obtained by the project activities.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**ENVIRONMENTAL ELEMENT AFFECTED**
Alteration of terrestrial habitats	Severe	Clearing, cleaning, topsoil removal and ground filling - Viaduct, Dock and Jetty	Flora and fauna
	Severe	Clearing, cleaning, topsoil removal and ground fillings – Onshore terminal	Flora and fauna
	Moderate	Clearing, cleaning, topsoil removal and ground fillings - Road	Flora and fauna
Vegetation cover Variation	Severe	Clearance, cleaning, topsoil removal and ground fillings - Viaduct, Jetty and Dock	Flora and fauna
	Severe	Clearing, cleaning, topsoil removal and ground fillings – Onshore terminal	Flora and fauna
	Moderate	Clearing, cleaning, topsoil removal and ground fillings - Road	Flora and fauna

APLICATION STAGE			
Previous activities		**Operation**	
Construction	**X**	**Dismantling**	

MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X	**X**		

ACTIONS TO DEVELOP

1. **Environmental education aimed at workers**

One week before starting the civil works, staff must attend talks or workshops on environmental education and behavior, which will have an intensity of 25 hours there will receive training on this environmental management program and on each of the actions that are exposed in it. For this, the environmental audit will keep records of the attendance records of the workers who attend these trainings.

2. **Clearing**

The clearing activity will consist in the removal of strictly necessary arboreal and shrubby individuals.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-01

ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING

These correspond to individuals identified and registered in the forestry inventory carried out in the forest exploitation plan of the chapter on DEMAND, USE, USE AND / OR AFFECTION OF NATURAL RESOURCES (Chapter 7) of the present study; for this, the contractor must take into account the following general management measures:

The system of removal of arboreal and shrub vegetation will be that of clear cutting with extraction of the root or stump; For this purpose, individuals shall be cut with a chainsaw, ax or other suitable instrument for that purpose, at ground level or approximately 30 cm high from ground level.

The direction of the cut will determine the direction of the fall of the tree, which depends on the place where the wedge is made; that is, the wedge will be made in the direction in which the fall of the tree is desired. In this case it is recommended that the fall of the tree in the track be made towards the axis. After the tree felling will be stump extraction, which consists of removal of the primary roots to a depth of 50 to 70 cm from the ground level; for this, and according to the availability of labor or machinery, appropriate machinery (backhoe or bulldozer) will be used or it will be done manually by using tools such as ax, pike and hoe, among others.

3. **Topsoil removal**

To perform the topsoil removal activities, the depth of the organic layer of the soil must be previously identified and signaled. It will be removed in a minimum thickness of 0.20 m, to remove the organic layer. The vegetal material of topsoil removal will be arranged in temporary zones of vegetal material disposition, avoiding the mixture with other materials or substances that can generate contamination. This soil should be used later in the process of revegetation of the area. The topsoil removal includes the clearance of trunks, roots and organic matter. The layer of organic soil that has not been used, will be arranged as another sector without altering the prevailing conditions of the place.

4. **Management and disposal of plant material**

The area defined for the disposal of the topsoil removal material should be located on flat ground, away from water sources and in areas with little or no vegetation cover.

Under no circumstances should burning of the leftover materials be made as a result of this activity.

Once the soil is laid, the following tasks will be carried out:

- Cover the mound with the material of the clearing (chopped material, leaves and branches), in order to leave the finest materials on the inside, preserving them of any event.
- Place a geotextile or fique fabric as cover, to protect the soil from maximum rainfall and intense solar exposures and possible nutrient washing.

5. To reduce compaction:

- The soil must be handled with the lowest possible moisture content.
- Avoid the passage of machinery over the stored organic material.
- Implement industrial safety measures

Transport vehicles (dump trucks) of materials must have waterproof tarpaulin to cover the hopper, before traveling to the final disposal site. These vehicles must comply with the proposed measures for air quality control and maintenance of machinery and equipment. A permanent inspection should be carried out on drainage works such as ditches, to avoid clogging by garbage or other waste.

6. **Recovery of vegetation cover produced by topsoil removal**

The rapid reuse of stored soil from the topsoil removal should be sought. The areas intervened by the

ENVIRONMENTAL MANAGEMENT PLAN	PMB-01
ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING	

project and that have been left free on the property, after the infrastructure of the land terminal has been installed, will be used to prevent soil erosion. It is recommended to plant grasses (pastures of the area) or sods extracted from the removed plant material, in order to protect the surface against the action of rain and wind.

It is also planned to plant, on the periphery of the facilities of the land terminal, a living barrier composed of ornamental trees typical of the region, such as Oak (Tabebuia rosea), Kapok tree Tolua (Bombacopsis quinata), Balsa tree (Ochroma pyramidale), Panama tree (Sterculia apetala) and Chiminango (Pithecellobium dulce); It is also recommended to plant fruit trees such as mango, guava and citrus.

EXECUTION TIMELINE

This date is effective from the start of construction activities and will continue until its completion.

APLICATION PLACE

Sector included as the area of direct impact of the project; which is formed by a corridor of 2474.7 m long and 60 m wide, for an area of 148,484 m^2 that goes from Nueva Colonia township, to the land where the terrestrial terminal of the port will be built.

The property (350,079 m^2) plus the withdrawal strip of the León rivers and the Nueva Colonia canal (63,358.58 m^2) have an area of 413,437.68 m^2; and a strip of 437.6 m long and 20 m wide (9,832.7 m^2), which is within the Protective Forest Reserve of León and Suriquí Rivers wetlands declared by agreement No 100-02- 02-01-0010-2011 by CORPOURABÁ[33][2] and which includes the mangrove vegetation of this area, as shown in Figure No. 11.15.

This last strip was taken from the Protective Forest Reserve through the agreement No 100-02-02-01-0004-2011 by CORPOURABÁ [34][3], with the purpose of constructing the viaduct that will lead from the land terminal to the dock.

[2] CORPORACIÓN PARA EL DESARROLLO SOSTENIBLE DEL URABÁ – CORPOURABÁ. Acuerdo No 100-02-02-01-0004-2011., Óp. cit. P. 6.

[3] CORPORACIÓN PARA EL DESARROLLO SOSTENIBLE DEL URABÁ – CORPOURABÁ. Acuerdo No 100-02-02-01-0004-2011., Óp. cit. P. 6.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-01

ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING

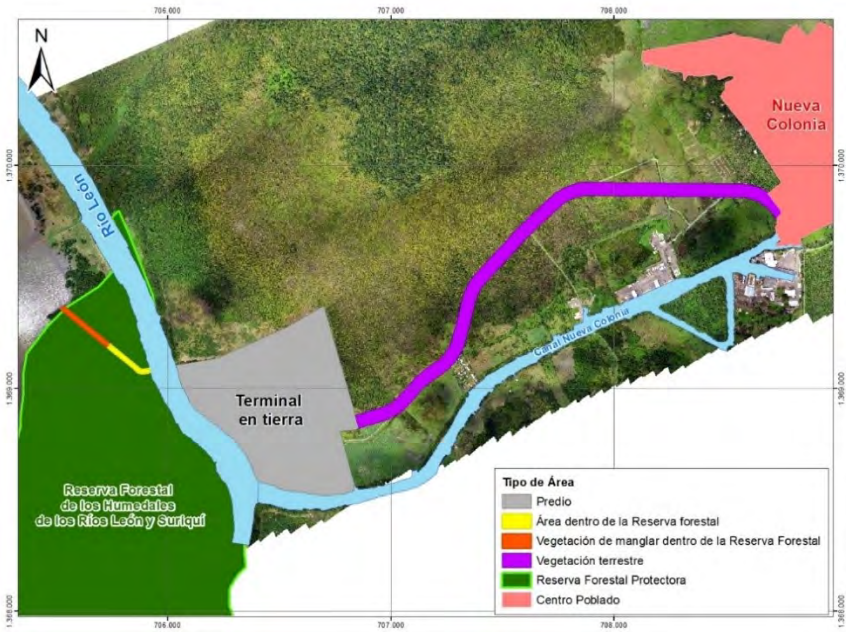


Figure No. 11.1 Area of direct impact of the project
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Reserva forestal de los humedales de los Rios León y Suriquí: Forest reserve of rivers León and Suriquí wetlands
Terminal en tierra: Onshore Terminal Canal Nueva Colonia: Nueva Colonia Channel Tipo de área: Área type Predio: Property Área dentro de la reserva forestal: Area within the forest reserve
Vegetación de manglar dentro de la Reserva Forestal: Mangrove vegetation within the forest reserve
Vegetación terrestre: Land vegetation Reserva forestal protectora: Protective forest reserve
Centro poblado: Population center

EXECUTION MANAGER

Construction contractor

REQUIRED STAFF

PROFESSIONALS
- Civil Engineer
- Forest Engineer.
- Industrial Safety Engineer

TECHNICIANS
- Heavy machinery operator

UNSKILLED LABOR
- Work assistant

ENVIRONMENTAL MANAGEMENT PLAN			PMB-01	
ENVIRONMENTAL MANAGEMENT PROGRAM OF VEGETATION COVER AND TOPSOIL STRIPPING				
MONITORING AND TRACKING INDICATORS				
TARGETS	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1	100% of the workers in charge of the work of clearing and topsoil removal	Training: (Number of trained workers who participated in the development of the clearing and topsoil removal / No. of trained workers) * 100	Construction contractor	Attendance acts records of workers who attend these trainings
Target 2	100% of the area directly affected by the project	Intervention area (Clearance and topsoil removal): (Total (m²) of area intervened / Area (m²) planned intervention (design plans)) * 100	Construction contractor	According to design plans
Target 3	100% of plant material product of topsoil removal	Recovery of vegetal material: (Area (m²) recovered with the material coming from stripping / Area (m²) of stripping area) * 100 (Area planted or sown with shrubs or trees / Intervened area of the property that has been left free (without facilities or roads)) * 100	Construction contractor	Area (m^2) of material removed product of topsoil removal
Target 4	100% of the prepared plant material	Management and disposal of plant material: (Volume of material arranged / Volume of existing plant material) * 100	Construction contractor	Volume of prepared plant material

QUANTIFICATION AND COSTS		
No	Description	Estimated cost
1	Execution of the activities for the Plant Cover Management Program and topsoil removal activities	The activities of clearing and topsoil removal are considered within the construction costs of the works. The contractors will allocate the necessary resources to correctly execute the cleaning and evacuation of the materials from the work areas

- *Worksheet PMB-02 Forest utilization environmental management program*

ENVIRONMENTAL MANAGEMENT PLAN		PMB-02	
FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM			
TARGETS	1. Implement technical criteria for the realization of forest utilization in the direct intervention area of the project. 2. Define strategies for the collection, storage and rational use of resources obtained by the activity of using the vegetation present on the area to be intervened.		
TARGETS	Target 1: Implement an environmental education program through training and talks aimed at workers. Target 2: Intervene only the authorized areas for forest utilization, fully demarcated and marked. Target 3: Give an adequate management to the products coming from the felling, using it for the forest uses reported by the community and in the activities of the project.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**ENVIRONMENTAL COMPONENT/ELEMENT AFFECTED**
Terrestrial habitats alterations	Severe	Clearance, cleaning topsoil removal and ground fillings - Viaduct, dock and jetty	Flora and fauna
	Severe	Clearance, cleaning, topsoil removal and ground fillings – Onshore terminal	Flora and fauna
	Moderate	Clearance, cleaning, topsoil removal and ground fillings - Road	Flora and fauna
Plant cover variation	Severe	Clearance, cleaning topsoil removal and ground fillings - Viaduct, dock and jetty	Flora and fauna
	Severe	Clearance, cleaning, topsoil removal and ground fillings – Onshore terminal	Flora and fauna
	Moderate	Clearance, cleaning, topsoil removal and ground fillings - Road	Flora and fauna

APLICATION STAGE			
Previous activities		**Operation**	
Construction	**X**	**Dismantling**	

MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X	**X**		

ACTIONS TO DEVELOP

ENVIRONMENTAL MANAGEMENT PLAN	PMB-02

FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM

1. Environmental eduction for workers

Before starting the forest exploitation, the workers who participate in this work will receive training in this environmental management program and on each one of the actions that are exposed in it. Therefore, the environmental audit will keep records of the attendance acts of the workers to the talks or induction workshops. The environmental education workshops will contemplate topics such as terrestrial habitats, Importance of natural resources, mainly flora; tree cutting systems, addressing the fall of trees, personal protection elements, among others.

2. Forest utilization

The forest utilization will be carried out on the area of direct affectation of the project. The system of forest utilization that will be used in the so-called clear-felling, that is, that those individuals to intervene that present DBH (diameter at breast height) less than or equal to fifteen centimeters (≤15 cm),
they will be cut using the ax as a tool; For individuals with DAP greater than fifteen centimeters (> 15 cm), it is recommended to use the chain saw. The individuals must be cut at ground level, or 30 cm high from the ground, to be able to perform the extraction of the root system. Trees with large crowns should be removed from the larger branches before cutting. At the moment of making the cut, the fall of the tree must be directed using the wedge in the direction in which the fall of the tree is desired.
The shrub-like forest use will be made using machetes and axes according to their branch density.

The trees to be felled will be cut with the appropriate equipment consisting of: - Ax for individuals with DBH≤15 cm and chainsaw for individuals with DBH> 15 cm.
- Basic industrial safety equipment.
- Manilas
- Pulleys
- Wedges
- High brand cutter

The procedure is as follows: The individuals to be exploited will be removed by knocking down the complete shaft and directing its fall; after that, the cutting of the same will be carried out for its use in constructive activities of the project, or it may be distributed among the inhabitants of the area of influence of the project.

To carry out the felling using the chainsaw, the direction of fall and the direction of escape will be chosen. Both the direction of fall of the tree and of escape must be free of any material or obstructive element. The cut is made at a height with respect to the floor of approximately 0.3 m. A perpendicular cut will be made with respect to the position of the tree at an angle of 45 °, up to approximately half the diameter of the shaft. To avoid tearing the tree and direct its fall, a steering wedge is made, which will unbalance the tree's resistance. Its depth should be between ¼ and 1/5 of the diameter of the base of the tree. Finally, a cut will be made on the back of the shaft and in the direction of the escape route.

The auxiliary personnel will proceed to cut the branches of the cup until the shaft is completely in contact with the ground.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-02
FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM	

Figure No. 11.2 Fall cut tree
Source: PINO PINASTER[4]

Corte de caída: Fall cut Bisagra: Hinge
Direction of fall: This cut must not exceed 33% of the width of the tree

The auxiliary personnel will proceed to cut the branches of the cup until the stem is completely in contact with the ground.
The work will include the temporary disposition or definitive treatment of all the waste coming from the work of eliminating the trees. The timber material from felling can be used in the construction of geotechnical protection works; while the non-timber material obtainable from the clearing activity such as foliage, twigs, branches and non-woody material may be replicated and used as organic material of the project or in some places within the forest.

There will be a storage and temporary disposal of plant material, which must have the following characteristics:
- The plant material will be disposed in temporary zones, avoiding mixing with other materials or substances that may generate contamination. The area defined for the disposal of the material should be located on flat ground, away from water sources and in areas with little or no vegetation cover.

[4] PINO PINASTER. Pine forestry technical manual. 2007. 2 p.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-02

FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM

-The removal of stumps and root systems of the trees immersed in the soil will be carried out in the excavation process with a backhoe or similar machinery or skilled labor for that purpose, according to the availability of resources. This plant material will have the same treatment as the top trimming.

Care should be taken to ensure the well-being and health of the workers (chainsaw operator and assistant); that is, they must have the elements of personal protection and adequate equipment to perform these tasks. Precautions should be taken to avoid work accidents. For example: inspect that there is no presence of personnel in the sector of falling trees, that the withdrawal paths (without obstacles) are prepared for each of the people employed in the felling. Likewise, the direction of the wind, inclination and shape of the crown, the work site near the trunk, among others, should be taken into account. Review in situ the security measures to carry out this activity, that is, marking of the sector with adequate tapes, direction of free fall, suitable personnel for carrying out this activity. An inspection and prior recognition of temporary disposal sites for plant materials must be carried out before proceeding with the placement of the same.
It is necessary to detect undesirable activities such as burning, disposal of materials on roads or paths, removal of unauthorized trees, failure to comply with basic and vital measures of industrial safety, or development of inappropriate and risky methodologies, etc. Burning of plant material will be completely forbidden during the development of the project, under no circumstances should burning of the remaining materials, product of this activity, be carried out.

3. Handling of felling products

The harvested wood will be used in the area, according to the forest uses reported by the community, among which stand out, stakes for fences, domestic constructions, firewood, coal, rods, among others.
Similarly, it will be used in the realization of some activities of the project, such as forms, signage lock, among other uses.

EXECUTION TIMELINE

To carry out forest exploitation of 57.17 hectares, it is estimated 3 months corresponding to 12 weeks of work, which will begin to run during the construction phase of the project.

APLICATION PLACE

The activities of forest exploitation will be carried out in the sector understood as the zone of direct affectation of the project; which is formed by a corridor of 2474.7 m long and 60 m wide, for an area of 148,484 m^2 that goes from Nueva Colonia township, to the land where the terrestrial terminal of the port will be built.
The property (350,079 m^2) plus the withdrawal strip of the León rivers and the Nueva Colonia canal (63,358.58 m^2) have an area of 413,437.68 m^2; and a strip of 437.6 m long and 20 m wide (9,832.7 m^2), which is within the Protective Forest Reserve of the León and Suriquí River wetlands declared by agreement No 100-02- 02-01-0010-2011 by CORPOURABÁ[5] and which includes the mangrove vegetation of this zone, as can be observed in the one shown in Figure No. 11.15.

[5] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ. Agreement No 100-02-02-01-0010-2011 (06/16/2011). By means of which the category of protected area of the Protective Forest Reserve of the Wetlands is certified between the rivers León and Suriquí in the municipality of Turbo, created in the agreement of the directive council No 100-02-02-01-011-2009 with the category of protected area Regional Natural Park (Decree 2372 of 2010). Apartadó, 7 p.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-02

FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM

This last strip was removed from the Protective Forest Reserve through the agreement No 100-02-02-01-0004-2011 by CORPOURABÁ[6], in order to build the viaduct that will lead from the land terminal to the dock.

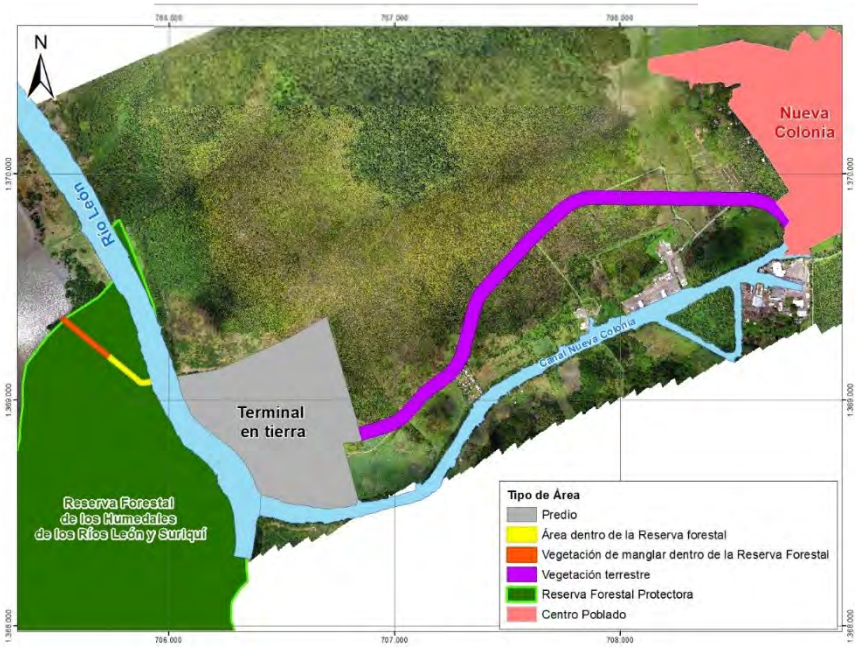


Figure No. 11.3 Area of direct impact of the project
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Reserva forestal de los humedales de los Rios León y Suriquí: Forest reserve of rivers León and Suriquí wetlands
Terminal en tierra: Onshore Terminal Canal Nueva Colonia: Nueva Colonia Channel Tipo de área: Área type Predio: Property Área dentro de la reserva forestal: Area within the forest reserve
Vegetación de manglar dentro de la Reserva Forestal: Mangrove vegetation within the forest reserve
Vegetación terrestre: Land vegetation Reserva forestal protectora: Protective forest reserve Centro poblado: Population center

EXECUTION MANAGER

Construction contractor

REQUIRED STAFF

PROFESSIONALS
- Civil Engineer
- Forest Engineer

[6] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ. Agreement No 100-02-02-01-0004-2011 (03/17/2011). By means of which an area of the Protective Forest Reserve of the wetlands between the León and Suriquí rivers is partially and temporarily subtracted and a season is partially lifted. Apartadó, 6 p.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-02

FOREST UTILIZATION ENVIRONMENTAL MANAGEMENT PROGRAM

- Industrial Safety Engineer

TECHNICIANS
- Heavy machinery operator

UNSKILLED LABOR
- Work assistant

MONITORING AND TRACKING INDICATORS

TARGETS	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1	100% of the workers in charge of the work of forest utilization	Training: (Number of trained workers who participated in the development of the clearing and topsoil removal / No. of trained workers) * 100	Construction contractor	Attendance acts records of workers who attend these trainings
Target 2	100% of área to be intervened for forest utilization	((Total intervened area) *100) / (Authorized area for forest utilization)	Construction contractor	Used area weekly
Target 3	Appropriate use of 90% of the products from felling	Percentage of volume of usable wood: (Usable volume of wood) / (Volume of extracted wood) * 100	Construction contractor	Volume of harvested wood weekly

QUANTIFICATION AND COSTS

No	Description	Estimated cost
1	Workers training	**Cost 1.** The costs of training on environmental education for workers are estimated at $ 3,000,000; includes documentation of topics, preparation of workshops, travel and refreshments.
2	Forest utilization	**Cost 2.** The costs corresponding to the activities of forest utilization in the area of direct affectation of the project, are estimated in $ 82,416,600; It is clear that this cost is subject to change according to the construction contractor. Chapter 7 presents the details of the costs.

- *Worksheet PMB-03 Environmental management program for handling of wildlife and protection of habitats*

ENVIRONMENTAL MANAGEMENT PLAN			PMB-03
ENVIRONMENTAL MANAGEMENT PROGRAM FOR HANDLING OF WILDLIFE AND PROTECTION OF HABITATS			
OBJECTIVES	1. Minimize the affectation to the wild fauna, that can be generated by the constructive and operative activities of the project. 2. Protect the wildlife present in the project's intervention area		
TARGETS	Target 1: Drive away the maximum possible number of organisms present in the area to intervene with special emphasis on endangered species, endemic or with some degree of ecological importance. Target 2: Rescue of at least 90% of the individuals present in the area to intervene with special emphasis on endangered, endemic or with some degree of ecological importance. Target 3: Relocation and transfer of the total of the species rescued to similar habitats, with a survival during this process greater than or equal to 90%. Target 4: Fauna management training for staff willing to carry out land clearing and clearing and forest utilization. Target 5: Construction of wildlife and signaling steps.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**AFECTED ENVIRONMENTAL ELEMENT**
Change in the dynamics of wildlife communities	Severe	Clearance, cleaning, topsoil removal and ground fillings	Flora and Fauna
Alteration of terrestrial habitats	Severe		

APLICATION STAGE			
Previous activities		**Operation**	**X**
Construction	**X**	**Dismantling**	

MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
	X	**X**	

ACTIONS TO DEVELOP

1. **Training**

All personnel participating in the project will be trained, paying special attention to those who participate in the work of clearing and clearing the land and of forest use regarding the importance of conserving wildlife, explaining the basic principles of the rescue of susceptible species to be found.

Emphasis will also be placed on the risks associated with the rescue of snakes and the proper way to act in the event of an ophidian accident. The capture for commercial or personal purposes, the hunting of fauna or the sacrifice of animals will be prohibited.

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2. **Short sampling**

In the intervention zone where the fauna is expected to be affected, a short sampling should be carried out, using specific methodologies for each group of individuals, identifying species richness and abundance, among other ecological characteristics. This sampling should be carried out at least one month before initiating the repelling. The methodology used for short sampling will depend on the approved techniques that the person in charge of executing the Management Plan has according to the study permit for the collection of specimens of wild species of biological diversity in order to elaborate environmental studies and the criterion of the professional responsible for the taxonomic group.

3. **Drive away the wild fauna present in the area of intervention of the project**

Repelling the fauna it will be carried out in the areas that will be intervened by the constructive activities of the project (up to the protection strip of the project), where vegetation removal and access roads will be carried out. The repellling should be done 10 to 15 days before the construction work begins, by trained personnel with experience in the preservation of natural resources. The procedure consists of walking the area on foot to ward off the fauna, generating noise, digging the ground and removing leaf litter with the help of long rods, covering holes in areas of shrubbery and at ground level. The fauna that remains in the area must be rescued, captured and processed in the place of passage arranged by CORPOURABÁ to be later released in the sites identified for the relocation.

To prevent the repelled fauna from returning to the work sites, the area should be fenced by the installation of barriers with a minimum height of 1.50 m and the necessary length, polypropylene or similar fabric can be used, making sure that it should be fixed to the ground enclosing the area that will be intervened. This information is expanded in Annex 11.1.1 PMA.

4. **Location of the sectors for the relocation and / or transfer of rescued wildlife**

The location of the sectors where the rescued fauna will be relocated, will be previously agreed with CORPOURABÁ officials a minimum of one month before initiating constructive activities, to have the support and availability of the sites identified by this environmental authority and thus avoid inconveniences ecological superimpositions of species that compete for resources or spaces. Likewise, a work plan will be organized to coordinate wildlife transfer activities to the temporaty home in case of need. These agreements and delivery of organisms to CORPOURABÁ, must be documented by means of photographic and / or filmic record, likewise it will be ratified by means of minutes.

5. **Rescue, capture and relocation of wildlife found in the project intervention area**

The rescue, capture and relocation of the fauna must be carried out at the same time as the repelling and in the company of a CORPOURABÁ official, where first they are scared away and then the persistent species are sought in the areas that were subject to the repelling.

The captured fauna will be transported in cloth bags or cages according to the group and size of the animal, at all times dehydration should be avoided by isolating individuals from solar radiation, through

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the use of sacks or vegetation. All individuals will be transported initially to the center of passage arranged by CORPOURABÁ. Those individuals that are found dead will be prepared and preserved following the specific methodologies for each group[7] [8] [9] and will be deposited in the biological collections attached to the Humboldt Institute.

For each faunal group whose organisms have not been possible to repel and will require rescue by capture, a specific methodology will be implemented, which is suggested below. These methodologies may vary according to the criteria of the professional in charge. In turn, the person responsible for executing this plan must have up-to-date study permits for the collection of specimens of wild species of biological diversity for the purpose of preparing Environmental Studies.

Birds: For the capture of small to medium-sized birds, ATX 12 type fognets will be installed (dimensions: 12.5 m long and 2.5 m wide). The networks should remain open for an approximate time of 3-4 hours (05:00 to 09:00 and from 17:00 to 18:30), in case of rain the networks will be closed to avoid the death of the individuals. The capture of larger birds (turkeys, herons, chickens) will be done with "jamas" devices, attracting them with playback (auditory reproduction of sounds specific to each species) of their vocalizations.

The identification of the captured individuals should be done with the help of specialized guides for birds [10] [11], museum specimens and photographs. The individuals will be transported in cloth bags, immobilizing large birds with bandages to avoid injuries during the transfer to the relocation site.

In case of finding nests with eggs and / or chicks, they will be protected with toilet paper and an aluminum foil cover to avoid minor deformations [12]. The transport of the nests (with eggs) will be carried out using plastic boxes with perforated covers or covered with gauze in case the nest is occupied by chicks. Chicks must be hydrated using droppers with water. As much as possible, we will try to relocate the nests according to the specifications (height and substrate) to those found in nearby trees that will not be used.

Mammals: Small-scale, three-size Sherman type traps will be used, large (10.1 x 11.4 x 38.1 cm),

[7] RAYMOND HALL, E. Collecting and preparing study specimens of vertebrates. Lawrence, Kansas.: University of Kansas Museum of Natural History, 1962. 46 p.
[8] SIMMONS, John. Herpetological Collecting and Collections Management. U.S.: Society for the study of amphibians & Reptiles, 2008. 153 p. ISBN 9780916984601.
[9] WINKER, Kevin. Obtaining, preserving and preparing bird specimens. In: Journal of ield ornithology. 2000, 71 (2),. p. 250 – 297.
[10] McMULLAN, Miles, DONEGAN, Thomas y QUEVEDO, Alonso. Field guide of the birds of Colombia. Foundation ProAves. Bogotá. 2010. p. 225. ISBN 978-0982761526
[11] HILTY, Steven., BROWM, William. Guides of the birds of Colombia. Translated by Humberto Álvarez López. Colombia.: Ornithological Society from Antioquia, 2001. ISBN 978-958-33-2254-9.
[12] KIFF, L. F., MARIN, M. A., SIBLEY, F. C., MATHEUS, J. C. & SCHMITT, N. J. Notes on the nests and eggs of some Ecuadorian birds. In: Bulletin of the British Ornithologists' Club, 1989. 109, p. 25 – 31.

medium (7.6 x 8.8 x 22.8) and small (5 x 5 x 22.8). The traps will be baited with a mixture of oat flakes, banana and peanuts, others with seeds and / or sardines, according to the trophic guild. Every day in the morning the traps will be reviewed and recited.

Because some terrestrial mammals are not attracted to the bait used in Sherman traps, an effective methodology for their capture is the use of fall traps. These consist of plastic containers of approximately 15 liters, with perforations in the base for drainage, which are buried leaving the mouth at ground level[13]. In the case of aquatic mammals, the guidelines established with CORPOURABÁ for their capture and transport will be followed.

All captured individuals will be taken body measurements and respective reproductive data following Hall (1962)[14], additionally they will be photographed, and their external diagnostic characters will be registered, all this in order to give an identification as accurate as possible.

Herpetofauna: when it comes to herpetofauna the methodology and field techniques proposed by Manzanilla and Péfaur will be followed [15] and other authors such as Palacio and collaborators [16] and Angulo and editors[17].

These techniques basically consist of day and night tours, where the observed individuals will be captured manually, in the case of snakes, a herpetological hook should be used. Like the other taxonomic groups, these will be measured, photographed and identified up to the lowest possible taxa with their respective inspection by the veterinarian. The transport guidelines discussed above will be followed.

Note: Special care will be taken with species of interest for conservation and / or bans, following the guidelines established above and the recommendations of the environmental authority CORPOURABÁ.

5. Installation of wildlife passages, speed reducers and wildlife signaling

To guarantee the protection of the fauna identified in the area of influence, it is proposed to install wildlife passages in the intervention areas.

In the sector of the road it will be necessary to build specific underpasses for the passage of large,

[13] VOSS, Robert., LUNDE, Darrin., SIMMONS, Nancy. The mammals of Paracou, French Guiana: A Neotropical Low Land Rainforest Fauna Part 2. Nonvolant species. In: Bulletin of the American Museum of Natural History. June 2001, no. 263, pp. 236.

[14] RAYMOND HALL. Op. cit.

[15] MANZANILLA, Jesús & PÉFAUR, Jaime E. Considerations on methods and field techniques for the study of amphibians and reptiles. In: Journal of Latin American Ecology. August 2000. vol. 7. no. 1-2 art. 3, p. 17 – 30.

[16] PALACIO BAENA, Jaime Alberto., MUÑOZ ESCOBAR, Eliana María., GALLO DELGADO, Sandra Milena., RIVERA CORREA, Mauricio. Amphibians and reptiles from Valle de Aburrá. Medellín.: Editorial Zuluaga Ltda, 2006. 92 p. ISBN 958-33-9901-9.

[17] ANGULO, Ariadne., RUEDA-ALMONACID, José Vicente., RODRÍGUEZ-MAHECHA, José Vicente & LA MARCA, Enrique (eds). Inventory and monitoring techniques for amphibians in the Tropical Andean region. Bogotá, D.C. – Colombia.: Panamericana forms and printed S.A, 2006. 150 p. (Manual Field Series No. 2). ISBN 978-958-97690-5-8.

medium and small mammals (otters, chigüiros, etc), reptiles (lizards, turtles, etc.) and amphibians. The road should be adapted with culvert box structures and / or by adapting the projected drainage structures which must have a minimum of 2 m X 2 m (Figure No. 11.18) and steps of arboreal fauna (Figure No. 11.19 B and C), following the guidelines outlined in the techniques for the design of wildlife passages and perimeter fences[18]. Likewise, speed reducers and wildlife signaling should be installed.

Figure No. 11.4 Examples of wildlife underpass structures
Source: MMA - Madrid, 2006

In the sector of the viaduct it is recommended that this has a design with a **diverse typology** (Figure No. 11.19 A) **following the g**uidelines outlined in the techniques for the design **of wildlife passages and perimeter fences[19], so that s**aid viaduct allows to re-establish the intervened **habitat and conserve those present around it. In th**e same way, steps of arboreal fauna should be **installed** [20] **that allow to generate connectivity with th**e reserve and to avoid the fragmentation of the **habitat** (Figure No. 11.19

[18] MINISTRY OF THE ENVIRONMENT. Prescriptions for the design of wildlife passages and perimeter fences. Documents for the reduction of habitat fragmentation caused by transport infrastructure, number 1. O.A. National Parks. 2006. Ministry of the Environment. Madrid. 108 p.
[19] Ibíd., p. 48.
[20] Ibíd., p. 46.

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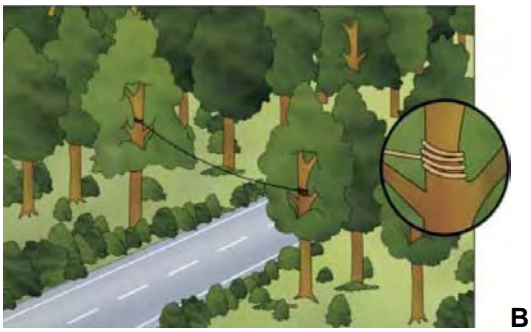
B and C).

A



B

C

Figure No. 11.5 A. Viaduct that allows continuity of fluvial course and prevents fragmentation. B and C. General scheme of wildlife passage between trees
Source: MMA - Madrid, 2006 and Ruta del Sol Sector-II

ESTIMATED TIMELINE

Activity	Preliminary	Constructive	Operational
Training			
Repelling of wildlife present in the area of intervention of the project			
Location of the sectors for the relocation and / or transfer of rescued fauna			
Rescue, capture and relocation of wildlife found in the project's intervention area			
Fauna steps and signaling			

APLICATION PLACE

Project intervention area

EXECUTION MANAGER

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Personnel contractor in charge of executing this activity				
REQUIRED STAFF				
- A biologist or ecologist with knowledge in herpetos - A biologist or ecologist with knowledge in birds - A biologist or ecologist with knowledge in mammals - CORPOURABÁ official - Four auxiliaries - Engineering team that is part of the work for the construction, installation and / or adaptation of underpasses and arboreal for wildlife.				
MONITORING AND TRACKING INDICATORS				
TARGET	**VALUE**	**INDICATOR**	**MANAGER**	**REGISTER TYPE**
Target 1	>90%	Number of individuals repelled / Number of individuals registered or observed * 100	Contractor personnel responsible for executing this activity	Field format
Target 2	>90%	Number of individuals rescued / Number of individuals registered or observed * 100		Field format
Target 3	100%	Number of individuals relocated / Number of individuals rescued * 100		Field format, acts y photographic or film record
	>90%	Number of individuals rescued / Number of alive individuals released * 100		
Target 4	100%	Number of people trained / Number of people assigned for cleaning, clearing, discarding and forest utilization	Contractor personnel responsible for executing this activity	Minutes and photographic and / or film record
Target 5	>80%	Bottom and arboreal steps built and / or installed / Construction and / or installation of underpasses and arboreal projected * 100	Contractor personnel responsible for executing this activity	Photographic and / or film record, field formats
ESTIMATED COSTS				
The associated costs will be part of the constructive and operative costs of the work.				

- *Worksheet PMB-04 Compensation program for biodiversity loss*

ENVIROMENTAL MANAGEMENT PLAN			PMB-04
COMPENSATION PROGRAM FOR BIODIVERSITY			
OBJECTIVES	1. Performing through revegetation (floristic enrichment) or reforestation of forest species an increase in vegetation coverage of the ecosystems intervened during the construction of the project PUERTO BAHÍA COLOMBIA DE URABÁ. 2. Ensure the sustainability of the process through the development of maintenance activities and monitoring of the compensated areas.		
TARGETS	Target 1: Implement environmental education through training and talks aimed at workers. Target 2: Compensate at 100% in the indicated proportions the areas intervened by the development of the project. Target 3: In the areas to compensate carry out the follow-ups and maintenance to increase the forest cover, contribute to the regulation of the water resource and increase the biodiversity of the area, in order to increase natural habitats.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**ENVIRONMENTAL AFECTED ELEMENT**
Alteration of terrestrial habitats	Severe	Clearance, cleaning, topsoil removal and ground filling - viaduct, dock and jetty	Flora and fauna
	Severe	Clearance, cleaning, topsoil removal and ground filling – Onshore terminal	Flora and fauna
	Moderate	Clearance, cleaning, topsoil removal and ground filling - Road	Flora and fauna
Variation of vegetation cover	Severe	Clearance, cleaning, topsoil removal and ground filling - viaduct, dock and jetty	Flora and fauna
	Severe	Clearance, cleaning, topsoil removal and ground filling – Onshore terminal	Flora and fauna
	Moderate	Clearance, cleaning, topsoil removal and ground filling - Road	Flora and fauna
APLICATION STAGE			
Previous activities		**Operation**	**X**
Construction		**Dismantling**	
MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
			X
ACTION TO DEVELOP			
1.Workers training Before starting the reforestation work, all the personnel that will carry out the different tasks must be			

trained. The trainings will contemplate the following topics: Importance of natural resources, reforestations, selection and collection of propagules or saplings, preparation of the land, layout, to make pits, sowing and replanting, as well as activities of maintenance, conservation and protection of the compensated areas

2. Densities and planting distances

The density of planting for the compensated mangrove areas will be on average 476 seedlings per hectare in different distances according to the planting method. And for the areas compensated with species other than the mangrove, a planting density of 1,283 seedlings per hectare is calculated in the triangular pitch arrangement or "chicken leg", as described in detail in chapter 11.2.2 of the compensation plan. loss of biodiversity, of the present study.

3. Selection and Collection of Mangrove Progules or saplings

At the time to harvest the propagules or saplings, the following characteristics must be considered:

1. Origin or origin of the propagules.
2. Size of 20 cm and up.
3. Right propagules.
4. Hard or rigid consistency of the propagules.
5. Vigor and vitality visible.
6. Presence of typical coloration. Strong olive tones.
7. Good development in all its parts
8. Absence of pests, fungi or insects.
9. Absence of physical damage caused by insects or pests.

There is usually an availability in time of mangrove seeds, which can be collected especially between the period from September to January, which is directly related to the fruiting periods. The collection can be done in nearby mangrove areas within the Protective Forest Reserve of the Wetlands between the León and Suriquí Rivers.

4. Activities for mangrove areas

- **Restoration**, restoration of the mangrove, has to do with the removal of tensors that have intervened in the ecosystem, the restoration aims to induce normal conditions for the subsequent recovery of plant cover and consequently other affected natural elements. According to Guevara[21] basically two levels of intervention are presented: in the first are the deteriorated areas and in the process of degradation, where a large part of the dead trees are evident and only some individuals remain standing, a situation caused by stressful conditions of a water imbalance in the area ; and in the second instance, deteriorated areas in an advanced state of degradation, with hypersaline soils and with all the dead trees, which have collapsed as a result of the natural loss of water flows and, therefore, of their dynamics. For the restoration of these areas it is proposed the recovery of areas altered by

[21] GUEVARA MANCERA OMAR ARIEL. Manual for the restoration of mangrove forests in degraded areas of the Colombian Pacific. MMA – ACOFORE – OIMT. Project PD. 171/91 Rev. 2 (F) Phase II (Stage). Bogotá, Colombia. 1998. 16 p.

dredging, rehabilitation of water flows, collection and management of propagules and seeds, establishment of community mangrove nurseries, establishment of mangrove plantations, maintenance and monitoring of plantations.

- **Revegetation,** is the activity related to the regeneration or restoration of the vegetation cover that was in the area. Usually this activity is carried out in disturbed areas where mangrove trees have been lost, generally by felling, and in which the vegetation cover has been replaced by invasive species such as the golden leather fern (Acrostichum aureum) and where the basic environmental conditions of salinity and water flow that are usually surrounded by mangrove areas in good conditions. For the revegetation of these areas, the collection and management of propagules and seeds, the establishment of community mangrove nurseries, the establishment of mangrove plantations, the maintenance and monitoring of plantations are proposed.

- **Vegetablization,** this activity consists in the planting of seedlings in selected areas, where the native vegetation cover has been removed mainly due to the expansion of the agricultural frontier for the sowing of pastures. For the vegetablization of these areas, the collection and management of propagules and seeds, the establishment of community mangrove nurseries, the establishment of mangrove plantations, the maintenance and monitoring of plantations are proposed.

5. Activities for areas with species other than the mangrove

- **Weed out**, It consists of the total cleaning of the site where the hole will be opened for the planting of the seedlings. The diameter is one (1) meter per plate.

- **Lay out,** Consists of the delimitation of the areas where the seedlings will be planted.

- **To make pits**, It consists of the opening of the holes, this activity must be done days before establishing the reforestation with the aim of aerating the site a bit, according to the size of the plant to be planted the opening of the hole is made. However, the standard size of 50 cm * 50 cm * 50 cm can be considered, to allow the young plant a good space for its root development.

- **Sowing,** this work should begin at the beginning of the rainy season to achieve good establishment and capture of the material. The sowing procedure is as follows: Once the soil is planted, the plant material is placed vertically without damaging the rootball, leaving the seedling at ground level, to avoid seedling mortality by drowning. Later, the hole is filled with the same soil that was extracted at the time of making the hole, finally a small pressure is exerted with the help of the hoe around the plant to give firmness, remove the air and avoid possible puddles.

6.Especies to use

For the selection of species, the characterization of the arboreal flora that is presented in the

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Management Plan of the Protective Forest Reserve of the Wetlands between León and Suriquí Rivers will be used [22] and the floristic characterization that are detailed in chapter 5.2 of this study. For this reason, the species recommended for the compensation program are (Table No. 11.69):

Table No. 11.22 Registry of tree species recommended to make compensation for forest harvesting.

Scientific name	Common name
Prioria copaifera	Cativo
Anacardium excelsum	Wild cashew
Lecythis sp.	Olleto
Swartzia sp.	Cucharo
Spondias sp.	Hog plums
Pachira acuática	Salero
Cecropia sp.	Yarumo
Trema micrantha	Zurrumbo
Hampea sp.	Melao
Carapa guianensis	Güino
Sterculia apetala	Camajón
Tabebuia rosea	Oak
Vitex sp.	Truntago
Pterocarpus officinalis	Barbudo
Inga codonantha	Guamo
Ficus glabrata	Higuerón
Luehea seemanii	Red Guásimo
Raphia taedigera	Pangana
Peltogyne sp.	Hard mangrove
Avicennia germinans	Black mangrove
Laguncularia racemosa	White mangrove
Rhizophora mangle	Red mangrove

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

7. Monitoring and tracking

Installation of the permanent growth plots (PGP). For the evaluation of the structural attributes of the compensated forest, permanent monitoring plots will be installed to measure the growth of the planted trees and evaluate the recovered ecosystems. The methodology proposed by Pinelo will be used[23], where plots of 0.25 ha (50 m long x 50 m wide) will be installed, which will be georeferenced and as far as possible delimited from the marking of the trees corresponding to the vertices with oil paint.

[22] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ- CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA. Management Plan for the Protective Forest Reserve of the Wetlands between León and Suriquí Rivers, Municipality of Turbo, Department of Antioquia. PUBLIC CALL No. 047 OF 2007. MEDELLÍN, MARCH 31 2008.

[23] PINELO, Gustavo Israel. Integrated forest inventory manual for management units. WWF Centroamérica. 2004. 49 p.

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It will be measured every 6 months, during the first 3 years; then every year until completing the fifth year (year 5), there will be measured the phytosanitary status of each tree as well as the diameter and the total height, this with the aim of realizing growth rates, structural analysis of the forest, also these results will be the basis to take corrective measures in case of finding deficiencies with respect to the monitored areas.

Forest inventory

Among others, the following factors will be considered:

- Georeferencing of each of the trees planted in the 255.4 hectares compensated.
- Environmental tensor will be identified that may affect the recovery of the compensated forest.
- A photographic record will be made prior to start.
- Mortality of planted trees will be recorded.

Maintenance

The maintenance will be carried out every six months, the first 3 years, then every year for two more years. Finally, upon completing the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas.

It is recommended that the maintenance be carried out at the beginning of each rainy season, during this phase it will be necessary to carry out the work of silting and replanting to compensate the mortality. Phytosanitary control and irrigation must be done whenever it is required, because of the rigorous monitoring of reforestation.

Through the execution of this project, it is intended to link conservation actions for the ecosystems found in the Protective Forest Reserve of the Wetlands between León and Suriquí Rivers, as a strategy to get us on track in a process of recovery of these strategic ecosystems.

EXECUTION TIMELINE

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It is estimated that for the realization of the compensation plan for the loss of biodiversity for 255.4 hectares, in the Forest Reserve of the Wetlands of the León and Suriquí Rivers and in the areas of the León River delta on the Caribbean Sea, it will take 5 years approximately. Following the following schedule (Table No. 11.23).

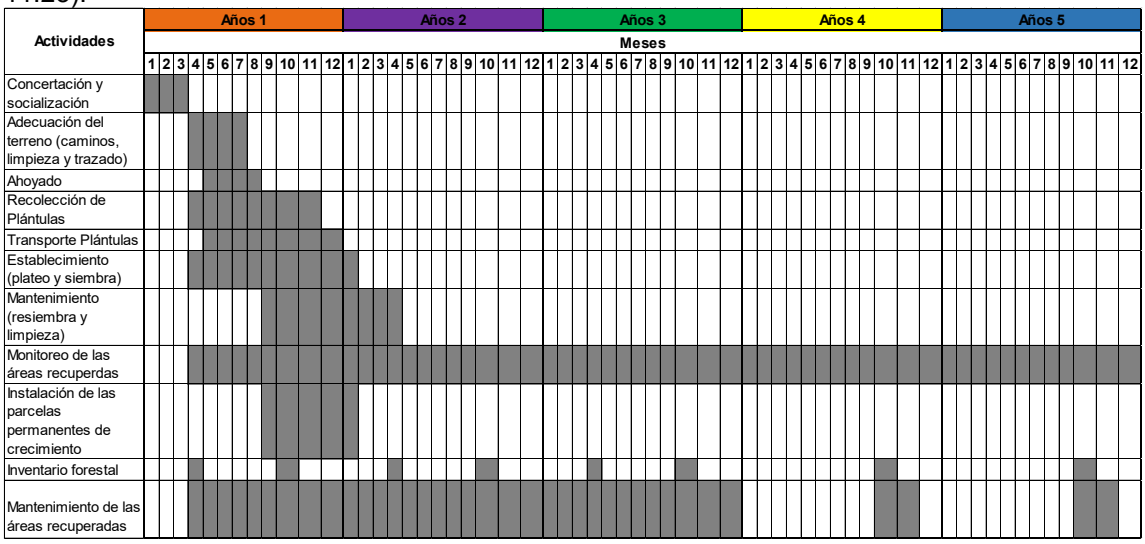

Table No. 11.23 Schedule of activities for the realization of the compensation plan
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

ACTIVITIES: Concertación y socialización: Agreement and socialization
Adecuación del terreno (caminos, limpieza y trazado): Land adequacy (roads, cleaning and layout)
Ahoyado: Digging holes Recolección de plántulas: Seedling collection Transporte de plántulas: Seedling transport Establecimiento (plateo y siembra): Establishment (Weed out and sowing)
Mantenimiento (Resiembra y limpieza): Maintenance (Reseeding and cleaning)
Monitoreo de las áreas recuperadas: Monitoring of recovered areas
Instalación de las parcelas permanentes de crecimiento: Installation of permanent plots of growth
Inventario forestal: Forest inventory Mantenimiento de las áreas recuperadas: Maintenance of recovered areas.

APPLICATION PLACE

It is recommended that the place to be compensated be made in ecologically equivalent areas, preferably within the area of influence of the project, in addition to promoting ecological connectivity. Considering the above considerations, in addition to the characteristics of the project, it is proposed that the compensation be made within the Forest Reserve of the Wetlands of the León and Suriquí Rivers and in the areas of the León River delta on the Caribbean Sea; to guarantee the conservation and survival of those individuals that are sown.

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To delimit them and specify the areas where it is necessary to carry out reforestation or revegetation activities, within the Protective Forest Reserve, it was identified with the help of the satellite images of the Google Earth geographical geovisor, foci of deforestation and loss of forest connectivity (Figure No. 11.20).

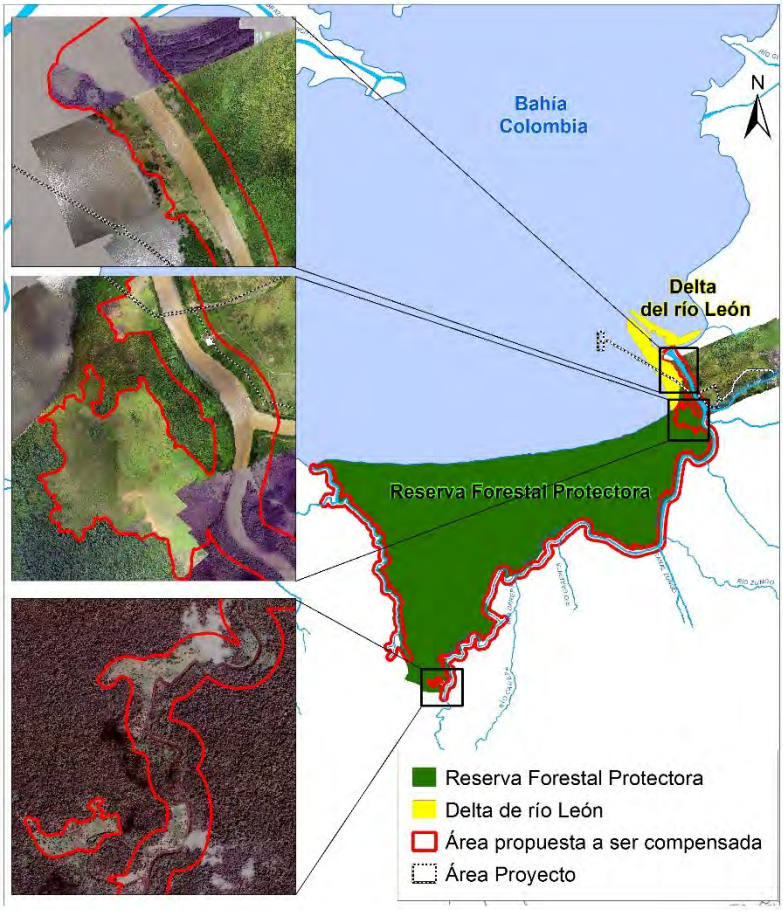

Figure No. 11.20 Area where compensation is proposed
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Bahia Colombia: Colombia Bay
Reserva Forestal Protectora: Protective Forest Reserve
Delta del río León: León River Delta
Área propuesta a ser compensada: Proposed area to be compensated
Área Proyecto: Project area

According to the above, it is proposed that the compensation be made on the banks of the León and Suriquí rivers, in a 100-meter wide strip; identifying those areas where colonization processes have involved the occupation of vacant lots and the felling of trees for the sowing of pastures for livestock use; likewise on the delta of the León River, with the objective of giving continuity to the mangrove vegetation that occurs within the Protective Forest Reserve; In this area of the Delta

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areas suitable for the adequate growth of mangrove species were identified.

EXECUTION MANAGER

SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A SOCIETY, along with CORPOURABA.

REQUIRED STAFF

PROFESSIONALS
- Forest engineer
- Biologist

TECHNICIANS
- Forest technicians

AUXILIARIES
- Field auxiliaries

MONITORING AND TRACKING INDICATORS

TARGETS	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1	100% of the workers in charge of the work of clearing and topsoil removal	Training: (Number of trained workers who participated in the development of the dismantling and topsoil removal / No. of trained workers) * 100	PUERTO BAHÍA COLOMBIA DE URABÁ S.A SOCIETY	Records of attendance records of workers who attend these trainings
Target 2	90% of the areas to be compensated	- Compensation rate: (total reforested area / total area to be compensated by the project) * 100 Success of afforestation: (Nº of living trees / No. of trees planted) * 100		Control of reforestation through forest inventories
Target 3	Monitoring and maintenance in 100% of the permanent growth plots	(No. of maintenance performed / No. of proposed maintenance) * 100		Installation of permanent growth plots (PGP)

QUANTIFICATION AND COSTS

No	Description	Estimated cost
1	Compensation program for loss of biodiversity	The compensation program for the loss of biodiversity has a total value of 1,089,588,783 (one thousand and eighty-nine million five hundred and eighty-eight thousand seven hundred and eighty-three Colombian

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		pesos), in chapter 11.2.2. It is detailed each of the activities to be developed and the cost for each one of them.
* The compensation plan for the loss of biodiversity is detailed in Chapter 11.2.2.		

- *Worksheet PMB-05. Environmental Management Program of the hydrobiological communities*

ENVIRONMENTAL MANAGEMENT PLAN			PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES			
OBJECTIVES	1. Control the impact on the hydrobiological communities (periphyton, benthos, plankton and fish) in the area of influence prior to the construction and operation of the port terminal on the León and Bahía Colombia rivers.		
TARGETS	Target 1: Establish the richness, abundance and diversity of the hydrobiological community (periphyton, benthos, plankton and fish) in the area of influence in the León and Bahía Colombia rivers before the construction phase of the Onshore terminal, the viaduct and the marine platform begins. Target 2: Establish the biomass of the planktonic community in the area of influence of the León and Bahía Colombia rivers before the construction phase of the terminal on land, the viaduct and the marine platform begins. Target 3: Establish the richness, abundance and diversity of the hydrobiological community (benthos, plankton and fish) in the area of influence in Bahía Colombia before the dredging began. Target 4: Establish the biomass of the planktonic community in the area of influence in Bahía Colombia before the start of dredging.		
IMPACT		**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**ENVIRONMENTAL ELEMENT AFECTED**
Alteration of continental aquatic habitats		Moderate	Anchoring and construction of the bridge and jetty	Continental aquatic ecosystem
Modification in the structure (distribution, abundance and composition) of the periphytic communities		Moderate		Flora and fauna
Modification in the structure (distribution, abundance and composition) of marine planktonic communities		Moderate	Disposal in dump of dredged material	Flora and fauna
Modification in the structure (distribution, abundance and composition) of marine benthic communities		Moderate	Transport, manufacture and driving of the piles	Fauna
		Severe	Cutting and extraction of material from the seabed	Fauna
		Moderate	Disposal in dump of dredged material	Fauna

ENVIRONMENTAL MANAGEMENT PLAN			PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES			
Modification in the structure (distribution, abundance and composition) of the marine fish communities	Moderate	Disposal in dump of dredged material	Fauna

APLICATION STAGE			
Previous Activities		Operation	
Construction	X	Dismantling	

MEASURE TYPE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X			

ACTIONS TO DEVELOP

To establish the structure and composition of the hydrobiological community (periphyton, benthos, phytoplankton, zooplankton, and fish) in the area of influence, a sampling must be carried out prior to the construction and operation of the port terminal on the river León and Bahía Colombia. It is noteworthy that the sampling of plankton (phytoplankton and zooplankton) will be carried out only in the stations located in Bahía Colombia and the sampling of periphyton is done only in those located in the León River. Sampling of the other two components of the hydrobiological community (benthos and fish) will be carried out in the León River and in Bahía Colombia Figure No. 11.21 and Table No. 11.24).

The following describes the methodologies generally used for the sampling of periphyton, benthos, plankton (phytoplankton and zooplankton) and fish. It should be noted that these methods may vary according to the criteria of the person in charge of executing this management plan. However, the person responsible for executing this plan must have up-to-date study permits for the collection of specimens of wild species of biological diversity for preparing Environmental Studies.

1. Periphyton

For the sampling of the periphyton, different substrates available in the river should be selected, such as rocks, leaves and trunks. From these substrates a scraping will be done with a toothbrush of the biofilm that is adhered to them, the scraping area must reach a minimum of 45 cm^2. Afterwards, the sample is stored in 60 ml amber containers, and stained with lugol to be then fixed with Transeau solution (distilled water, alcohol, formaldehyde), ratio 1: 1: 1.

2. Benthos

For the sampling of the benthos, a dredger of an area of 0.1 m^2 will be used. The dredge will be sent to the bottom and with the help of levers the closing mechanism will be activated removing the substrate causing the organisms to be trapped in it (Photo No. 11.2). Once the sample has been collected, it will be deposited in ziploc bags of 35 x 25 cm and will be fixed with Transeau solution (distilled water, alcohol, formaldehyde), 1: 1: 1 ratio.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES	

Photograph No. 11.2 Sampling procedure for the community of benthic macroinvertebrates
Source: Taken from SGS Environmental Services, 2015

To analyze this community each sample will be worked independently, subjecting it to a water wash on 250 µm and 710 µm sieves whose objective is to separate the organisms from the other impurities (plant material and sediments).

3. Plankton

For the sampling of phytoplankton and zooplankton a conical network of 50 cm of mouth diameter and 80 µm of mesh opening will be used, equipped with a previously calibrated mechanical flow meter. The trawls will be made in a circular way at horizontal and superficial level for a time of two minutes at constant speed (Photograph No. 11.3). Before carrying out each trawl, the initial reading of the flow meter and the start time (Ti) will be recorded. At the end of the trawls the time (Tf) and the final reading of the flow meter will be recorded. Once the sample has been deposited in the collection bottle, it will be packed in 250 ml bottles and it will be fixed with Transeau solution (distilled water, alcohol, formaldehyde), 1: 1: 1 ratio.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES	

Photograph No. 11.3 Sampling procedure of the planktonic community
Source: Taken from SGS Environmental Services, 2015

The phytoplankton biomass will be estimated by in situ measurements of chlorophyll-a and the zooplankton biomass will be estimated with the dry weight of each sample collected.

4. Fishes

To characterize the fish community will be installed drift net, which will remain approximately 4 hours in the water. Once this time has passed, the networks will be collected, and the species and number of organisms will be counted.

The ecological indexes to be measured for each group are: Margalef, Shannon, Simpson, Equity, similarity and correlations with the physicochemical parameters (the latter when applicable).

ESTIMATED TIMELINE

The sampling of the hydrobiological community must be done one month before starting the construction phase of the terminal on land, the viaduct and the marine platform. For the case of deepening dredging, the samplings of the hydrobiological community must be carried out one month before starting this activity in the seven marine stations shown in Figure No. 11.21. The foregoing does not matter that the dredging process occurs during the execution of the construction stage of the terminal on land, the viaduct and the marine platform.

APLICATION PLACE

Figure No. 11.21 and Table No. 11.24 show the geographic location of the stations where the hydrobiological community will be sampled one month before starting the construction of the terminal on land, the viaduct and the marine platform in the León River and Colombia Bay. It is noteworthy that for the case of deepening dredging, the samplings of the hydrobiological community must be done one month before starting this activity in the seven marine stations shown in Figure No. 11.21.

ENVIRONMENTAL MANAGEMENT PLAN	PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES	

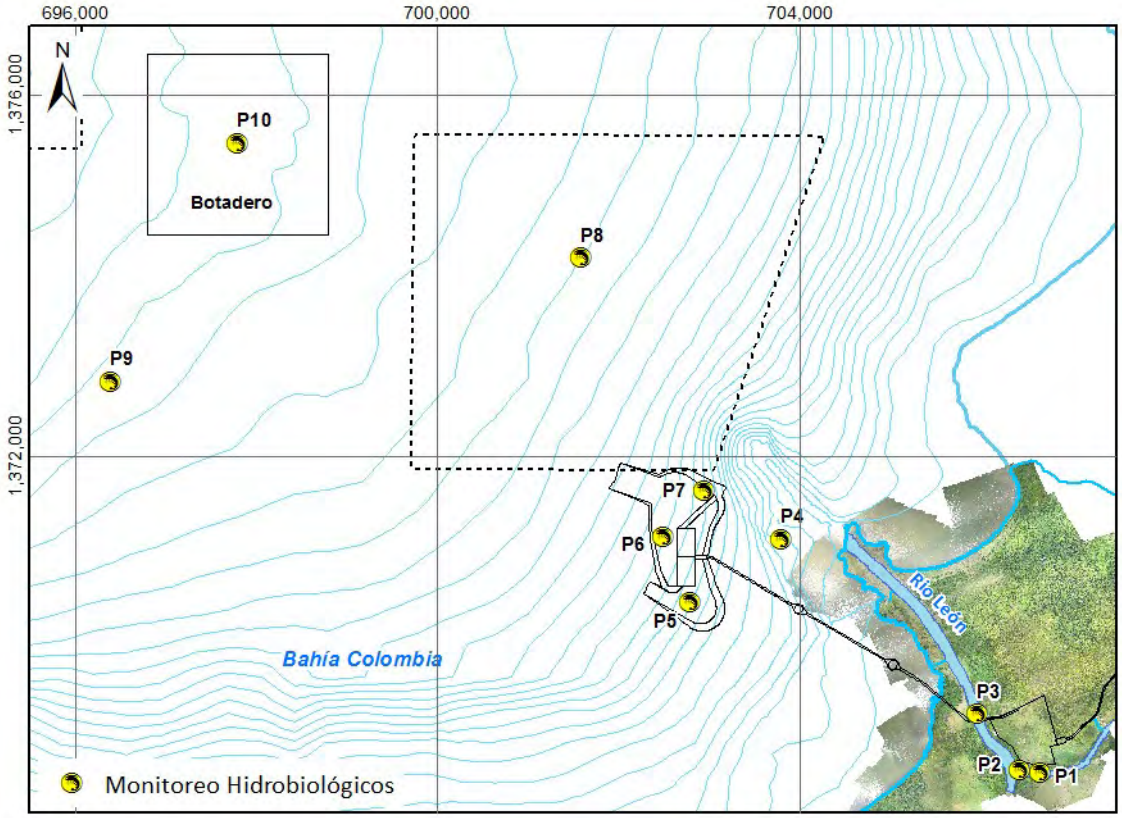

Figure No. 11.21 Sampling stations of the hydrobiological community
Source: Elaborated by Aqua&Terra Consultores Asociados S.A.S., 2015
Monitoreos Hidrobiológicos: Hydrobiological Monitoring
Rio León: Leon River Bahía Colombia: Colombia bay
Botadero: Dump

Table No. 11.24 Geographical location of the sampling stations of the hydrobiological community (benthos, plankton and fish)

ECOSYSTEM	ID	FLAT COORDINATES MAGNA SIRGAS Origin BOGOTÁ	
		East	North
Aquatic continental	P1	706.648,2	1.368.501,9
	P2	706.422,3	1.368.536,0
	P3	705.959,8	1.369.149,3
Marine	P4	703.792,9	1.371.083,5
	P5	702.783,7	1.370.390,9
	P6	702.487,9	1.371.110,6
	P7	702.943,7	1.371.628,0
	P8	701.577,0	1.374.197,1

ENVIRONMENTAL MANAGEMENT PLAN			PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES			
	P9	696.387,8	1.372.825,3
	P10	697.792,4	1.375.464,0

Source: Elaborated by Aqua&Terra Consultores Asociados S.A.S., 2015

EXECUTION MANAGER
Contractor personnel responsible for executing this activity

REQUIRED STAFF
A biologist or ecologist with knowledge in periphyton and continental and marine aquatic plankton - A biologist or ecologist with knowledge in continental and marine aquatic benthic fauna - A biologist or ecologist with knowledge in fish - Two auxiliaries - A boat captain

MONITORING AND TRACKING INDICATORS				
TARGET	**VALUE**	**INDICATOR**	**MANAGER**	**REGISTER TYPE**
Target 1	100%	Wealth of species found in the 10 monitoring stations before the start of the construction stage	Contractor personnel responsible for executing this activity	Field format and laboratory records
	100%	Abundance of species found in the 10 monitoring stations before the start of the construction stage		Field format and laboratory records
	100%	Ecological indexes found in the 10 monitoring stations before the start of the construction stage		Field format and laboratory records
Target 2	100%	Chlorophyll (Phytoplankton) value and organic matter value (mg / m^3; Zooplankton) found in the 10 monitoring stations before the start of the construction stage		Field format and laboratory records
Target 3	100%	Wealth of species found in the 7 monitoring stations before dredging		Field format and laboratory records
	100%	Abundance of species found in the 7 monitoring stations before dredging		Field format and laboratory records
	100%	Ecological indexes found at the 7 monitoring stations before dredging		Field format and laboratory records
Target 4	100%	Chlorophyll (Phytoplankton)		Field format and

ENVIRONMENTAL MANAGEMENT PLAN				PMB-05
ENVIRNMENTAL MANAGEMENT PROGRAM OF THE HYDROBIOLOGICAL COMMUNITIES				
		value and organic matter value (mg / m^3; Zooplankton) found in the 7 monitoring stations before dredging		laboratory records
ESTIMATED COSTS				

The estimated cost for the realization of this plan is $ 30,000,000 COP without VAT. This value includes the estimated cost of carrying out the sampling before starting the construction phase of Onshore terminal, the viaduct and the marine platform ($ 15,300,000 COP without VAT) and the estimated cost

to carry out the samplings before starting deepening dredging (14,700,000 pesos COP without VAT).
It should be noted that these estimated costs are based on the data collection and analysis of the samples, so the cost of additional personnel that may be required is not considered.

1.1.1.2 *Socioeconomic Environment*

Below are the environmental management programs proposed for the socioeconomic environment. Table No. 11.25 shows the equivalence of the programs authorized by the ANLA through Resolution 0032 of 2012[24] and those proposed here, which include the requests made by the Authority and the pertinent adjustments due to the present study.

Table No. 11.25 Equivalence of environmental management plans authorized by Resolution 0032 of 2012 and those proposed in the present study.

Resolution Plan Code 0032	Name of the plan and / or environmental management program (Resolution 0032)	Plan code in the present study	Name of the proposed plan and / or environmental management program
WORKSHEET MS-1	Education and training program for personnel linked to the project	WORKSHEET PS-1	Environmental education program for personnel linked to the project
WORKSHEET MS-2	Community information and participation program	WORKSHEET PS-2	Community information and participation program
WORKSHEET MS-3	Resettlement program for the affected population		The present program is deleted.
WORKSHEET MS-4	Support program for institutional management capacity	WORKSHEET PS-3	Support program for institutional management capacity
WORKSHEET MS-5	Training program, education and awareness to the community surrounding the project	WORKSHEET PS-4	Environmental education program for the communities in the area of influence
WORKSHEET MS-6	Labor hiring program		This program is abolished because it is the responsibility of Labor Ministry
		WORKSHEET PS-5	Strengthening and management program for artisanal fishing activities.
		WORKSHEET PS-6	Neighborhood records program.
WORKSHEET MS-7	Preventive archeology program	WORKSHEET PS-7	Awaiting approval of the archaeological prospecting plan by ICANH which includes the respective archaeological management plan

Source: Prepared by Aqua &Terra Consultores Asociados S.A.S, 2015

[24] COLOMBIA. NATIONAL AUTHORITY OF ENVIRONMENTAL LICENSES - ANLA. Resolution 0032 (January 25, 2012). Op. Cit

Worksheets of the Environmental Management Plan of the Socioeconomic Environment

- *Worksheet PS-01 Environmental education program for personnel linked to the project*

ENVIRONMENTAL MANAGEMENT PLAN			PS-1
ENVIRONMENTAL EDUCATION PROGRAM FOR PERSONNEL LINKED TO THE PROJECT			
OBJECTIVES	1. 1. Sensitize, educate and train all the people involved in the construction and port operation on the socio-environmental management of the project and improve the labor competencies of the project workers (skilled and unskilled labor, local and foreign). 2. Inform and train port employees and their contractors about the scope of WFP, in order to generate a culture of prevention and mitigation of impacts on the environment.		
TARGETS	Target 1: 100% of the project staff with induction		
IMPACT	IMPACT ENVIRONMENTAL SIGNIFICANCE	ACTIVITY	COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED
Alteration of cultural patterns	MODERATE	Transport, manufacture and driving of the piles	Artisanal fishermen that transit or carry out fishing activities in the area
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Artisanal fishermen that transit or carry out fishing activities in the area
	MODERATE	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal	Artisanal fishermen that transit or carry out fishing activities in the area
Alteration in the transit of vessels	MODERATE	Transport, manufacture and driving of the piles	Boats that transit in the area
	MODERATE	Anchoring and construction of the bridge and jetty.	Boats that transit in the area
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Boats that transit in the area

APLICATION STAGE			
Previous Activities	X	Operation	X
Construction	X	Distmantling	

MEASURE TYPE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X			

ENVIRONMENTAL MANAGEMENT PLAN	PS-1

ENVIRONMENTAL EDUCATION PROGRAM FOR PERSONNEL LINKED TO THE PROJECT

ACTIONS TO DEVELOP

1. Induction workshop for all personnel

To ensure the achievement of the objective, it is required to include at least the following topics during the workshops:

- General description of the project and port facilities.
- Area of influence of the port.
- Environmental and social policies of the port.
- Current environmental legislation for the project.
- Environmental License and Environmental Management Plan, emphasizing the following aspects:

• Importance, prevention, management and conservation of natural resources.

• Atmospheric emissions, hazardous and non-hazardous waste.

- Code of conduct for all workers, where rules of behavior for project staff are established in aspects such as:

• Respectful treatment with the community.

• Prohibited behaviors for workers such as purchase of fauna and flora, hunting and fishing, actions that affect the cultural stability of the communities surrounding the project, entry of personnel from outside the port facilities, among others.

• Mechanisms to be followed in case of accidents, property damage or conflicts between personnel and the community.

• Sanctions to the personnel in case of violating the established norms.

This code of conduct should be widely disseminated and explained to all workers within the induction workshop and displayed in a visible and easily accessible place.

This type of training should also be carried out specifically for each task, for each group and permanently for employees and officials.

The respective photographic and / or film record of each of the workshops and the attendance record will be made.

2. Training in environmental education:

A workshop will be developed (which can be simultaneous to the Worker Induction Workshop), prior to the start of construction and maintenance works, aimed at all engineers, contractors and workers in general, to raise awareness and sensitize them to the possible impacts on the environment, the social environment and infrastructure, which they themselves can generate during the development of their activities, due to ignorance, carelessness or the occurrence of accidents. This involves topics such as:

- Knowledge and compliance with the Environmental Management Plan and Colombian environmental regulations applicable to the project
- Basic concepts about the environment, natural resources and the importance of their conservation.
- The activities of the work, the operation and the possible impacts that these may generate in the environment.
- In the talks that will be held, the staff will be explained about the socio-cultural dynamics of the population of the artisanal fishermen in the area of influence of the project.

ENVIRONMENTAL MANAGEMENT PLAN	PS-1

ENVIRONMENTAL EDUCATION PROGRAM FOR PERSONNEL LINKED TO THE PROJECT

- Knowledge of the activities carried out by the community near the port.
- Knowledge of the transit routes carried out by the vessel
- Management of solid and liquid waste from the work and operation of the port.
- Environmental management of the construction and maintenance activities of the port terminal.
- Risk overview. Analysis and preventive, corrective and improvement management.

The workshop can be done in several sections oriented and according to the competence of the participants. It will be developed in the form of lectures; and also, the methodology of the round tables on the issues raised will be used, contributing the individual experiences in other similar projects.

For the additional workshops that are dictated, the environmental incidents that have been presented in the development of the activities will be considered in order to prevent the new occurrence of the same. Monthly training sessions will be held for all employees of the construction of the port, in which they will work and deepen those issues that are presenting weaknesses and that have been detected by the supervision of the works.

To verify the level of understanding of the topics, at the end of all the talks and workshops, a simple evaluation, in the form of a test, will be applied to each of the participants, which will be qualified by the workshop. Those who obtain less than 80% of the points or qualification, will be rescheduled for another workshop, until achieving an evaluation equal or superior to this standard.

EXECUTION TIMELINE

The induction workshops must be carried out before starting the construction and operation phases and at the time of the hiring of the personnel.

Reinforcement workshops will be scheduled bimonthly

During the construction phase, informative and reinforcement talks must be made by the contractor 3 times a week for five (5) minutes, in which a different topic related to environmental education is discussed.

It is important to clarify that the periodicity of the activities will be subject to programming of activities by the Contractor

APLICATION PLACE

Port site
Dredger and auxiliary vessels used for deepening dredging

EXECUTION MANAGER

Personnel contractors in charge of the execution of the works

ENVIRONMENTAL MANAGEMENT PLAN			PS-1	
ENVIRONMENTAL EDUCATION PROGRAM FOR PERSONNEL LINKED TO THE PROJECT				
REQUIRED STAFF				
Environmental professional Social management professional				
MONITORING AND TRACKING INDICATORS				
TARGET	**VALUE**	**INDICATOR**	**MANAGER**	**REGISTER TYPE**
Total personal capacitado/ total personal contratado	100%	Total trained personnel / total staff hired	PUERTO BAHÍA COLOMBIA DE URABÁ S.A SOCIETY	Records of attendance acts of workers who attend these trainings

QUANTIFICATION AND COSTS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project's personnel are estimated at $ 40,000,000 COP taking into account the hiring of two professionals for a period of forty (40) months, for the development of 21 workshops.
2	Workshops costs	The costs of the 21 associated workshops are destined for logistics expenses, such as: Hall rent, audiovisual aids, refreshments and stationery among others. Total allocated $ 21,000,000 COP.
1	Unexpected costs	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 6,100,000 COP.
	TOTAL	$ 67.100.000 (sixty-seven million one hundred thousand pesos)
Note: The estimate of costs for this Program does not include IVA. At the time of execution, the budget will be indexed.		

- *Worksheet PS-02 Community information and participation program*

ENVIRONMENTAL MANAGEMENT PLAN		PS-2	
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM			
OBJECTIVES	1. Keep informed the municipal, regional and environmental authorities, as well as the communities and unions in general, about the characteristics and management measures of the project under construction and operation of the Port, its scope, progress, implications and relevant characteristics in the technical, social and environmental aspects. 2.Establish open and permanent communication channels with the business sector neighboring the port, local, regional and environmental authorities, as well as with the community surrounding the project.		
TARGETS	1. Give an effective response to 100% of complaints and claims filed by authorities and communities in the area of influence and received through the office of attention to citizenship. 2. Keep the Citizen Service Office (C.S.O) active during the development of the construction and operation activities. 3. Execute 100% of scheduled meetings.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED**
Variation in the number of inhabitants	MODERATE	Construction and operation of temporary facilities	Communities
	MODERATE	Construction of infrastructure and facilities associated with the operation of the terminal	Communities
	MODERATE	Load and unload merchandise (solids)	Communities
	MODERATE	Load and unload merchandise (liquids)	Communities
	MODERATE	Load and unload merchandise (general cargo)	Communities
	MODERATE	Transport and storage on Port	Communities
	MODERATE	Trucks load and unload	Communities
	MODERATE	Operation and maintenance of infrastructure and	Communities

ENVIRONMENTAL MANAGEMENT PLAN		PS-2	
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM			
		facilities associated with the operation of the terminal	
	MODERATE	Demolition and dismantling of temporary infrastructure	Comunities
Variation in the volume of vehicular traffic	MODERATE	Transport, manufacture and driving of the piles	Communities
	SEVERE	Material transport (Onshore terminal)	Communities
	MODERATE	Construction of temporary facilities operation	Communities
	MODERATE	Construction of infrastructure and facilities associated with the operation of the temporary terminal	Communities
	MODERATE	Materials transport (road)	Communities
	SEVERE	Load and unload of merchandise (solids)	Communities
	SEVERE	Load and unload of merchandise (liquids)	Communities
	SEVERE	Load and unload of merchandise (general cargo)	Communities
	CRITICAL	Transport and storage in port	Communities
	CRITICAL	Load and unload of trucks	Communities
	SEVERE	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal	Communities
	MODERATE	Activities for laying the pavement (Affirmed, granular sub - base, granular and stabilized bases.	Communities

ENVIRONMENTAL MANAGEMENT PLAN		PS-2	
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM			
Generation of community expectations	MODERATE	Transport, manufacture and driving of the piles	Communities
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Communities
	MODERATE	Construction and operation of temporary facilities	Communities
	MODERATE	Construction of infrastructure and facilities associated with the operation of the terminal	Communities
	MODERATE	Extraction of material from the seabed	Communities
	MODERATE	Transfer of dredging material	Communities
	MODERATE	Disposal in dump of dredged material	Communities
	MODERATE	Materials transport	Communities
	MODERATE	Navigation, anchoring and approach of boats and tugboats	Communities
	MODERATE	Load and unload of merchandise (solids)	Comunities
	MODERATE	Load and unload of merchandise (Liquids)	Communities
	MODERATE	Load and unload of merchandise (general cargo)	Communities
	MODERATE	Transport and storage in port	Communities
	MODERATE	Load and unload of trucks	Communities
	MODERATE	Transfer of dredging material	Comunities
	MODERATE	Activities for laying the pavement (Affirmed, granular sub - base, granular and stabilized bases.	Communities

ENVIRONMENTAL MANAGEMENT PLAN		PS-2	
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM			
	MODERATE	Demolition and dismantling of temporary infrastructure	Communities
APLICATION STAGE			
Previous activities	X	Operation	X
Construction	X	Dismantling	X

MEASURE TYPE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
X			

ACTIONS TO DEVELOP

The calls for the proposed meetings must be made in writing, one week in advance of the development of the activity.
A meeting will be held with municipal, regional and environmental authorities and with guilds in each phase of the project.

With the community, meetings will be held at least every 4 months (three per year) during the construction phase and each time it is required during the operation phase, to listen and resolve concerns and measure the opportunity, efficiency and impact of the activities carried out within the framework of the social responsibility of the port. The project must leave open the possibility of scheduling extraordinary meetings at any time during the construction phase, at the request of the community.

Before starting the mobilization of machinery and equipment, new meetings should be scheduled, which should include topics such as:
- Reach Environmental License
- Presentation construction contractors
- Explain the system of reception, processing, resolution and response of concerns, initiatives and claims.

In these presentations, the main construction contractors must be present, to commit them to follow the procedures explained therein.

Before finalizing the constructive phase, informative meetings should be scheduled where the estimated date of beginning of operations is announced, as well as the management measures of the operative stage. Keeping the communities and authorities informed about the status of the project.

The community in a general assembly and in a consented manner, will appoint a supervision committee, which will be the interlocutors of the Project / Community. These will meet every two months in the Citizen Service Offices.

The citizen attention office (C.A.O) will be installed and put into operation, which seeks to provide

ENVIRONMENTAL MANAGEMENT PLAN	PS-2

COMMUNITY INFORMATION AND PARTICIPATION PROGRAM

information about the project. In addition, this space will allow receiving, filing and timely dealing with complaints, claims and requests from the surrounding population in the terms that the law stipulates from its reception.

Through the following means: by telephone, via email, personalized attention in the C.A.O.

The community in a general assembly and in a consented manner, will appoint a supervision committee, which will be the interlocutors of the Project / Community. These will meet every two months in the Citizen Service Offices.

The photographic and / or filmic record of the meetings that take place will be maintained and the corresponding attendance forms will be processed to leave evidence of the processes. Likewise, minutes of all meetings must be prepared, stating the concerns raised by them and the answers given by the Company.

The C.A.O must continue to provide its services during the operation stage.

EXECUTION TIMELINE

Informative meetings will be held in the stages of previous activities, construction and operation in the periodicity indicated above.

APLICATION PLACE

Area of influence of the Project, Major and minor territorial units
Dredger and auxiliary vessels used for deepening dredging

EXECUTION MANAGER

Personnel contractors in charge of the execution of the works

REQUIRED STAFF

Environmental Professional
Social management Professional

MONITORING AND TRACKING INDICATORS

TARGET	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1: Comply with all the workshops programmed with the communities	100%	(Workshops held with communities / workshops programmed communities) * 100	SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Call record Record of meetings held with the communities. Attendance list. Photographic record.
Target 2: Comply with all scheduled workshops with government entities	100%	(Workshops held with government entities / scheduled workshops) * 100	SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.	Call record Record of meetings held. Attendance list Photographic record.
Target 3: Citizen	1	Citizen attention office during the	SOCDAD PUERTO	Evidence the operation with the respective photographic

ENVIRONMENTAL MANAGEMENT PLAN			PS-2	
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM				
attention office (O.A.C) operating during the development of construction activities.		construction and operation phase of the project	BAHÍA COLOMBIA DE URABÁ S.A	record
Target 4: Provide the route and adequate response to complaints and claims received during the construction and operation	100%	Number of complaints and claims answered / total number of complaints and claims.	PUERTO BAHÍA COLOMBIA DE SOCIEDAD URABÁ S.A	Report of complaints and claims received and formalized.

CUANTIFICACIÓN Y COSTOS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project's personnel are estimated at $ 40,000,000 COP, considering the relationship of two professionals for a period of forty (40) months, to carry out the informative and participatory activities of the community.
2	Citizen Service Office (C.A.O)	$ 40,000,000 is allocated for a period of 40 months for the installation and provision and maintenance of an Office for Citizen Services. Established in the construction phase of the project and must remain in the operational stage as an information channel
3	Meetings with institutions and communities in the construction stage	The costs of 14 meetings to be held with the institutions and community in the construction phase. They are associated for logistics expenses, such as: Hall rental, audiovisual aids, snack and stationery among others. Total allocated $ 12,000,000 COP.
4	Meetings with institutions and communities in the operation stage	The costs of 10 meetings to be carried out with the institutions and community in the operation phase, are associated to the logistics expenses, such as: Hall rent,

ENVIRONMENTAL MANAGEMENT PLAN		PS-2
COMMUNITY INFORMATION AND PARTICIPATION PROGRAM		
		audiovisual aids, refreshments and stationery, among others. Total allocated $ 10,000,000 COP.
5	Meetings prior entry of machinery	The costs of 2 meetings to be held with the community to announce the previous entry to machinery, are associated to the logistics expenses, such as: Hall rent, audiovisual aids, snack and stationery among others. Total allocated $ 2,000,000 COP.
6	Meeting Committee Overseer	The costs of 22 meetings to be held with the oversight committee will be held every two months and in an extraordinary manner if necessary. $ 2,200,000 COP.
7	Stationery	$ 2'000,000 is allocated for general stationery expenses
8	Unexpected events	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 10,820,000 COP.
9	TOTAL	$ 119'020.000 (One hundred and nineteen million, twenty thousand pesos, COP)
Note: The estimate of costs for this Program does not include IVA. At the time of execution, the budget will be indexed.		

- *Worksheet PS-03 Support program for institutional management capacity*

ENVIRONMENTAL MANAGEMENT PLAN		PS-3	
SUPPORT PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY			
OBJECTIVES	1.Support training activities for community organizations that contribute to both the social legitimacy of the project and the strengthening of community organizations that can provide services of importance for local social development. 2.Provide mechanisms for the strengthening of social organizations. 3.Establish communication channels between municipal and environmental authorities and the communities in the area of influence. 4.Plan workshops aimed at strengthening social organizations on issues of relevance such as citizen participation, institutional offer and social development.		
TARGETS	1.Execution of 100% of the proposed workshops. 2.Completion of calls to 100% of municipal and environmental authorities located in the territorial area and participation in meetings held with institutions and communities.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED**
Variation in the coverage and quality of public services	MODERATE	Hiring of labor	Communities
	MODERATE	Hiring services	Communities
	SEVERE	Construction and operation of temporary facilities	Communities
	SEVERE	Construction of infrastructure and facilities associated with the operation of the terminal	Communities
	SEVERE	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal.	Communities
Alteration of existing infrastructure	MODERATE	Material transport	Communities
	MODERATE	Materials transport	Communities
APLICATION STAGE			

ENVIRONMENTAL MANAGEMENT PLAN			PS-3
SUPPORT PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY			
Previous Activities	X	Operation	X
Construction	X	Dismantling	

MEASURE TYPE			
PREVENTION	MITIGATION	CORRECTION	COMPENSATION
			X

ACTIONS TO DEVELOP

The actions to be developed in this program are aimed at generating an approach between the communities of the area of influence with the municipal and environmental authorities. To do this, two axes of activities are proposed:

Strengthening workshops for institutional management

- Identify the main social actors and create a directory that facilitates communication with them.
- Hold one (1) meeting prior to the start of the workshops to explain the topics to be developed. These should be structured in the thematic axes of citizen participation and institutional management associated with social development.
- Carry out during the construction stage one (1) biannual workshop in each of the topics listed below:

Community strengthening and social rights: The aim is to provide tools for citizen participation and social organization, seeking to bring the community organizations of social development closer to the State institutions present in the territorial area of the project. Some issues to address are rights and duties citizens, participatory democracy, administrative structure of the State and citizen oversight.

Institutional management: Present the institutional offer of the different State entities with a presence in the area and how communities can access their programs. To this end, it is pertinent to review the POT and the Municipal Development Plan, as well as the environmental plans generated by the different entities of the sector.

Project design: for the development of projects it is first necessary to know the institutional offer of them, to contextualize community needs and possible solutions (identified in territorial planning plans and municipal development plans).

- - The workshops should be convened in a timely manner through correspondence, local media, megaphoning and / or voice to voice.

Communication channels

- Hold one (1) previous meeting with the community organizations in the area of influence to agree on the institutions to be convened. It is important to make clear that the commitment of the company does not cover the guarantee of institutional participation, for the latter to be independent in decision-making.

ENVIRONMENTAL MANAGEMENT PLAN	PS-3

SUPPORT PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY

- Prepare an institutional and community directory to facilitate communication between social actors. This directory will be managed by each of the parties, which guarantees a communication without intermediaries.

- Carry out timely calls to state institutions to participate in the processes of community strengthening.

- Carry out timely calls to state institutions to participate in the processes of community strengthening.

EXECUTION TIMELINE

The workshops must be implemented every six months during the construction stage.

APLICATION PLACE

Area of influence of the Project, minor territorial units.

EXECUTION MANAGER

Contractor in charge of works execution.

REQUIRED STAFF

Environmental Professional
Social Environmental Professional

MONITORING AND TRACKING INDICATORS

TARGET	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1: Execution of 100% of the proposed workshops.	100%	Previous scheduled meeting / previous meeting Workshops / workshops scheduled	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Call records, photographic and / or film record, attendance lists and memory of each of the workshops carried out. Registration of invitation calls sent to municipal and environmental institutions. Institutional and community directory.
Target 2:	100%	Calls made / scheduled calls	SOCIEDAD PORTUARIA	Registration of calls to administrative and

ENVIRONMENTAL MANAGEMENT PLAN			PS-3	
SUPPORT PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY				
Completion of calls to municipal and environmental authorities located in the territorial area and participation in meetings held with institutions and communities		Number of participating government entities / number of entities convened.	PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	environmental institutions that have interference in the local area.

QUANTIFICATION AND COSTS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project personnel are estimated at $ 40,000,000 COP, considering the hiring of two professionals for a period of forty (40) months, to carry out training activities in institutional management capacity.
2	Workshops and meetings	The costs of the 21 workshops and the 2 meetings to be held with the community leaders, in the operation phase, are associated to the logistics expenses, such as: Hall rent, audiovisual aids, snack and stationery among others. Total assigned $ 23,000,000 COP
3	Stationery	$ 2'000,000 is allocated for general stationery expenses
4	Unexpected events	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 10,820,000 COP.
4	TOTAL	$ 71'500.0000 (Seventy-one million five

ENVIRONMENTAL MANAGEMENT PLAN		PS-3
SUPPORT PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY		
		hundred thousand pesos COP).
Note: The estimate of costs for this Program does not include IVA. At the time of its execution, the budget will be indexed.		

- *Worksheet PS-04 Environmental education program for the communities in the area of influence*

ENVIRONMENTAL MANAGEMENT PLAN			PS-4
ENVIRONMENTAL EDUCTION PROGRAM FOR COMMUNITIES IN THE AREA OF INFLUENCE			
OBJECTIVES	1. Develop a sensitization program aimed at the communities in the area of influence, regarding the importance of protecting the environment, renewable and non-renewable natural resources, reforestation, deforestation, water resources and environmental sanitation. 2.Strengthen the knowledge and environmental knowledge of the communities of the minor territorial area.		
TARGETS	1. Execution of 100% of the awareness trainings proposed. 2. Realization of an environmental project during the construction phase of the project. 3. Carrying out inter-institutional and community meetings for the theme of natural and industrial risk		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED**
Alteration of cultural patterns	MODERATE	Hiring of labor	Communities
	MODERATE	Transport, manufacture and driving of the piles	Communities
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Communities
	MODERATE	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal.	Communities
	MODERATE	Road improvement	Comunity

APLICATION STAGE			
Previous Activities	**X**	**Operation**	**X**
Construction	**X**	**Dismantling**	

MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
			X

ACTIONS TO DEVELOP

The proposed activities correspond to the sensitization to the local community regarding the importance and value of natural resources.

1. Rising awareness in the community about environment protection:

- Calls must be made in writing, local media and / or megaphoning to the communities of the minor

ENVIRONMENTAL MANAGEMENT PLAN	PS-4

ENVIRONMENTAL EDUCTION PROGRAM FOR COMMUNITIES IN THE AREA OF INFLUENCE

territorial area for participation in environmental awareness workshops.
- A participatory exercise will be carried out with the community, which will result in the elaboration of a community environmental diagnosis.
- Based on the environmental diagnosis, an environmental problem will be selected. To do this, a project must be proposed that must be led by the communities, in such a way that the largest number of people are involved and voluntarily participate in it, which seeks to strengthen and appropriate natural resources locally.
- Based on the definition of the project defined by the communities, a series of dissemination workshops will be initiated on the aforementioned project, and through participatory methodologies, the most effective way to involve the community and the institutions in the execution of the environmental planned program will be defined.

EXECUTION TIMELINE

The awareness workshops will be held in agreement with the communities as soon as the different stages of the preparation and implementation of the environmental project are completed during the construction phase. The number of workshops may not exceed 6 per year, which will be organized according to local needs.

APLICATION PLACE

Area of influence of the Project, minor territorial units.

EXECUTION MANAGER

Contractor in charge of the execution of the works

REQUIRED STAFF

A biologist
A Social Management professional

MONITORING AND TRACKING INDICATORS

TARGET	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1: Execution of 100% of the awareness trainings proposed.	100%	Trainings held / Programmed trainings * 100	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Call records, photographic record, attendance lists and memories of the trainings carried out.
Target 2: Completion of at least one environmental	100%	Number of environmental projects executed / number of environmental	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE	Community environmental diagnosis. Environmental project

ENVIRONMENTAL MANAGEMENT PLAN			PS-4	
ENVIRONMENTAL EDUCTION PROGRAM FOR COMMUNITIES IN THE AREA OF INFLUENCE				
project during the construction phase of the project.		projects proposed * 100	URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	implemented and photographic record.

QUANTIFICATION AND COSTS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project's personnel are estimated at $ 40,000,000 COP taking into account the hiring of two professionals for a period of forty (40) months, for the development of 21 workshops.
2	Workshops on environmental education with the communities	The costs of 20 workshops in environmental education to be carried out with the community, are associated to the logistics expenses, such as: Hall rent, audiovisual aids, snack and stationery among others. Total allocated $ 20,000,000 COP.
3	Conducting an environmental workshop	The costs related to the Environmental Project are estimated at $ 10'000,000
5	Unexpected events	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 7,000,000 COP.
6	TOTAL	$ 77’000.000 (seventy-seven million pesos COP)
Note: The estimate of costs for this Program does not include IVA. At the time of execution, the budget will be indexed.		

- *Worksheet PS-05 Strengthening and management program for artisanal fishing activities*

ENVIRONMENTAL MANAGEMENT PLAN		PS-5	
STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES			
OBJECTIVES	1. Prevent, control and mitigate the impacts that project activities may generate for fishermen in the surrounding area 2. Establish a good relationship with fishermen in the area, through informative and support channels. 3. Document changes in artisanal fishing activity, attributed to deepening dredging		
TARGETS	1. Implement 100% of the training to fishermen who carry out activities in the area of influence of the project 2. Perform monitoring to document the presence of fishermen within the project area. 3. Carry out studies of fishing effort to document the product of the tasks carried out by the fishermen. Document the changes in the artisanal fishing activity, attributed to port activities and deepening dredging.		
IMPACT	**IMPACT ENVIRONMENTAL SIGNIFICANCE**	**ACTIVITY**	**COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED**
Alteration of cultural patterns	MODERATE	Transport, manufacture and driving of the piles	Artisanal fishermen that transit or carry out fishing activities in the area
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Artisanal fishermen that transit or carry out fishing activities in the area
	MODERATE	Operation and maintenance of infrastructure and facilities associated with the operation of the terminal	Artisanal fishermen that transit or carry out fishing activities in the area
	MODERATE	Activities for pavement placement (Affirmed, granular sub - base, granular and stabilized bases).	Artisanal fishermen that transit or carry out fishing activities in the area
Alteration in the transit of vessels	MODERATE	Transport, manufacture and driving of the piles	Boats that transit in the area
	MODERATE	Anchoring and construction of the bridge and pier	Boats that transit in the area
	MODERATE	Installation of the conveyor	Boats that transit in the

ENVIRONMENTAL MANAGEMENT PLAN		PS-5	
STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES			
		belt and laying of the service connections of the dock	area
Generation of community expectations	MODERATE	Transport, manufacture and driving of the piles	Communities
	MODERATE	Installation of the conveyor belt and laying of the service connections of the dock	Communities
	MODERATE	Extraction of material from the seabed	Communities
	MODERATE	Transfer of dredging material	Communities
	MODERATE	Navigation, anchoring and approach of boats and tugboats	Communities
	MODERATE	Load and unload of merchandise (solids)	Communities
	MODERATE	Load and unload of merchandise (Liquids)	Communities
	MODERATE	Load and unload of merchandise (general cargo)	Communities
	MODERATE	Transport and storage in Port	Communities
	MODERATE	Transfer of dredging material	Communities

APLICATION STAGE			
Previous Activities	**X**	**Operation**	**X**
Construction	**X**	**Dismantling**	

MEASURE TYPE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
X			

ACTIONS TO DEVELOP

- Clear and timely information will be provided to the communities on the signs used during the project.
- Carry out awareness-raising talks about port activities and dredging
- Socialize with the communities of fishermen of Nueva Colonia, the informative document "Notice to the Navigators" issued by DIMAR, which informs about the news within the jurisdiction of the

ENVIRONMENTAL MANAGEMENT PLAN	PS-5

STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES

Captaincy of Puerto de Urabá; This will include the position of the dredger, the time of stay in the area and the characteristics of the vessels that transit in the area.
- For the development of this program, the fishing effort will be carried out at the Nueva Colonia jetty, during seven (7) consecutive days, during the construction and operation phase of the Port.

At the Nueva Colonia jetty (See Figure No. 11.22), interviews and fishing effort surveys will be carried out on artisanal fishermen in the sector, it will consider the following parameters:
- Place of the artisan fishermen's room identified
- Dependents
- Time of development of the activity
- Frequency of activity development
- Elements that account for the development of artisanal fishing activity (fishing gear, boats)
- Species, quantity and sizes captured
- Sites where the productive activity develops
- Fishing costs
- Productive chain (self-consumption, sale, barter, transformation)
- Place of commercialization
- Link to any organization

ENVIRONMENTAL MANAGEMENT PLAN	PS-5
STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES	

Figure No. 11.6. Nueva Colonia Jetty

- **- Fishing effort will be carried out in the Port construction and operation phases. (See Figure No. 11.23).**

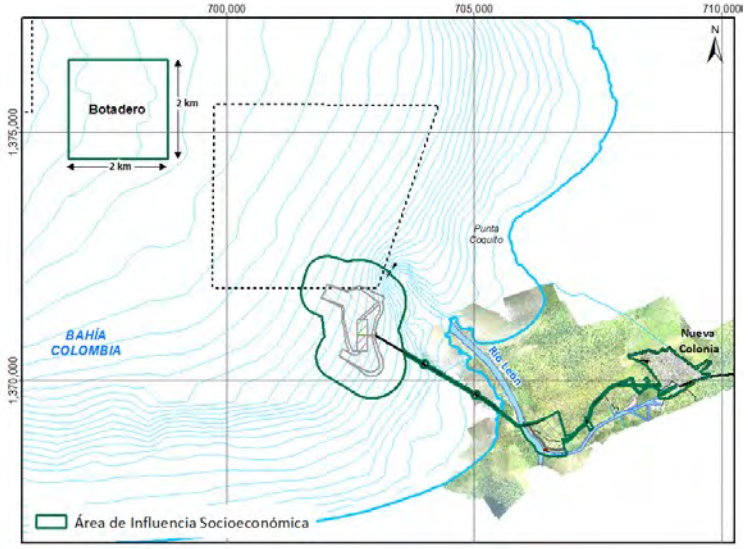

Figure No. 11.7. Project Area
Source: Prepared by Aqua&Terra Consultores Asociados S.A.S., 2015
Área de influencia Socioeconómica: Area of socioeconomic influence
Botadero: Dump

ENVIRONMENTAL MANAGEMENT PLAN	PS-5

STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES

EXECUTION TIMELINE

There will be training for fishermen in the construction phase of the port (Before, during and at the end)
Fishing effort will be made every 6 months during the construction stage and once a year during the operation phase during the first five years.

APLICATION PLACE

Project Area
Nueva Colonia Jetty

EXECUTION MANAGER

Personnel contractors in charge of the execution of the works

REQUIRED STAFF

1 Social Management Professional
1 Biologist
10 Field assistants for the implementation of the surveys and characterization of fishing effort

MONITORING AND TRACKING INDICATORS

TARGET	VALUE	INDICATOR	MANAGER	REGISTER TYPE
Target 1: Comply with the totality of the programmed workshops with the fishermen of the communities of Nueva Colonia and el Canal	100%	-N ° of informative meetings held / N ° of informative meetings scheduled	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Record of meetings held with the communities. Photographic record
Target 2: Carry out the fishing efforts proposed during the construction and operation stages. The above to document the changes in the artisanal fishing activity, attributed to the port activities and dredging of deepening	100%	Fishing Efforts Made / Programmed Fishing Efforts	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Surveys, and their respective processing and analysis in quantitative and qualitative terms. The synthesis of the information will be presented through graphs and tables that allow determining the CPUE (catch per unit of fishing effort), number of

ENVIRONMENTAL MANAGEMENT PLAN			PS-5	
STRENTHENING AND MANAGEMENT PROGRAM FOR ARTISANAL FISHING ACTIVITIES				
				individuals, size and biomass for each of the species per moment, site of capture and fishing gear, to make comparisons between moments (baseline, during construction and through operation).

QUANTIFICATION AND COSTS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project personnel are estimated at $ 68,000,000 COP, considering the relationship of two professionals and 10 assistants for a period of forty (40) months, for the development of monitoring and fishing effort.
2	Fishing effort in the construction phase	A total of $ 6 '400,000 is estimated for the cost of the logistics required for the activity to be carried out every 6 months during the Operation phase
3	Fishing effort in the operation phase	A total of $ 30,000,000 is estimated for the cost of the logistics required for the activity to be carried out each year, during the first five (5) years of the port activity.
4	Unexpected events	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 10,440,000 COP.
5	TOTAL	$ 114’840.000 (One hundred nineteen million twenty thousand pesos. COP)
Note: Estimated costs will be subject to the CPI (Consumer Price Index)		

- *Worksheet PS-06 Neighborhood records program*

ENVIRONMENTAL MANAGEMENT PLAN			PS-6
NEIGHBORHOOD RECORDS PROGRAM			
OBJECTIVES	1. Implement mechanisms for the restoration of the constructive conditions of the houses in Nueva Colonia that may be affected by the increase in vehicular traffic derived from the project. 2. Apply the form of neighborhood records to the homes of Nueva Colonia located on the sides of the land transportation infrastructure to be used for the transport of cargo. 3. Communicate to the families susceptible of affectation the procedures associated with the implementation of the neighborhood acts.		
TARGETS	Target 1: Perform 100% of the neighborhood records. Target 2: Reestablish the constructive conditions of the homes that may be affected by the completion of the different phases of the project. Target 3: Implement the pertinent information strategies with the communities susceptible of affectation.		
IMPACT	SIGNIFICANCIA AMBIENTAL DEL IMPACT ENVIRONMENTAL SIGNIFICANCE	ACTIVITY	COMPONENT / ENVIRONMENTAL ELEMENT AFFECTED
Alteration of existing infrastructure	MODERATE	Material Transport	Communities
	MODERATE	Materials Transport	Communities
Variation in the volume of vehicular traffic	MODERATE	Transport, manufacture and driving of the piles	Communities
	SEVERE	Material Transport (Onshore terminal)	Communities
	MODERATE	Construction of temporary facilities operation	Communities
	MODERATE	Construction of infrastructure and facilities associated with the operation of the temporary terminal	Communities
	MODERATE	Materials Transport (road)	Communities

APLICATION STAGE			
Previous Activities	X	Operation	X
Construction	X	Dismantling	

MEASURE TYPE			
PREVENTION	MITIGATIO	CORRECTION	COMPENSATION

ENVIRONMENTAL MANAGEMENT PLAN			PS-6
NEIGHBORHOOD RECORDS PROGRAM			
	N		
		X	

ACTION TO DEVELOP

For the implementation of the neighborhood acts, two complementary activities must be carried out: the application of the act itself and the adequate communication with the owners that may be affected by the occurrence of some constructive activities of the project.

- Prior to the start of the implementation of the neighborhood acts, the owners of Nueva Colonia must be summoned on the sides of the vehicular traffic path leading to the port for a meeting in which the objective of the minutes of neighborhood and the format thereof. To the meeting should be convened the municipal personality as guarantor of rights of the community of Nueva Colonia.
- For the lifting of the neighborhood records, an information leaflet should be prepared specifying the criteria to be used, the date of the visit and those responsible.

- The information will be given to the owners of the properties with 5 days of anticipation to the realization of the activity. To do this, a format that evidences the fulfillment of the activity must be used.
- A neighborhood act must be made for each property that may be affected in Nueva Colonia.
- If the owner is not in the property on the day of the visit, the professional in charge must leave a new flyer with the date and time of the new visit (which cannot be less than 5 days). This activity must be evidenced in the format for this purpose by signing the received and / or photograph of the home.
- If the owner of the property is not present at the second visit, the neighbor's act will be carried out with the person who is in the property and approval will be recorded both in the minutes and in the photographic record. These particular cases will be notified to the supervisor.
- Neighborhood records should begin at the project construction stage.
- Neighborhood records must be prepared by professionals with experience in the property field and will be accompanied by a social professional who will serve as a liaison with the community. The activity must be accompanied by auditing professionals.
- Each neighborhood document must be signed by the owner or a person authorized by the owner, the person responsible by the contractor and the supervisor.
- There will be three copies of the neighborhood records: 1 in possession of the contractor, 1 in possession of the owner and 1 in possession of the supervision. The original record will be duly filed by the contractor.
- If during the construction process there are evidences of damage to the properties, the mechanisms of the Customer Service Office must be linked. The owner may request an inspection visit by completing the format for that purpose. Once the procedure is completed, the contractor, together with the supervisor, will carry out the verification visit and the establishment of possible agreements.
- Neighborhood records must remain open during the construction and operation phase of the project.
- Once the operation phase is completed, the neighborhood records will be terminated.
- A database with neighborhood records duly closed must be prepared.

ENVIRONMENTAL MANAGEMENT PLAN		PS-6		
NEIGHBORHOOD RECORDS PROGRAM				
EXECUTION TIMELINE				
The neighborhood records should start at the beginning of the construction stage and will be completed once the operation stage is finished.				
APLICATION PLACE				
Town center of the township of Nueva Colonia				
EXECUTION MANAGER				
Personnel contractors in charge of the construction stage				
REQUIRED STAFF				
Professional with experience in property development Social Management Professional				
MONITORING AND TRACKING INDICATORS				
TARGET	**VALUE**	**INDICATOR**	**MANAGER**	**REGISTER TYPE**
Target 1 Perform 100% of neighborhood records:	100%	Total neighborhood records completed / total neighborhood records initiated	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Neighborhood records. Database with neighborhood records completed.
Target 2: Restore the construction conditions of the homes that may be affected by the completion of the different phases of the project.	100%	Number of conditions restored / number of impacts generated	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A before SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	Neighborhood records. Photographic record
Target 3: Implement the pertinent information strategies with the communities	100%	Number of information strategies implemented / number of information strategies Proposals	SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA S.A SOCIETY, before	Calls, initial meeting minutes, photographic record and attendance list. Delivery format of the information

ENVIRONMENTAL MANAGEMENT PLAN			PS-6	
NEIGHBORHOOD RECORDS PROGRAM				
susceptible of affectation.			SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A	flyer.

QUANTIFICATION AND COSTS		
No	**Description**	**Estimated cost**
1	Project staff	The costs associated with the project's personnel are estimated at $ 40,000,000 COP considering the hiring of two professionals for a period of forty (40) months, for the development of 21 workshops.
2	Materials and equipments	$ 2'000,000 is allocated for general stationery expenses
3	Unexpected events	10% of the total value of the program was allocated for contingency expenses, corresponding to $ 4,200,000 COP.
4	TOTAL	$ 46’200.000 (forty-six million two hundred thousand pesos COP)
Note: The estimate of costs for this Program does not include IVA. At the time of execution, the budget will be indexed.		

1.1.2 Monitoring and tracking plan

The monitoring and tracking plans proposed for the abiotic, biotic and socioeconomic media are shown below. The main objective of these plans is to review the validity and reliability of environmental management plans and / or programs, thus each plan is aimed at monitoring and verifying their behavior and effectiveness. On the other hand, these plans are also intended to monitor and track the environmental components, in accordance with the analysis of impacts and the evaluation of the magnitude of the alterations that are produced by the activities of the project[25].

1.1.2.1 *Abiotic environment*

Table No. 11.26 shows the equivalence of monitoring and monitoring plans authorized by the ANLA through Resolution 0032 of 2012[26] and those proposed for the abiotic environment. These follow-up and monitoring plans include the verification of the behavior and effectiveness of the management plans and the monitoring and monitoring of the trend of the environment.

Table No. 11.26 Equivalence of monitoring and monitoring plans authorized by Resolution 0032 of 2012 and those proposed in this study

Code Plan Resolution 0032	Name of the plan and / or environmental management program (Resolution 0032)	Code Plan in the present study	Name of the proposed plan and / or environmental management program
WORKSHEET S-1	Wastewater monitoring	WORKSHEET SMA-1	Monitoring of water resources
WORKSHEET S-2	Monitoring of water quality and sediments of receiving streams		
WORKSHEET S-3	Monitoring of atmospheric emissions, air quality and noise	WORKSHEET SMA-2	Monitoring of atmospheric emissions, air quality and noise
WORKSHEET S-4	Monitoring of the generation and management of hazardous and non-hazardous waste	WORKSHEET SMA-3	Monitoring for the integral management of hazardous and non-hazardous solid waste

Source: Prepared by Aqua&Terra Consultores Asociados S.A.S, 2015

Additionally, two (2) monitoring and tracking programs were created that complement the programs proposed by the ANLA through Resolution 0032 of 2012[27], and the follow-up sheets to the trend of the abiotic environment are included, see Table No. 11.27.

[25] COLOMBIA. NATIONAL AUTHORITY OF ENVIRONMENTAL LICENSES - ANLA. Resolution 0112 (January 28, 2015). Op. cit

[26] Ibíd

[27] Ibíd

Table No. 11.27 Monitoring and environmental tracking plans added for the present study

Code Plan in the current assessment	Name of the proposed plan and / or environmental management program
WORKSHEET SMA-4	Monitoring of the handling of fuels, fats and oils on land and on board the dredge and auxiliary vessels
WORKSHEET SMA-5	Follow-up and monitoring of the control measures for the deepening dredging of the access channel and final disposal site
WORKSHEET TMA-1	Follow-up and monitoring of the abiotic environment trend - Atmospheric
WORKSHEET TMA-2	Follow-up and monitoring of the abiotic environment trend - Inland waters and oceanography (marine waters)

Source: Prepared by Aqua&Terra Consultores Asociados S.A.S, 2015

- Records of the Abiotic Monitoring and Monitoring Program

A. ..... M onitoring and monitoring of plans and programs

- *SMA-1 Sheet. Follow up and monitoring program for water resources*

FOLLOW UP AND MONITORING OF THE WATER RESOURCE MANAGEMENT PLAN	SMA-01
FOLLOW UP AND MONITORING PROGRAM OF WATER RESOURCES	
Objectives	1. ..... o comply with the measures established in the environmental management plan of the water resource of the effluents generated on land and the management of the effluents generated on board the motor ships, auxiliary vessels or naval artifacts. 2. ..... erify the efficiency of the PTAR in comparison with the environmental regulations Resolution 0631 of 2015, in accordance with the results of the monitoring of the discharge quality of the port terminal before and after the treatment. 3. ..... onitor the eventual impact of the quality of the water and the continental and marine sediments of the different works of the project under construction and operation.
PMA Sheets	- PMA -6 Environmental management of water resources - PMA - 8 Environmental management for deepening dredging, maintenance and disposal of dredged material
Actions to develop	1. Conduct inspections w) A daily visual inspection will be made in the runoff waters in the work fronts, in order to detect the possible presence of floating material, sedimented material, oils and grease and / or hydrocarbons, in order to take necessary measures to clean them

FOLLOW UP AND MONITORING OF THE WATER RESOURCE MANAGEMENT PLAN	SMA-01
FOLLOW UP AND MONITORING PROGRAM OF WATER RESOURCES	

and prevent pollutant carryover to the León River or the Nueva Colonia canal.

x) There will be weekly inspections during the operation of the port terminal in rainwater management works.

y) Verify the volume discharged to the Nueva Colonia Canal, which complies with that granted in the environmental license through a meter or landfill, among others.

$$\frac{\text{ARD volume and managed ARnD}}{\text{Volume of wastewater generated}} x100\%$$

2. Verification of environmental management of vessels

z) Check monthly that boats governed by MARPOL 73/78 Annex IV associated with the port, perform a proper delivery of wastewater to a specialized port operator duly authorized to perform this operation, if performed through the port terminal.

aa) Verify that the International Certificate for the Prevention of Pollution by dirty water and that must be equipped with a facility for the treatment of dirty water, is in force.

bb) Perform a volume control of the discharge of bilge water of the vessels associated with the port, which should be delivered to a specialized port operator.

3. Water quality and continental sediments monitoring

cc) During the construction and operation phase of the project, water quality and continental sediment monitoring will be carried out in three (3) stations every six months, one during the rainy season and the other during the dry season. It should be noted that during construction, monitoring must start before construction works begin.

dd) A semiannual report should be made with an analysis and comparison of the variations of the water column, verifying compliance with the current environmental regulations, Decree 1076 of 2015 issued by the Ministry of Environment and Sustainable Development, in order to know the variations of water quality and continental sediments by the project works.

ee) Location of monitoring stations

Table No. 11.4 shows the Magna Sirgas flat coordinates originating from Bogotá of the monitoring stations defined for the analysis of water quality and continental sediments in the study area of the Project and in Figure No. 11.4 the location of said stations is presented.

Table No. 11.28 Location of the water quality and continental sediments sampling stations

ID	Station name	Magna-Sirgas Flat coordinates origin Bogotá	
		East	North

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FOLLOW UP AND MONITORING PROGRAM OF WATER RESOURCES	

P1	Station upstream of the León River	706,648.2	1,368,501.9
P2	Station in front of the jetty	706,422.3	1,368,536.0
P3	Station downstream of the León river	705,959.8	1,369,149.3

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

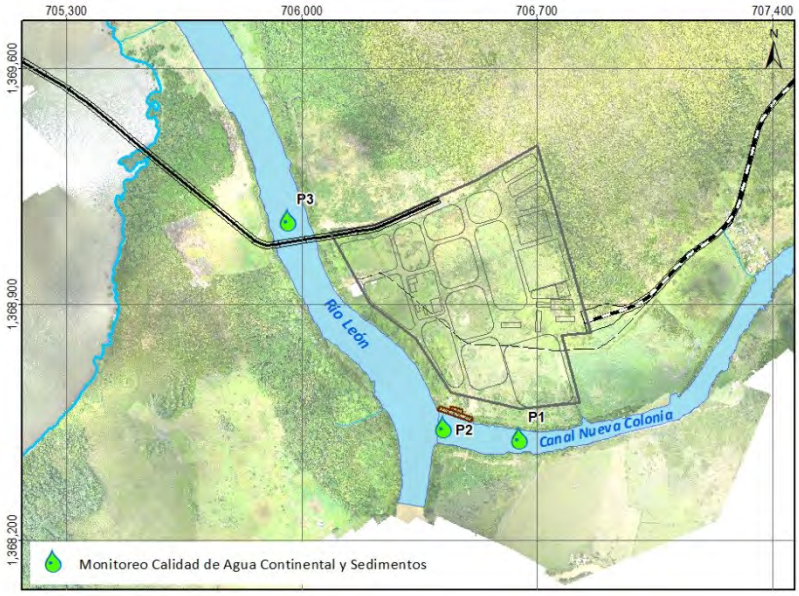

Figure No. 11.24 Location of water quality and continental sediments sampling stations
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

ff) Parameters to be monitored in the water column and continental sediments, an integrated sampling will be carried out in the depth and in the cross section in the three (3) stations distributed over the León River and the Nueva Colonia Canal, for the continental sediments the first five (5) cm of the bottom will be taken. Table No. 11.5 and Table No. 11.6 show the parameters that should be monitored.

Table No. 11.29 List of physicochemical and bacteriological parameters of the continental water

Characterization	Parameter	Unit
Physics	Temperature	°C
	Total suspended solids	mg/L
	Total dissolved solids	mg/L
	Sedimentable solids	mL/L–h
	Electric conductivity	µS/cm
	Potential of Hydrogen - pH	PH units

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		Turbidity	UNT
		Real Color	m^{-1}
	Chemistry	Dissolved oxygen (DO)	mg/L
		Chemical Oxygen Demand (COD)	mg/L O_2
		Biochemical Oxygen Demand at five (5) days (BOD5)	mg/L O_2.
		Total Nitrogen Kjeldahl	mg/L NTK
		Total phosphorus	mg/L P
		Greases and oils	mg/L
		Total Alkalinity	mg/L $CaCO_3$
		Total Acidity	mg/L $CaCO_3$
		Calcic hardness	mg/L $CaCO_3$
		Total hardness	mg/L $CaCO_3$
		Total phenols	mg/L
		Arsenic	mg/L
		Barium	mg/L
		Cadmium	mg/L
		Zinc	mg/L
		Chrome	mg/L
		Copper	mg/L
		Mercury	mg/L
		Nickel	mg/L
		Silver	mg/L
		Lead	mg/L
		Selenium	mg/L
	Bacteriological	Total coliforms	NMP/100 mL
		Fecal Coliforms	NMP/100 mL

Source: Resolution 0112 of January 28, 2015 and SGS Laboratory, Colombia S.A.S, 2015

Table No. 11.30 Relationship of chemical parameters analyzed from continental sediments

Characterization	Parameter	Unit
Chemistry	Chrome	mg/L
	Zinc	mg/L
	Copper	mg/L

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	Nickel	mg/L
	Greases and oils from the bottom sediment layer	mg/L
	Phenols from the bottom sediment layer	mg/L
	Total hydrocarbons of the bottom sediment layer	mg/L

Source: Resolution 0112 of January 28, 2015

4. Water quality and marine sediments monitoring

gg) During the construction and operation phase of the project, water quality and marine sediments will be monitored in seven (7) stations every six months, one in the rainy season and the other in the dry season. It is worth noting that during the construction phase, monitoring must start before the construction works begin (1 month before).

hh) A semi-annual report should be made with an analysis and comparison of the variations of the seawater column, verifying compliance with current environmental regulations, Decree 1076 of 2015 issued by the Ministry of Environment and Sustainable Development, in order to know the variations of the water quality and marine sediments by the project´s works.

ii) For the deepening dredging activities, water quality and marine sediment monitoring will be done before (1 month before), during (50% of the dredged volume) and after the deepening dredging (1 month later), in the seven (7) marine stations, in order to analyze the variations of the marine water column and sediment quality, by the resuspension of the dredged material and in the dumping area.

jj) For maintenance dredging activities, water quality and marine sediment monitoring will be done before (1 month before) and after maintenance dredging (1 month later), in the seven (7) marine stations.

kk) Location of monitoring stations

Table No. 11.7 shows the Magna Sirgas flat coordinates originating from Bogotá of the monitoring stations defined for the analysis of the water quality and marine sediments in the study area of the Project and in Figure No. 11.5 the location of said stations is presented.

Table No. 11.31 Location of the water quality and marine sediments sampling stations

ID	Station name	MAGNA SIRGAS FLAT COORDINATES Origin BOGOTA	
		EAST	NORTH
P4	Viaduct Station	703.792,94	1.371.083,51
P5	Maneuvering Area Station 1	702.783,75	1.370.390,87
P6	Maneuvering Area Station 2	702.487,86	1.371.110,59
P7	Maneuvering Area Station 3	702.943,68	1.371.628,00
P8	Access Channel Station Phase I	701.577,00	1.374.197,10
P9	Checkpoint station	696.387,84	1.372.825,31
P10	Landfill	697.792,41	1.375.464,03

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

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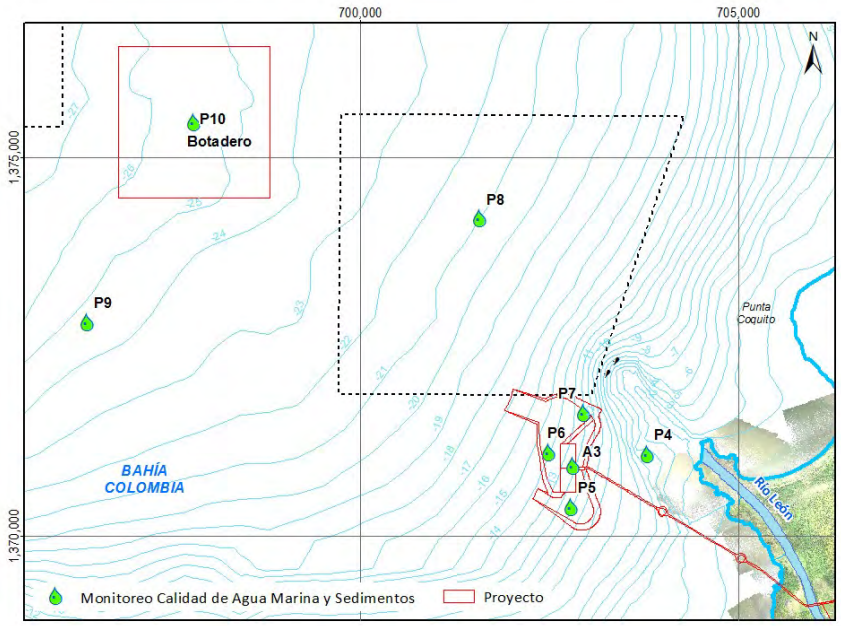

Figure No. 11.25 Location of the water quality and marine sediments sampling stations
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

ll) Parameters to be monitored in the water column and marine sediments

mm) An integrated depth sampling will be carried out in seven (7) stations distributed in Bahía Colombia for the quality of the seawater, for the marine sediments the first five (5) cm of the bottom will be taken.

Table No. 11.8 and Table No. 11.9 present the parameters that must be monitored for the physicochemical and bacteriological characterization of the water column and physicochemical characterization of the marine sediments in Bahía Colombia.

Table No. 11.32 Relation of the physicochemical and bacteriological parameters to be analyzed of the seawater column

Characterization	Parameter	Unit
Physics	Temperature	°C
	Total suspended solids	mg/L
	Total dissolved solids	mg/L
	Sedimentable solids	mL/L–h
	Electric conductivity	uS/cm

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		Potential of Hydrogen - pH	pH Units
		Turbidity	UNT
		Real Color	m^{-1}
	Chemistry	Dissolved oxygen (DO)	mg/L
		Chemical Oxygen Demand (COD)	mg/L O_2
		Biochemical Oxygen Demand at five (5) days (BOD5)	mg/L O_2
		Total Nitrogen Kjeldahl	mg/L NTK
		Total phosphorus	mg/L P
		Greases and oils	mg/L
		Total Alkalinity	mg/L $CaCO_3$
		Total Acidity	mg/L $CaCO_3$
		Calcic hardness	mg/L $CaCO_3$
		Total hardness	mg/L $CaCO_3$
		Total phenols	mg/L
		Arsenic	mg/L
		Barium	mg/L
		Cadmium	mg/L
		Zinc	mg/L
		Chrome	mg/L
		Copper	mg/L
		Mercury	mg/L
		Nickel	mg/L
		Silver	mg/L
		Lead	mg/L
		Selenium	mg/L
		Chlorophyll a	mg/L CHLa
		Chlorophyll b	mg/L CHLb
		Polycyclic aromatic hydrocarbons	mg/L HAP
		Active Substances to Methylene Blue (SAAM)	mg/L
	Bacteriological	Total coliforms	NMP/100 mL
		Fecal Coliforms	NMP/100 mL

Source: Resolution 0112 of January 28, 2015

Table No. 11.33 List of physicochemical parameters to be analyzed of marine sediments

Characterization	Parameter	Unit

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Physics	Temperature	°C
	Potential of Hydrogen - pH	pH Units
Chemistry	Greases and oils	mg/L
	Arsenic	mg/L
	Barium	mg/L
	Cadmium	mg/L
	Zinc	mg/L
	Chrome	mg/L
	Copper	mg/L
	Mercury	mg/L
	Nickel	mg/L
	Silver	mg/L
	Lead	mg/L
	Selenium	mg/L
	Total Hydrocarbons	mg/L
	Phenols	mg/L
	Polycyclic aromatic hydrocarbons	mg/L HAP
	Total organic carbon	mg/L COT
	Volatile Acid Sulphide	mg/L S^{-2}
	Total phosphorus	mg/L
	Total Nitrogen	mg/L

Source: Resolution 0112 of January 28, 2015

5. Discharge Water quality monitoring

During the operation phase of the project, monitoring will be carried out before entering the treatment plant (PTAR) and in the effluent (discharge point), quarterly the first year of operation, and annually from the second year of operation.

A comparison of compliance with current environmental regulations should be made, Resolution 0631 of 2015 issued by the Ministry of Environment and Sustainable Development, in each monitoring that is executed.

nn) Location of discharge monitoring stations

oo) In Table No. 11.10 the Magna Sirgas flat coordinates originating from Bogotá of the monitoring stations of the discharge generated in the Project are presented and in Figure No. 11.6 the location of said stations is presented as well.

Table No. 11.34 Location of the discharge sampling stations

ID	Station name	MAGNA SIRGAS FLAT COORDINATES Origin BOGOTA	
		EAST	EAST
MV 1	Before entering the PTAR	706.624,9	1.368.629,3
MV 2	After treatment at the PTAR	706.615,4	1.368.590,8

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Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

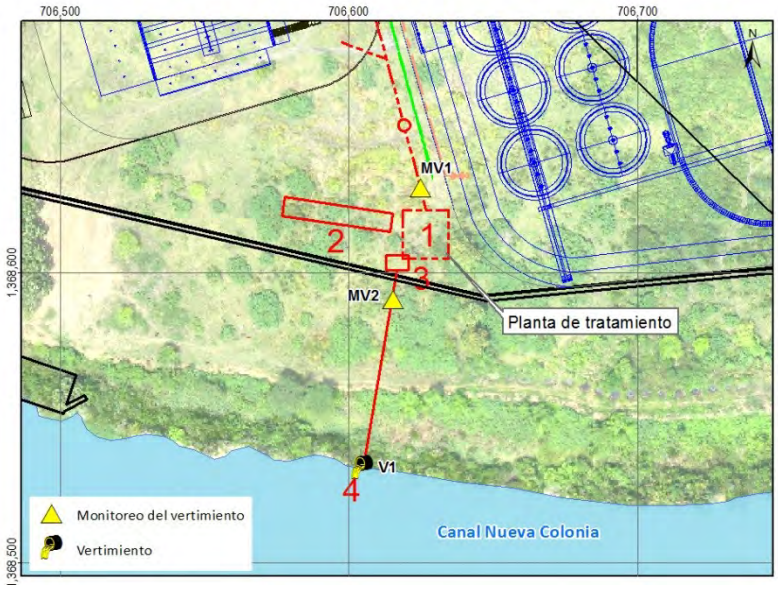

Figure No. 11.26 Location of discharge sampling stations
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

pp) Parameters to monitor

Table No. 11.8 and Table No. 11.9 present the parameters that must be monitored for the physicochemical and bacteriological characterization of the discharge.

Table No. 11.35 List of physicochemical and bacteriological parameters of the discharge

Parameters to analyze in domestic wastewater (ARD) with a load less than 625.00 Kg / day BOD	
Parameter	Units
pH	pH Units
Chemical Oxygen Demand (COD)	mg/L O_2
Biochemical Oxygen Demand (BOD)	mg/L O_2
Total Suspended Solids (TSS)	mg/L
Sedimentable Solids (SSED)	mL/L
Greases and oils	mg/L
Active Substances to Methylene Blue (SAAM) - Surfactants	mg/L
Total hydrocarbons (HTP)	mg/L
Orthophosphates	mg/L

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Total phosphorus	mg/L
Nitrates	mg/L
Nitrites	mg/L
Ammoniacal nitrogen	mg/L
Total nitrogen	mg/L

Source: Resolution 0631 of 2015

6. Measurements of indicators

With the results obtained in the monitoring carried out in the continental, marine and residual waters semiannually in the rainy and dry seasons, the following indicators will be calculated in compliance with the Colombian regulations in force, Decree 1076 of 2015, or the one that modifies it:

qq) Continental Waters

$$\frac{Parameters\ that\ comply\ with\ the\ standard}{Monitored\ parameters} \text{ x } 100\%$$

rr) Marine waters

$$\frac{Parameters\ that\ comply\ with\ the\ standard}{Monitored\ parameters} x100\%$$

ss) Residual waters

$$\frac{(Parameters\ that\ comply\ with\ the\ discharge\ standard)}{Monitored\ parameters} \text{ x } 100\%$$

7. Reports results

tt) An analysis and comparison will be made of the results of the water quality and continental and marine sediments of the environmental baseline monitoring and with the REDCAM monitoring points of the INVEMAR located and monitored periodically in the area, and that are close to those proposed by the project.

uu) In each monitoring performed, a report of analysis and comparison with the standard will be made according to the results obtained from the laboratory (accredited by the IDEAM for sampling and analyzed parameters). and / or, standards or international references for those parameters that are not regulated in Colombia, for interpretation purposes.

vv) In addition, the samples chain of custody report and the calibration reports in the field and in the laboratory of used sampling equipment must be submitted.

ww) All results must be included in the Environmental Compliance Reports - ICA to the competent environmental authority.

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FOLLOW UP AND MONITORING PROGRAM OF WATER RESOURCES	
Used Criteria	1..... ompliance with the permissible limits of the current environmental regulations for discharges into natural waters, Resolution 0631 of 2015 issued by the Ministry of Environment and Sustainable Development. 2. Compliance with the permissible limits of the current environmental regulations established in Decree 1076 of 2015, for the use of preservation of flora and fauna and recreational use, in continental waters and marine waters.
Measurement frequency	1. Daily and monthly field inspections in the management measures proposed in the water resource 2. Water resources monitoring xx) Construction phase - Continental and marine waters and sediments monitoring (10 stations): Half-yearly (rainy season (between January and March) and dry season (between October and November) Note: the first monitoring during the construction must be done before starting the construction of the project works, as a baseline, at least 1 month before. yy) Operation phase - Continental and marine waters and sediments monitoring (10 stations): half-yearly (rainy season (between January and March) and dry season (between October and November) - PTAR discharge monitoring: quarterly 1 year, the other years of operation, annual frequency zz) Deepening dredging - Frequency: Before (1 month before), During (50% of dredging) and After (1 month after) aaa) Maintenance dredging - Frequency: Before (1 month before) and After (1 month after)
Justification of the indicator´s representative ness	The indicators related to compliance with the quality of continental and marine water in the Nueva Colonia Canal, León River and Bahía Colombia are aimed at quantifying variations in the concentrations of physicochemical and bacteriological parameters, in accordance with the limits established by the Colombian regulations (Decree 1076 of 2015), in order not to exceed the concentrations that may affect the aquatic flora and fauna. Likewise, discharge compliance is sought with the limits established by the Colombian regulations (Resolution 0631 of 2015) and to avoid alterations in the water quality of the receiving water body.
Responsible for the execution	SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A, Construction contractor and port operator.

- *SMA-2 Sheet. Follow up and monitoring program for atmospheric emissions, air quality and noise*

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN FOR THE CONTROL OF ATMOSPHERIC EMISSIONS AND NOISE	SMB-02
FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	
Objectives	1..... erform air quality and environmental noise monitoring, in order to verify that there is no environmental impact due to the emission of particulate material, combustion gases and noise generation. 2..... erify the implementation of the proposed measures in the environmental management plan for the control of atmospheric emissions and environmental noise.
PMA Sheets	- PMA-2 Environmental management of vehicles, machinery, equipment, ships and naval artifacts. - PMA-3 Environmental management of landfill activities and land consolidation - PMA-4 Environmental management of construction materials - PMA-9. Management for the control of atmospheric emissions and noise - PMA-11. Environmental management of loading and unloading activities of authorized cargo types.
Actions to develop	1. **Conduct inspections** There will be daily inspections carried out on the vehicles, machinery and equipment associated with the project to identify: bbb) Any vehicles that present a bad combustion, susceptible to emit pollutants into the atmosphere outside the permissible limits. ccc) Execution of work susceptible of lifting particulate material, without the adequate containment elements being implemented ddd) Equipment, machinery or vehicles that apparently generate noise above the expected. eee) Verification of the daily performance of the wetting of the access road and intervened areas, if required, to avoid contamination by particulate material due to the frequent transit of vehicles. fff) In operation. It will be verified that the proposed actions for the loading and unloading of the authorized load are complied with, to avoid spills and accidents in the port, that alter the environmental conditions. ggg) In operation. It will be verified weekly that bag filters or electrostatic precipitators are in good condition, to avoid the generation of emissions of particulate material to the environment in the operation of solid bulks cargoes. hhh) Carry out daily inspections of the vehicles that transit the project's intervention areas, which should not travel at speeds greater than 20 km / h. iii) Inspect daily that the vehicles that transport granular materials, are properly covered.

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN FOR THE CONTROL OF ATMOSPHERIC EMISSIONS AND NOISE	SMB-02
FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	

jjj) Verify on a monthly basis that the vehicles linked to the construction and operational stage of the project have the gas emissions certificate and the mechanical technical revision, as established by Law 769 of 2002, for vehicles that apply.

kkk) Check on a monthly basis that the mechanical equipment, motors and the dredge are in good mechanical condition, in order to avoid leaks and fumes.

2. **Air quality monitoring**

Air quality monitoring will be carried out in the project´s area of influence, twice a year during the construction phase in two stations located on the land side (A1 and A2). During the operation of the port terminal, an annual air quality monitoring is proposed in the three stations located: two in the land part and one in the dock (A1, A2 and A3). It will be verified in each monitoring that they comply with the guidelines established in the protocols for the air quality monitoring, established by Resolution 650 of 2010, modified by Resolution 2154 of 2010.

lll) Location of stations

In Table No. 11.36 the location coordinates are presented and in Figure No. 11.13, the location of the stations for the air quality control in the port terminal are shown.

Table No. 11.36 Location of air quality stations

POINT	MAGNA SIRGAS FLAT COORDINATES ORRIGIN BOGOTÁ		
	Location name	EAST	NORTH
A1	New Colonia District	708.833,5	1.369.842,9
A2	Onshore terminal	706.490,4	1.368.972,5
A3	Dock	702.802,0	1.370.929,9

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN FOR THE CONTROL OF ATMOSPHERIC EMISSIONS AND NOISE	SMB-02
FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	

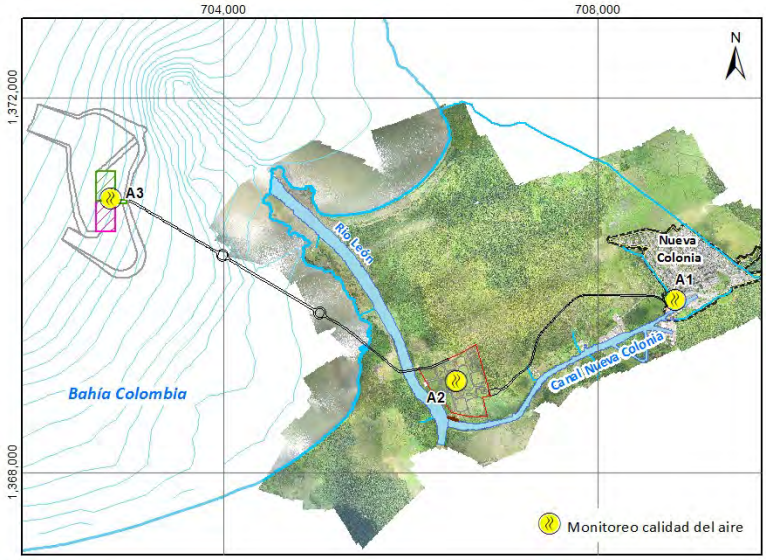

Figure No. 11.27 Air quality monitoring stations
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

mmm) Parameters to monitor

Air quality monitoring of the following parameters will be carried out:

- Particulate matter (MP) - PST - PM10
- SO2 - NOX - CO

3. **Environmental noise monitoring**

Environmental noise monitoring will be carried out in the project´s area of influence, every six months during the construction phase and the first 2 years of the operational phase, and annually starting 2 years after the project´s operational phase.

It will be verified in each monitoring that they comply with the guidelines established in the noise protocols, in accordance with Resolution 627 of 2006.

nnn) Location of stations

In Table No. 11.37 the location coordinates are presented and in Figure No. 11.14 the location of the stations for the control of environmental noise in the port terminal is presented.

Table No. 11.37 Location of environmental noise stations

POINT	MAGNA SIRGAS FLAT COORDINATES Origin BOGOTÁ		
	Location name	EAST	NORTH
R1	NE of the access road to the Nueva Colonia District	709.518,96	1.369.996,53

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FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	

R2	NW of the access road to the Nueva Colonia District	708.833,52	1.369.842,90
R3	N of the Nueva Colonia District	708.553,10	1.370.542,73
R4	Access to the project site	706.969,86	1.368.841,19

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

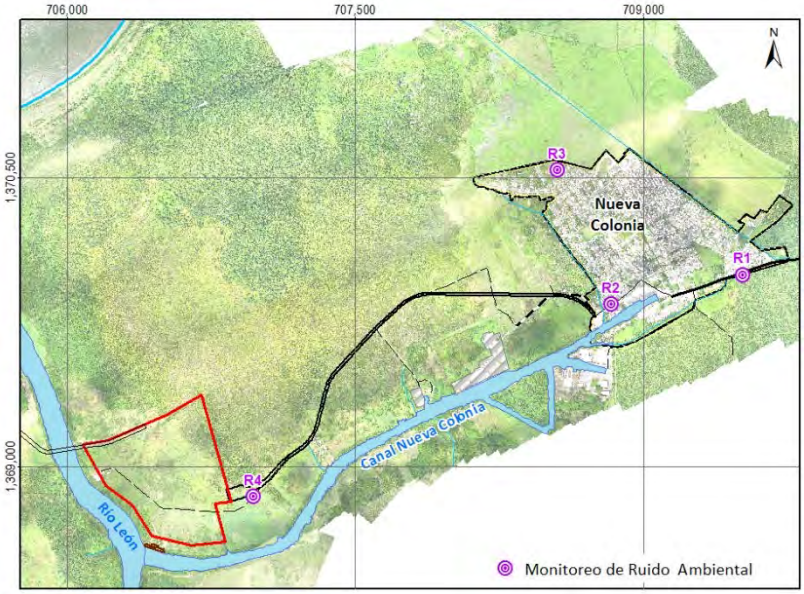


Figure No. 11.28 Environmental noise monitoring stations
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

ooo) Parameters to monitor

Environmental noise monitoring will be carried out on the following days:
- Business days in daytime and nighttime
- Day and night non-business days

4. **Indicators Measurement**

The indicators will be calculated according to the monitoring carried out and obtained results:

ppp) Wetting

$$\frac{\textit{Executed wetting frequency}}{\textit{Scheduled wetting frequency}} x100\%$$

qqq) Executed monitorings

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN FOR THE CONTROL OF ATMOSPHERIC EMISSIONS AND NOISE	SMB-02
FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	
	$\frac{Number\ of\ monitorings\ performed}{Number\ of\ scheduled\ monitorings}\ x\ 100\%$ rrr) Percentage of parameters that meet the standard $\frac{No.\ of\ monitored\ parameters\ -\ Air\ quality}{No.\ of\ parameters\ that\ meet\ the\ standard}\ x100\%$ sss) Percentage of parameters that meet the standard $\frac{Number\ of\ monitored\ stations\ -noise-dB\ Daytime}{No.of\ stations\ that\ meet\ the\ standard}$x100% ttt) Percentage of parameters that meet the standard $\frac{Number\ of\ monitored\ stations\ -noise-dB\ Nighttime}{No.of\ stations\ that\ meet\ the\ standard}$x100 5. **Preparation of reports** uuu) In each air quality and ambient noise executed monitoring, a report of analysis and comparison with the standard will be made according to the results obtained from the laboratory (accredited by the IDEAM for sampling and analyzed parameters vvv) All results must be included in the Environmental Compliance Reports - ICA to the competent environmental authority.
Used Criteria	1. ..... arameters that have permissible limits, established by Resolution 610 of 2010[28]. or to modify it. 2. Parameters that have permissible limits, established by Resolution 627 of 2006, or to modify it.
Measurement frequency	1. **Perform the proposed inspections on a daily, monthly and permanent basis.** 2. **Air Quality monitoring** – Construction phase: half-yearly air quality (onshore stations A1 and A2) – Operation phase: Annual (stations A1, A2 and A3) 3. **Environmental noise monitoring** – Construction phase: semianual – Operation Phase in the first 2 years: semianual - Operation phase after the first 2 years: Annual - Note: Contemplating two climatic situations susceptible to affect the air quality (dry season and rainy season), it is proposed that monitoring be carried out during the construction phase in the dry season (between January and March) and during the rainy season (April -July or October-November). For the operative stage, as it is an annual monitoring, intercalate the climatic times of the monitoring.

[28] MINISTRY OF ENVIRONMENT, HOUSING AND SUSTAINABLE DEVELOPMENT, NOW MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. Resolution 610 (March 24, 2010). "By which Resolution 601 of April 4, 2006 is modified".

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN FOR THE CONTROL OF ATMOSPHERIC EMISSIONS AND NOISE	SMB-02
FOLLOW UP AND MONITORING PROGRAM FOR ATMOSPHERIC EMISSIONS, AIR QUALITY AND NOISE	
Justification of the indicator´s representative ness	The indicators related to air quality and environmental noise compliance are aimed at quantifying the variations in the concentrations of the parameters, in accordance with the limits established by Colombian regulations (Resolution 610 of 2010) and Resolution 627 of 2006). Likewise, it is sought that the management measures control and mitigate the emissions that may be generated, in the sense of not altering the normal conditions of the atmosphere in the project´s area of influence, which may affect the health of the community.
Responsible for the execution	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A , Construction contractor and port operator.

- *SMA-3 Sheet. Follow up and monitoring program for the integral management of hazardous and non-hazardous solid waste*

FOLLOW UP AND MONITORING OF THE INTEGRAL MANAGEMENT PLAN FOR HAZARDOUS AND NON-HAZARDOUS SOLID WASTE (ONSHORE, DOCK AND BOATS)	SMA-03
FOLLOW UP AND MONITORING PROGRAM FOR THE INTEGRAL MANAGEMENT OF HAZARDOUS AND NON-HAZARDOUS SOLID WASTE	
Objectives	1. stablish a detailed record of the different types of waste generated by the operation of the Terminal. 2. onitor compliance with the environmental measures established by the environmental management plan to provide adequate treatment and final disposal of the hazardous and non-hazardous solid waste generated in the port terminal (onshore, dock and boats).
PMA sheets	PMA-5 SHEET: Integrated management of hazardous and non-hazardous solid waste (Onshore, dock and boats)
Acciones a desarrollar	1. **Integral management of hazardous, non-hazardous and special solid waste onshore and dock.** www) Monthly training workshops will be held on the integral management of waste, with all employees who have a direct link to the port. The issues to be addressed: - Waste prevention and reduction at the source - Workshops on waste segregation, collection and storage - Current environmental legislation - Environmental risks of inadequate waste management - Socialization of the organization chart and assignment of responsibilities - Hazardous waste management - Environmental benefits of proper handling of hazardous and non-hazardous waste. $\%\ of\ Trained\ employees = \frac{No.\ of\ trained\ employees}{Total\ employees\ at\ the\ port\ terminal} x100$ The assistance formats for training on environmental issues with emphasis on waste must be filled in order to meet an environmental education goal of 100% of the people linked to the project. xxx) Waste collection points will be installed according to the need and weekly inspections will be carried out in order to verify the proper separation and management of solid waste, for which a field format will be completed and the required corrective measures will be implemented. yyy) A monthly record will be kept of the waste volumes delivered to third parties for their treatment, use or final disposal, according to the waste characteristics: - Ordinaries - Organic - Cardboard and paper (recyclable) - Plastic and glass (recyclable) - Hazardous solids (hazardous) - Hospital waste (hazardous)

FOLLOW UP AND MONITORING OF THE INTEGRAL MANAGEMENT PLAN FOR HAZARDOUS AND NON-HAZARDOUS SOLID WASTE (ONSHORE, DOCK AND BOATS)	SMA-03
FOLLOW UP AND MONITORING PROGRAM FOR THE INTEGRAL MANAGEMENT OF HAZARDOUS AND NON-HAZARDOUS SOLID WASTE	

$$\%\ of\ Ordinary\ waste = \frac{Volume\ of\ ordinary\ waste\ generated}{Total\ volume\ of\ waste\ generated} x100$$

$$\%\ of\ Ordinary\ waste = \frac{Volume\ of\ organic\ waste\ generated}{Total\ volume\ of\ waste\ generated} x100$$

$$\%\ of\ Recycled\ waste = \frac{Volume\ of\ recycled\ waste\ generated}{Total\ volume\ of\ waste\ generated} x100$$

$$\%\ of\ Hazardous\ waste = \frac{Volume\ of\ hazardous\ waste\ generated}{Total\ volume\ of\ waste\ generated} x100$$

zzz) Storage and collection of solid waste

- For the storage of hazardous solid waste, the Substances Safety Sheets to be stored must be provided before being taken to the storage warehouse (NTC 4435 "Transportation of goods. Materials Safety Sheets).
- Routes and frequencies will be established according to the volume of waste generated, for the collection of hazardous and non-hazardous solid waste, which will be done separately.
- It will be guaranteed that the contracted operator complies with the provisions of Decree 2981 of 2013 regarding the collection and transport of non-hazardous waste.

aaaa) Final disposal of hazardous and non-hazardous solid waste:

- The transport of hazardous waste will be carried out by a company that has an Environmental License for handling, treatment, final disposal and / or use of hazardous waste.
- The hazardous and special waste generated within the project will be delivered to an external hazardous waste manager with their respective delivery support and record where it will specify the treatment and final disposal of the waste.
- Complete a checklist that indicates the complete cycle of the waste, from the time it is generated until it is reused, destroyed or disposed of; therefore, the adequate and definitive disposal of the waste must be clear and guaranteed (hazardous or non-hazardous).

2. **Integrated management of hazardous and non-hazardous solid waste on board the dredger and auxiliary vessels**

bbbb) Non-hazardous waste:

- The dredger and the auxiliary boats must separate the solid waste inside the boat, and then deliver it to the specialized port operator responsible for each type of waste generated.
- Operators must deliver to the Contractor the documentary records and certificates that indicate the delivery period, quantity, type of waste and treatment, as established in Annex V of the International Agreement for the Prevention of Pollution by Ships - MARPOL AGREEMENT 73 / 78.

FOLLOW UP AND MONITORING OF THE INTEGRAL MANAGEMENT PLAN FOR HAZARDOUS AND NON-HAZARDOUS SOLID WASTE (ONSHORE, DOCK AND BOATS)	SMA-03
FOLLOW UP AND MONITORING PROGRAM FOR THE INTEGRAL MANAGEMENT OF HAZARDOUS AND NON-HAZARDOUS SOLID WASTE	
	cccc) Hazardous waste: - The dredger and auxiliary vessels should contact a specialized port operator to perform the collection, treatment and final disposal of the hazardous solid waste generated within the motor ships. - The specialized port operator must deliver a certificate to the ship or naval artifact, specifying the type of waste, quantity, treatment and final disposal that will be given to the waste, as established in Annex V of the International Agreement for the prevention of pollution by ships - MARPOL AGREEMENT 73/78. - During the transfer of the product from the ship, the port operator and the receiving team must place a responsible person in the area of the waste collector to verify and control the presence of leaks or breakages and spills.
Used Criteria	1. Number of trained people working in the port terminal 2. Volume of generated solid waste (ordinary, organic, recyclable and hazardous) on land, dock and boats.
Measurement frequency	1..... n land and dock - The employee training will be done monthly - Weekly inspections will be made at the collection points of hazardous and non-hazardous waste. - Measure the volume of solid waste generated each month. 2..... n the boats - Records of the waste volumes will be requested to the vessels and dredges on a monthly basis.
Justification of the indicator´s representative ness	The activities proposed in the project must be permanently evaluated in order to verify the effectiveness of the proposed environmental measures, the predicted impacts and make adjustments or changes that optimize the objectives to be met for both the construction and operation phases. In order to assess compliance with environmental management measures, the amount of solid waste generated must be quantified through the completion of a solid waste generation field format that would apply to onshore installations, dock and vessels. The monitoring and follow up indicators involve the permanent inspection of each project activity where solid waste is generated (hazardous and non-hazardous) and supervision regarding the environmentally safe management of this waste at the source, storage, storage, transport and final disposal. Additionally, with the indicator of training for employees, it is intended to have a monthly control of the people trained on environmental issues with an emphasis on solid waste, in order to meet an environmental education goal of 100% of the people linked to the project.
Responsible for the execution	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A , Construction and operation contractor and Project controller.

- *SMA-4 Sheet. Follow up and monitoring program for the handling of fuels, greases and oils on land and on board the dredger and auxiliary vessels*

FOLLOW-UP AND MONITORING OF THE ENVIRONMENTAL MANAGEMENT PLAN FOR FUELS, OILS AND LUBRICANTS (ON LAND, DOCK AND BOATS)	SMA-04
FOLLOW UP AND MONITORING PROGRAM FOR THE MANAGEMENT OF FUELS, GREASES AND OILS ON LAND AND ON THE BOARD OF THE DREDGER AND AUXILIARY BOATS	
Objectives	1..... onitor the storage, handling and disposal of fuels, oils and lubricants activities. 2. Monitor the adequate implementation of environmental measures by vehicles, machinery and construction equipment that provide their services to the project.
PMA Sheets	– PMA-7. Environmental management of fuels, oils and lubricants (On land, dock and boats) – PMA-2: Environmental management of vehicles, machinery, equipment, ships and naval artifacts.
Actions to develop	**1. Vehicles, machinery, equipment and boats:** – It will be verified that all the vehicles used during the construction and operation of the onshore terminal and the maritime dock that are of the works contractor or port operator, must have the current mechanical technical revision certificates. – It will be verified that the vehicles, equipment, boats and machinery that operate for the project have the spill control elements (spill control kit). – In case of spills, follow the procedure established in the Risk Management Plan. **2. Maintenance workshop and fuel station** – The volumes of hazardous materials generated in the maintenance workshop and fuel station will be measured. – Inspections of the state of fuel, greases and oils storage tanks should be carried out; as well as the security conditions in which they are located. – Verifications will be made of the service station that is implemented in the operation stage by the port's environmental personnel, in which compliance with the recommendations given in the Environmental Management Plan for this type of facility will be verified.
Used criteria	1. Number of vehicles that have valid certificates 2. Number of times the spill risk management plan is activated 3. Volume of hazardous waste generated on land, dock and boats 4. Inspection report to the service station
Measurement frequency	- Half-yearly verification of the validity of the certificates of the vehicles of the project or of the operation - Immediate report of the activation of the risk management plan - Monthly record of the volume of hazardous waste generated and the volume delivered to external managers
Justification of the indicator´s representative ness	The activities proposed in the project must be permanently evaluated in order to verify the effectiveness of the proposed environmental measures, the predicted impacts and to make adjustments or changes that optimize the objectives to be met for both the construction and operation phases.

FOLLOW-UP AND MONITORING OF THE ENVIRONMENTAL MANAGEMENT PLAN FOR FUELS, OILS AND LUBRICANTS (ON LAND, DOCK AND BOATS)	SMA-04
FOLLOW UP AND MONITORING PROGRAM FOR THE MANAGEMENT OF FUELS, GREASES AND OILS ON LAND AND ON THE BOARD OF THE DREDGER AND AUXILIARY BOATS	
	In order to evaluate compliance with environmental management measures, the amount of hazardous waste generated must be quantified through the completion of a waste generation format that would apply to onshore facilities, the dock and the vessels. The follow up and monitoring indicators involve the permanent inspection of each project activity and of its vehicles, machinery, equipment and vessels; as well as facilities where fuel, greases and oils are handled, in order to adequately address the environmental impacts that may be generated by the use of these and take the necessary corrective and preventive measures during the construction and operation stage of the port
Responsible for the execution	SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A, Construction and operation contractor and Project controller

- *SMA-5 Sheet. Follow up and monitoring of control measures for the access channel´s deepening dredging and final disposal site*

FOLLOW-UP AND MONITORING TO THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE DEEPENING AND MAINTENANCE DREDGING AND DISPOSAL OF DREDGED MATERIAL.	SMA-05
FOLLOW UP AND MONITORING PROGRAM OF THE CONTROL MEASURES FOR THE ACCESS CHANNEL´S DEEPENING DREDGING AND THE FINAL DISPOSAL SITE	
Objectives	1. To comply with the measures established in the environmental management plan for the deepening and maintenance dredging and the disposal management of the dredged material. 2. To comply with the measures established in the environmental management plans necessary to prevent alterations in the quality of the seawater and the sediments that could be generated during the deepening and maintenance dredging in Bahía Colombia.
PMA Sheets	- PMA – 8 Environmental management for deepening and maintenance dredging and disposal of dredged material
Actions to develop	1. **Pre-dredging activities (deepening and maintenance)** dddd) Verify the validity and approval of permits for the development of dredging activities. eeee) Keep a volume control of material to be dredged in the area of intervention in Bahía Colombia. 2. **Dredging operations supervision (deepening and maintenance)** ffff)- The correct installation and operation of the signaling in the dredging area will be verified, according to the location design previously approved by the maritime authority. gggg) Supervise that dredging activities, both deepening and maintenance are carried out within the area established for this activity and they´re following the recommendations included in the PMA-08 plan. hhhh) Corroborate that the pre-dredging, dredging and post-dredging bathymetries are carried out for the deepening and maintenance dredging. iiii) Corroborate the realization of the water and marine sediments quality monitoring in the deepening and maintenance dredging in Bahía Colombia, as follows: • **Periodicity:** - Deepening dredging: Before starting dredging (1 month before), during dredging (50% of dredged volume) and at the end of dredging activities (1 month after). - Maintenance dredging: Before starting dredging (1 month before) and at the end of dredging activities (1 month after). • **Parameters:** The parameters presented in the SMA-1 sheet. Water resource • **Monitoring sites:** n the seven (7) stations located in Bahía Colombia,

FOLLOW-UP AND MONITORING TO THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE DEEPENING AND MAINTENANCE DREDGING AND DISPOSAL OF DREDGED MATERIAL.	SMA-05
FOLLOW UP AND MONITORING PROGRAM OF THE CONTROL MEASURES FOR THE ACCESS CHANNEL´S DEEPENING DREDGING AND THE FINAL DISPOSAL SITE	

presented in the SMA-1 file. **Named P4, P5, P6, P7, P8, P9 and P10.**

- **Laboratory:**

- The samples must be taken by a laboratory that is recognized and certified by the IDEAM. The monitoring results will be analyzed and compared with the permissible limits in Colombia according to the current regulations for the marine and estuarine waters quality, as applicable, and / or, norms or international references for those parameters that are not regulated in Colombia, for interpretation purposes.
- In addition, the samples chain of custody report and the calibration reports in the field and in the laboratory of the used sampling equipment must be submitted.

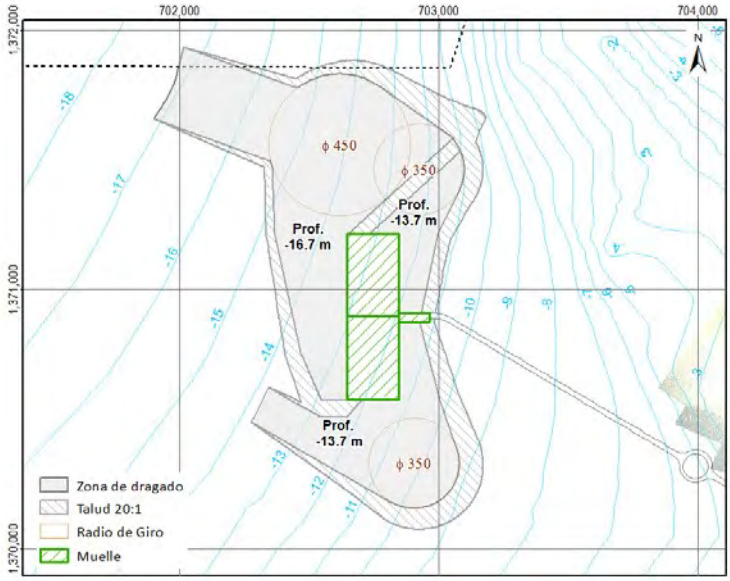


Figure No. 11.29 Areas and volume to be dredged in Bahía Colombia
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

3. **Final disposition of the dredged material**

jjjj) Verify that the disposition of the dredged material is carried out inside the area destined for dumping in Bahía Colombia (see Table No. 11.38and Figure No. 11.9).

kkkk) Corroborate that the pre-dredging and post-dredging bathymetry is carried out in the landfill area.

Table No. 11.38 Coordinates of the landfill location in Bahía Colombia

VERTEX	MAGNA SIRGAS FLAT COORDINATES Origin BOGOT	
	EAST	NORTH

FOLLOW-UP AND MONITORING TO THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE DEEPENING AND MAINTENANCE DREDGING AND DISPOSAL OF DREDGED MATERIAL.	SMA-05
FOLLOW UP AND MONITORING PROGRAM OF THE CONTROL MEASURES FOR THE ACCESS CHANNEL´S DEEPENING DREDGING AND THE FINAL DISPOSAL SITE	

B1	698.497,53	1.376.155,75	
B2	698.497,53	1.374.755,75	
B3	697.097,53	1.374.755,75	
B4	697.097,53	1.376.155,75	

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S., 2015

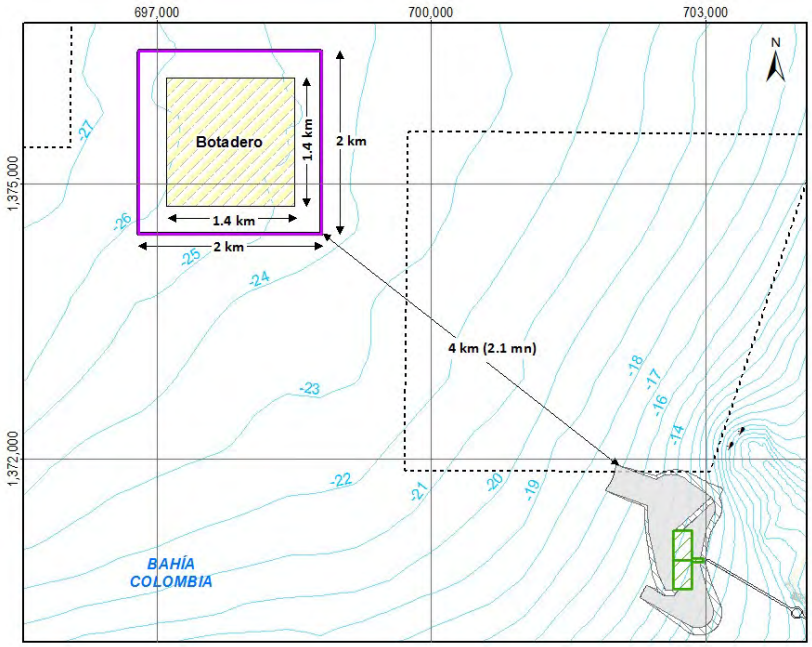


Figure No. 11.30 Disposal area for dredged material
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

4. **Erosion Control in underwater embankments**

llll) - Verify that dredging activities start at the top of the embankment, so that better support can be obtained and thus avoid instability in the foot of the submarine embankment.

mmmm) - Verify that the embankments were managed according to the calculations and technical designs slopes, embankments of 1V: 20H.

5. **Indicators calculation**

The following calculations will be made to measure indicators.

nnnn) Percentage of dredged volume

FOLLOW-UP AND MONITORING TO THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE DEEPENING AND MAINTENANCE DREDGING AND DISPOSAL OF DREDGED MATERIAL.	SMA-05
FOLLOW UP AND MONITORING PROGRAM OF THE CONTROL MEASURES FOR THE ACCESS CHANNEL´S DEEPENING DREDGING AND THE FINAL DISPOSAL SITE	
	$\frac{Dredged\ volume\ with\ overflow}{scheduled\ volume\ of\ dredging\ with\ overflow}\ x\ 100$ oooo) Percentage of volume deposited in the landfill $\frac{Volume\ deposited\ in\ the\ landfill}{Volume\ scheduled\ to\ be\ deposited\ in\ the\ landfill}\ x\ 100\%$ pppp) Percentage of executed bathymetries $\frac{Bathymetries\ executed}{Scheduled\ bathymetries} x100\%$ qqqq) Percentage of executed monitoring $\frac{Executed\ monitoring\ (water, sediments\ and\ hydrobiological)}{Scheduled\ monitoring\ (water, sediments\ and\ hydrobiological)} x100$
Used criteria	1. Dredge in the requested area of intervention 2. Arrange dredged volume exclusively in the authorized landfill area.
Measurement frequency	1. Compliance inspections of the actions proposed in the PMA-8 file. 2. Bathymetries before, during and after to the area to be dredged 3. Bathymetries before and after in the landfill area. 4. Water and marine sediments quality monitoring in seven (7) stations located in the marine area: - Deepening dredging: Before starting dredging (1 month before), during dredging (50% of dredged volume) and at the end of dredging activities (1 month after). - Maintenance dredging: Before starting dredging (1 month before) and at the end of dredging activities (1 month after).
Justification of the indicator´s representative ness	The indicators related to compliance with water and marine sediments quality are aimed at quantifying the variations in the concentrations of the parameters, in accordance with the limits established by Colombian regulations (Decree 1076 of 2015). Likewise, it is sought that the bathymetries are carried out in the intervention areas, to guarantee that the activities are carried out in the proposed areas for dredging and for the disposal of dredged material.
Responsible for the execution	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A , Construction and operation contractor and Project controller

B. Follow up and monitoring of the biotic environment trend

- *TMA-1 Sheet. Follow up and monitoring of the abiotic-atmospheric environment trend*

<table>
<tr><th colspan="5">FOLLOW UP AND MONITORING OF THE ABIOTIC ENVIRONMENT TREND</th><th colspan="2">TMA-01</th></tr>
<tr><td>Objectives</td><td colspan="6">Analyze the abiotic environment state, through the atmospheric component, over time according to the results of the actions proposed in the management and monitoring plan.</td></tr>
<tr><td rowspan="2">Environmental components to monitor</td><td colspan="2">Continental waters</td><td>Atmospheric</td><td colspan="2">Soils, geology and geomorphology</td><td>Oceanography</td></tr>
<tr><td colspan="2"></td><td>[redacted]</td><td colspan="2"></td><td></td></tr>
<tr><td rowspan="3">Indicators</td><td>Goal</td><td>Value</td><td colspan="2">Indicator</td><td>Control and / or registration mechanism</td><td>Responsible</td></tr>
<tr><td>Goal 1</td><td>100%</td><td colspan="2">$\frac{(Number\ of\ executed\ air\ monitorings)}{(Number\ of\ scheduled\ air\ quality\ monitorings)}$ x 100</td><td rowspan="2">air and noise quality monitoring reports</td><td rowspan="2">Execution contractor (construction and operation)</td></tr>
<tr><td>Goal 2</td><td>100%</td><td colspan="2">$\frac{(Number\ of\ executed\ noise\ monitorings)}{(Number\ of\ scheduled\ noise\ monitorings)}$ x 100</td></tr>
<tr><td>Location of monitoring sites</td><td colspan="6">The air quality monitorings must be carried out, at least in three stations:
1) a station in the town center of the District of Nueva Colonia, 2) a station in the site area or onshore terminal and 3) a station in the marine dock (the monitoring in this station will be carried out once the dock is in operation), as presented in PMA-9.
Environmental noise monitoring should be carried out in at least four stations: 1) three stations in the town center of the Nueva Colonia district and 2) one in the onshore terminal. As presented in the PMA-9.</td></tr>
<tr><td>Identification of PMA measures</td><td colspan="6">The abiotic environment trend monitoring (atmospheric component) is based on the management measures presented in the PMA-9 sheet, Control of atmospheric emissions and noise management.</td></tr>
<tr><td>Description of procedures and / or instruments</td><td colspan="6">TREND FOLLOW UP
rrrr) The air and noise quality monitoring data should be used to perform the comparative analyzes between the baseline and the results of the monitoring carried out during the construction and operation.

ssss) Create a trend line of air and noise quality with the average results of the parameters considered most relevant both in the baseline and monitoring performed per station, for construction and for operation. Figure 1 shows an example of a graph to analyze the trend in the abiotic environment, through the atmospheric component.

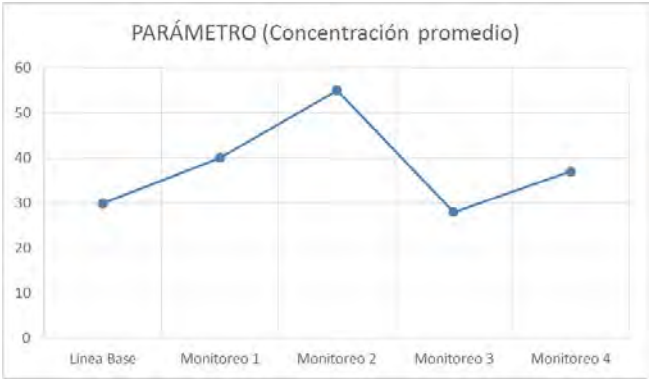
tttt) Different methods to compare the results can be considered, according to the available techniques.

uuuu) For the follow up and monitoring analysis of the abiotic environment trend, through</td></tr>
</table>

FOLLOW UP AND MONITORING OF THE ABIOTIC ENVIRONMENT TREND	TMA-01
	the atmospheric component, the most relevant pollutants can be selected. vvvv) The analysis should be done per monitoring station. wwww) The Air Quality Index (ICA) must be calculated, as a minimum, for PST. This should be developed according to the Protocol for the Follow up and Monitoring of Air Quality and should be prepared for each station and compared with the campaigns and baseline results that are available at the time of preparation of the report. Additionally, it should be compared with SISAIRE stations, if they exist in the area of influence.  Figure No. 1 Example to compare the trend and results of the impact on the abiotic environment through the atmospheric component Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.
Periodicity and duration	xxxx) The follow up and monitoring analysis report of the atmospheric environment trend should be made once a year and presented in the Environmental Compliance Report. This monitoring must be done for the life of the project. yyyy) The monitoring required for these analyzes should be executed according to the phase (construction and operation) as presented in the PMA-9 Sheet. Control of atmospheric emissions and noise management.
Analysis and results interpretation criteria	zzzz) The results of the generated reports will be compared with the permissible levels for PST and PM10 established in resolution 610 of 2010 or that which modifies or replaces them. aaaaa) The results of the generated reports will be compared with the permissible sound pressure levels presented in resolution 627 of 2006, both for noise emission and for environmental noise. bbbbb) The results of the generated reports will be compared with the results of the baseline presented in the study and with applicable legislation according to the analyzed pollutant. ccccc) The analyzes should consider the climatic conditions of the monitoring dates. ddddd) Air quality follow up and Monitoring protocol.

- *TMA-2 Sheet. Follow up and monitoring of the abiotic environment trend - Continental waters and oceanography (marine waters)*

<table>
<tr><td colspan="3">ABIOTIC ENVIRONMENT TREND FOLLOW UP AND MONITORING</td><td colspan="3">TMA-02</td></tr>
<tr><td>Objectives</td><td colspan="5">Analyze the abiotic environment state, through the component of continental waters and sediments and oceanography (marine waters and sediments), over time according to the results of the actions proposed in the management and monitoring plan.</td></tr>
<tr><td rowspan="2">Environmental components to monitor</td><td colspan="2">Continental waters</td><td>Atmospheric</td><td>Soils, geology and geomorphology</td><td>Oceanography</td></tr>
<tr><td colspan="2">[redacted]</td><td></td><td></td><td>[redacted]</td></tr>
<tr><td rowspan="5">Indicators</td><td>Goal</td><td>Value</td><td>Indicator</td><td>Control and / or registration mechanism</td><td>Responsible</td></tr>
<tr><td>Goal 1</td><td>100 %</td><td>$\frac{(Number\ of\ continental\ water\ monitoring\ ex}{(Number\ of\ continental\ water\ monitori}$</td><td>Continental water quality monitoring reports</td><td>Execution contractor (construction and operation)</td></tr>
<tr><td>Goal 2</td><td>100 %</td><td>$\frac{(Number\ of\ marine\ water\ monitorings\ exec}{(Number\ of\ scheduled\ marine\ water\ monitor}$</td><td>Marine water quality monitoring reports</td><td>Execution contractor (construction and operation)</td></tr>
<tr><td>Goal 3</td><td>100 %</td><td>$\frac{(Number\ of\ continental\ sediments\ monitori}{(Number\ of\ scheduled\ continental\ sediments}$</td><td>Continental sediment quality monitoring reports</td><td>Execution contractor (construction and operation)</td></tr>
<tr><td>Goal 4</td><td>100 %</td><td>$\frac{(Number\ of\ marine\ sediments\ monitorings\ e}{(Number\ of\ schedule\ marines\ sediment\ mon}$</td><td>Marine sediment quality monitoring reports</td><td>Execution contractor (construction and operation)</td></tr>
<tr><td>Location of monitoring sites</td><td colspan="5">The water and sediment quality monitoring sites (marine and inland) will be the same as those set forth in the PMA-6 sheet. Environmental management of water resources.</td></tr>
<tr><td>Identification of PMA measures</td><td colspan="5">The abiotic environment trend follow up, through the continental water and sediment component and oceanography (marine waters and sediments), is based on the management measures presented in the PMA-6 Sheet. Environmental management of water resources.</td></tr>
<tr><td>Descripción de procedimientos y/o instrumentos</td><td colspan="5">TREND FOLLOW UP
eeeee) The water and sediment quality monitoring data (marine and inland) should be used to perform the comparative analyzes between the baseline and the monitoring results carried out during the construction and operation.
fffff) Prepare a trend line of water and sediment quality (marine and continental) with the average results of the parameters considered most relevant, both baseline and monitoring carried out by station, for construction and for operation. Figure 1 shows an example of a graph to analyze the abiotic environment trend, through the water and sediment component (marine and continental).
ggggg) Different methods to compare the results can be considered, according to the available techniques.</td></tr>
</table>

ABIOTIC ENVIRONMENT TREND FOLLOW UP AND MONITORING	TMA-02
	hhhhh) For the abiotic environment trend follow up and monitoring analysis, by means of the water and sediment component (marine and continental), the most relevant pollutants could be selected. iiiii) The analysis should be done per monitoring station for water and sediments (marine and continental). jjjjj) For the continental water, in this case the León river or current, the Water Quality Index (ICA) proposed by the IDEAM should be calculated. This should be developed for each monitoring carried out and compared with the results of campaigns and baseline that are available at the time of preparation of the report. kkkkk) For marine water, the Marine Water Quality Index (ICAM) proposed by INVEMAR must be calculated. This should be developed for each monitoring performed and compared with the results of campaigns, baseline of the study or results of existing water quality stations, which are counted at the time of report preparation. 6.  Figure No. 1 Example to compare the trend and results of the impact on the abiotic environment through the water and sediment component (marine and continental) Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.
Periodicity and duration	lllll) The abiotic environment trend follow up and monitoring analysis report, through the water and sediment component (marine and continental), should be carried out once a year and presented in the Environmental Compliance Report. This follow up must be done for the life of the project. mmmmm) The monitoring required for these analyzes should be executed according to the phase (construction and operation) as presented in the PMA-6 Sheet. Environmental management of water resources.
Analysis and results interpretation criteria	nnnnn) The results of the generated reports will be compared with the results of the baseline presented in the study and with the legislation that apply according to the pollutant analyzed. ooooo) The analyzes should consider the climatic conditions of the monitoring dates.

1.1.2.2 *Biotic Environment*

Table No. 11.39 shows the equivalence of the follow up and monitoring plans authorized by the ANLA through Resolution 0032 of 2012 and those proposed for the biotic environment, which include the requests made by the Authority and the respective adjustments of agreement. to the needs of the project. These follow-up and monitoring plans include the verification of the behavior and effectiveness of the management plans and the environment.

Table No. 11.39 Equivalence of follow up and monitoring plans authorized by Resolution 0032 of 2012 and those proposed in the present study

Code Plan Resolution 0032	Name of the environmental management plan and/or program (Resolution 0032)	Code Plan in the present study	Name of the plan and / or proposed follow up and monitoring program
		FICHA SMB-01	Follow up and monitoring of flora element management plans
		FICHA SMB-02	Follow up and monitoring of the wildlife management plan and habitat protection
S-5 SHEET	Monitoring of the hydrobiological resources of the receiving streams	FICHA SMB-03	Hydrobiological community follow up and monitoring
		FICHA TMB-01	Follow up and monitoring the tendency of the biotic environment of the flora element
		FICHA TMB-02	Follow up and monitoring of the trend of the biotic environment in relation to habitat
S-5 SHEET	Hydrobiological resources monitoring of the receiving streams	FICHA TMB-03	Follow up and monitoring of the trend of the biotic environment to the hydrobiological community

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

- Follow up and monitoring program sheets of the biotic environment

A. Plans and programs follow up and monitoring

- *SMB-01 Sheet. Follow up and monitoring program for flora element management plans*

FOLLOW-UP AND MONITORING OF FLORA ELEMENT MANAGEMENT PLANS	SMB-01
FOLLOW-UP AND MONITORING OF FLORA ELEMENT MANAGEMENT PLANS	
Objectives	1. Measure the forest use efficiency in the areas where it is carried out. 2. Establish the activities and procedures to measure the changes occurred on the vegetation coverage and the terrestrial habitats during the management for the restoration of the areas intervened temporarily by the project. 3. Measure the effectiveness of the compensation plan proposed by the intervention of vegetation coverage. 4. Measure the dynamics of changing spatial patterns of vegetation based on landscape ecology indicators.
PMA Sheets	1. PMB-01. Vegetation coverage management program and the stripping activities 2. PMB-02. Forest exploitation environmental management program 3. PMB-04. Compensation program for biodiversity loss
Actions to develop	**1. Forestry exploitation** In order to follow up and monitor the activities corresponding to forest exploitation, it must be taken into account: - Verify that the area intervened by the forest exploitation, is the one licensed by the environmental authority. - Verify that the felling is done in a technified manner (directed felling) with the intention of reducing the damage and waste of the wood at the time of the exploitation. - Quantify the volume of harvested wood, to carry out this measure, it is recommended to quantify the number of cut logs or planks as well as their dimensions. The efficiency of forest exploitation will be measured based on Equation No. 11.1: $$VMU = VMA * \frac{100}{VME}$$ Equation No. 11.1 Equation to find the percentage of of the usable wood volume Dónde: • VMU: Percentage of usable wood volume • VMA: Usable wood volume VME: Volume of extracted wood With this indicator, the total extracted wood and the percentage of wood that is usable will be calculated, based on this indicator the monitoring of its use will be done using Equation No. 11.2: $VMUt * \frac{100}{VMU}$ Equation No. 11.2 Equation to find the percentage of usable wood volume. Where: VMUt: Percentage of usable wood volume used for project activities or restoration work VMU: Percentage of usable wood volume

The areas that are directly affected by the project in the dismantling and stripping activities will be monitored using Equation No. 11.8:

$$\frac{\text{Total (m}^2\text{) de área intervenida}}{\text{Área (m}^2\text{) prevista de intervención de acuerod a los planos de diseño}} * 100$$

Equation No. 11.3 Equation to determine the affected areas

2. Vegetation Coverage

The measurement of the increase in the extension of vegetation coverage in the areas recovered and compensated in the Forest Reserve of the León and Suriquí River wetlands and in the Leon River delta on the Caribbean Sea, will be carried out from satellite images every year during the first five years, upon completion of the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas. Landscape ecology indexes will be measured as multitemporal analysis of vegetation coverage which will be compared over time. In the same way, the evaluation of the structural attributes of the compensated forest will be carried out, for this permanent monitoring parcels will be installed to measure the growth of the planted trees and evaluate the recovered ecosystems. The methodology proposed by Pinelo will be used, where parcel of 0.25 ha (50 m long x 50 m wide) will be installed, which will be georeferenced and, as far as possible, delimited from the marking of the trees corresponding to the vertices with oil paint.

There, the first 3 years will be measured every 6 months, then every year for two more years. Finally, upon completing the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas. Data on the phytosanitary status of each tree will be taken as well as the diameter at breast height and the total height, this in order to calculate growth rates and structural analysis of the forest, these results will also be the basis for taking corrective measures in case of find deficiencies with respect to the monitored areas.

The sites where treatments related to floristic enrichment and sowing are carried out, measurements will be made to quantify the efficiency of the sowings, reporting semiannually information of the planted trees, in the same way it will have to monitor the areas that have been planted within the premises and the trees planted in the periphery of the installations of the terrestrial terminal like alive barrier of the following way:

Survival, follow up for this indicator will be calculated through Equation No. 11.4 and No. 11.5:

$$\frac{\textit{Number of live trees}}{\textit{Nnumber of trees planted}} * 100$$

Equation No. 11.4 Equation to find the percentage of survival

$$\frac{\text{Grassed area}}{\text{Free area within the premises}} * 100$$

EEquation No. 11.5 Equation to find the percentage of grassed area

The areas that are recovered with the vegetation material product of the stripping will be monitored using Equation No. 11.6:

$$\frac{\text{Area (m}^2\text{) recovered with the material coming from the stripping}}{\text{Stripping Area (m}^2\text{).}} * 100$$

Equation No. 11.6 Equation to find the percentage of area recovered with material from the stripping

To monitor the adequate disposition of the vegetal material obtained by the dismantling and stripping activities, Equation No. 11.7 will be used.:

$$\frac{\text{arranged material volume}}{\text{VExisting plant material volume}} * 100$$

Equation No. 11.7 Equation to find the percentage of material arranged

These measurements will be made semiannually, the first 3 years, then every year for two more years, where the measure will be 95% survival taking into account the reseeding.

The rapid reuse of stored soil from the stripping should be sought. The areas intervened by the project and that have been left free on the property, after the infrastructure of the land terminal has been installed, will be used to prevent soil erosion. It is recommended to sow grasses (grass from the area) or sods extracted from the ground. vegetable material product of the stripping, in order to protect the surface against the action of rain and wind.

It is also planned to plant, on the periphery of the facilities of the onshore terminal, a living barrier composed of ornamental trees typical of the region, such as Oak (Tabebuia rosea), Ceiba Tolua (Bombacopsis quinata), Balso (Ochroma pyramidale), Cajon (Sterculia apetala) and Chiminango (Pithecellobium dulce); It is also recommended to plant fruit trees such as mango, guava, and citrus fruits.

The success of treatments for floristic enrichment, will be measured based on the coverage and diversity of pioneer plant species, to determine changes in diversity and richness the following indices will be used:

Margalef's wealth index

The Margalef index relates the number of species according to the total number of individuals and is expressed by Equation No. 11.8:

$$D_{Mg} = (S-1)/lnN$$

Equation No. 11.8 Equation to find the Margalef indexWhere:

S: number of species

N: total number of individuals

Menhinick Index

The Menhinick Diversity Index is based on the relationship between the number of species and the total number of individuals observed, which increases with increasing sample size; it is calculated with Equation No. 11.9.

$$Dmn = \frac{S}{\sqrt{N}}$$

Equation No. 11.9 Equation to calculate the Menhinick index

Where,

S: number of species

N: number of individuals

Shannon-Wiener diversity index

This index indicates how uniform the species are represented (in abundance) taking into account all the species sampled and is expressed with Equation No. 11.10:

$$H' = \sum_{i=1}^{s} p_i \ln p_i$$

Equation No. 11.10 Equation to calculate the Shannon-Weiner index

Where:

S: number of species

p_i: proportion of individuals found in the ith species. In a sample the true value of pi is unknown, but it can be estimated as shown in Equation No. 11.11:

$$p_i = {}^{p_i}/_{N}$$

Equation No. 11.11 Equation to find the proportion of individuals

The value of this index varies between 1 and 5, although exceptions may occur in some ecosystems that may exceed the maximum value.

Simpson's dominance index

his index refers to the probability that two individuals of an infinitely large community, taken at random, belong to the same species. For finite communities the index is expressed by the expression (Equation No. 11.12):

$$D = \sum \frac{n_i (n_i - 1)}{N(N-1)}$$

Equation No. 11.12 Equation to calculate Simpson's dominance index

Where,

n_i: number of individuals of the ith species

N: total of individuals.

As D increases, diversity decreases. Therefore, the index is usually expressed as 1-D, which ensures that the value of the index increases with the increase in diversity.

Berger Parker Index

The Berger Parker index in a measure of dominance that expresses the proportional abundance of the most abundant species, this index is independent of the species but is strongly influenced by the size of the sample; it is calculated with Equation No. 11.13.

d = Nmax / N

Equation No. 11.13 Equation to calculate the Berger Parke index

Where,

Nmax = The highest abundance of the evaluated species N = Number of total individuals

For the interpretation of the Simpson and Berger Parker indices, the numerical values are expressed in reciprocal form (1 / D and 1 / d), in this way they are directly proportional to the diversity.

Importance value index (IVI)

In order to perform the structural analysis of the forest, the importance value index (IVI) will be calculated. Formulated by Curtis & Mc Intosh, which is possibly the best known, this is calculated for each species from the sum of relative abundance, relative frequency and relative dominance. This analysis allows to evaluate the behavior of individual trees and species on the forest surface through the occurrence of the species and their ecological importance within the ecosystem.

This index allows to determine the most relevant species within the structure of a forest, through the parameters of abundance, frequency and dominance. The relevant species

determined by this index are those that best adapt to the environmental conditions of the forest coverage under study. Equation No. 11.14 expresses the way in which this index is found.

$$IVI = Ar + Fr + Dr$$

Equation No. 11.14 Equation to find the importance value index (IVI)

Where:

IVI: Important Value Index

Ar: relative abundance: Percentage of each species in relation to the total number of individuals of all the species found in the sample. Equation No. 11.15 shows how relative abundance is calculated.

$$Ar = \left(\frac{Aabs}{\sum AabsTotal}\right) * 100\%$$

Equation No. 11.15 Equation to find relative abundance (Ar)

Fr: relative frequency: It is the absolute frequency of a species in relation to the sum of absolute frequencies of all the species present in the sample. Equation No. 11.16 shows the way in which it finds the relative frequency.

$$Fr = \left(\frac{Fabs}{\sum FabsTotal}\right) * 100\%$$

Equation No. 11.16 Equation to find the relative frequency (Fr)

Dr: relative dominance. It is the percentage of the absolute dominance of a species with respect to the sum of the absolute dominances of all the species present in the sample. Equation No. 11.17 shows how relative dominance is calculated:

$$Dr = \left(\frac{Dabs}{\sum DabsTotal}\right) * 100\%$$

Equation No. 11.17 Equation for finding relative dominance (Dr)

Compensation

The vegetation coverage compansation will be measured in relation to the compensation plan for loss of biodiversity, detailed in chapter 11.2.2 of this study. .

To follow up on the compensated areas in the forest reserve of the León and Suriquí river wetlands and the León River delta on the Caribbean Sea, the following equation will be used:

$$TC = \frac{\text{reforested area total}}{\text{Total area intervened by the project}} * 100$$

Equation No. 11.18 Equation to find the compensated area

Where:

TC: Vegetation coverage compensation rate

To monitor the follow ups and maintenances performed on the compensated areas, Equation No. 11.19 will be used.

$$TC = \frac{\text{Number of maintenances performed}}{\text{Number of proposed maintenances}} * 100$$

Equation No. 11.20 Equation to find the monitoring percentage that was carried out

Used criteria	- Total area (m2) intervened - Area (m2) planned for intervention - Area (m²) recovered with the material coming from the stripping - Stripping Area (m²). - Area planted or planted with shrubs or trees - Intervened area of the property that has been left free (without facilities or roads) - Volume of arranged material - Volume of existing plant material - Total reforested area - Total area intervened by the project - Number of live trees - Number of trees planted - Number of maintenances performed - Number of proposed maintenances
Measurement frequency	The measurement of the increase in the extension of vegetation coverage in the areas recovered and compensated in the Forest Reserve of León and Suriquí Rivers wetlands and in the Leon River delta on the Caribbean Sea, will be carried out from satellite images every year during the first five years, upon completion of the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas. The effectiveness analysis of the sowings and floristic enrichments will be carried out every 6 months, during the first 3 years, then every year for two more years, until completing 5 years. The efficiency of forest exploitation will be measured weekly during the construction stage of the project
Justification of the indicator´s representativeness	Know the recovered area with the vegetation material coming from the stripping, likewise the survival of the same taking into account the reseeding activities. Likewise, control and monitoring of the environmental impacts caused by forest harvesting activities will be carried out and it will be monitored that these are carried out on the strictly necessary individuals and which were recorded in the 100% forest inventory. In order to monitor the effectiveness of the management measures for compensation of terrestrial ecosystems intervened by the project, it will be in accordance with the provisions of the compensation plan for biodiversity loss in this study (Chapter 11.2.2) ; In the same way, it is intended to monitor and monitoring of the compensated areas, through permanent growth parcels (PPC), with the intention of carrying out growth rates, structural analysis of the recovered forest and taking corrective measures in case of finding deficiencies, either by high mortality of the planted individuals or by problems of recovery of natural ecosystems.
Responsible for the execution	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A , Construction contractor and competent environmental authorities.

- *SMB-02 Sheet. Follow up and monitoring program for wildlife management plan and habitat protection*

FOLLOW-UP AND MONITORING OF THE WILDLIFE MANAGEMENT PLAN AND HABITATS PROTECTION	SMB-02
WILDLIFE AND PROTECTION OF HABITATS FOLLOW UP AND MONITORING PROGRAM	
Objectives	1. Confirm that the management and protection of wildlife and protection of habitats program is carried out in an optimal manner, in such a way as to guarantee the removal, rescue and relocation of the affected wildlife, with special emphasis on endangered or endemic species. 2. Corroborate that the wildlife management training to personnel assigned to the activities of cleaning, clearing, stripping and forest use is done. 3. Corroborate the construction and / or installation of wildlife passages and their correct maintenance for the protection of habitats and fauna.
PMA Sheets	PMB-03 Environmental management program for the management of wildlife and protection of habitats
Actions to develop	**1. Verification of the implementation of the rescue and relocation of wildlife** Continuous field inspections must be carried out for the duration of the clearing, stripping, deforestation and forest harvesting activities, carried out by a biological area professional with experience in wildlife management, who will be in charge of keeping records in field formats, records, photographic and filmic of the different activities directed to the protection of the fauna, during the construction and operation (adaptation of the route) of the project. **2. Verification of the correct personnel training** An accompaniment to the wildlife management training activities of the personnel in charge of stripping,clearing and forest exploitation should be done. A record must be kept showing the number of workers assigned to that activity and the effective number of workers receiving the training. The records will be made through attendance, photographic and / or filmic records. **3. Verification of the installation of the fauna, signaling and maintenance steps** The correct facilities of the different fauna passages, both inferior and arboreal, will be verified in the area of intervention of the project. Likewise, semi-annual inspections of the structures must be carried out. In the case of the viaduct, its surface will be checked to verify that there are no obstacles that impede the passage of animals and to prevent inappropriate uses being implanted. For the arboreal passages, they will be inspected to avoid excessive wear of ropes, cables, platforms, etc. and so replace those that were in poor condition. For the underpasses a bimonthly maintenance shoulf be schedule, to remove waste, stockpiles of material, or other elements that hinder the passage and cleaning accumulation by dragging materials, these activities should be scheduled especially after times of heavy rain. Likewise, the state of signaling on the road must be checked and the change made when it is deteriorated. **4. Indicator** As an indicator of compliance with the PMB-03 activities and the current

FOLLOW-UP AND MONITORING OF THE WILDLIFE MANAGEMENT PLAN AND HABITATS PROTECTION	SMB-02
WILDLIFE AND PROTECTION OF HABITATS FOLLOW UP AND MONITORING PROGRAM	
	monitoring record, the project owner will designate a staff to monitor the activities. Said personnel must record each activity photographically as well as fill out a format recording the information pertinent to the realization of the activities such as: date and time, in charge of the execution and observations that are considered important.
Used criteria	1. Survival of the organisms and / or nests rescued during the transfer and release to the relocation sites. 2. Training in wildlife management 3. Protection of fauna
Measurement frequency	The activities will be carried out during the constructive and operative stage, frequently according to the need of each activity.
Justification of the indicator´s representativeness	The indicators related to the removal, rescue and relocation of fauna, are aimed at quantifying the success of the activity and implementation of the PMA, in relation to the survival, success of rescue and relocation of organisms and / or nests and protection of the fauna and habitats through the implementation of structures that allow the passage of fauna and that in turn avoid the fragmentation of habitats and the correct signaling of the road.
Responsible for the execution	Sociedad Puerto Bahía Colombia De Urabá S.A

- *SMB-03 Sheet. Follow up and monitoring program for the management plan of the hydrobiological community*

FOLLOW UP AND MONITORING THE HYDROBIOLOGICAL COMMUNITY MANAGEMENT PLAN	SMB-03
FOLLOW UP AND MONITORING PROGRAM TO THE HYDROBIOLOGICAL COMMUNITY	
Objectives	1. Verify the execution of the environmental management program of the hydrobiological communities (PMB-05).
PMA Sheets	PMB-05. Environmental Management Program of the hydrobiological communities
Actions to develop	1. Accompanying the activity in the taking of samples must be carried out, completing a compliance format of each hydrobiological group (periphyton, benthos, plankton and fish) to be monitored with their respective photographic and / or filmic record. This information must be completed for each of the stations sampled and must be signed by the person responsible for executing this activity and responsible for verifying the execution. 2. Verification of reports will also be carried out to comply with the requirements of the environmental authority and its purpose as an indicator of compliance with the goals established in the EMP (calculations of wealth, abundance, taxonomic composition, ecological indexes).
Used criteria	Prevention and control of affectation to the hydrobiological communities
Measurement frequency	The verification and accompaniment to the activities must be carried out before the work and the dredging begin as proposed in the PMA.
Justification of the indicator´s representativeness	The indicators proposed in the PMA will allow knowing the variation of the hydrobiological community by the different activities proposed for the construction and operation of the port terminal. Allowing to foresee greater affectations that may affect the resource.
Responsible for the execution	Sociedad Puerto Bahía Colombia De Urabá S.A

B. Biotic environment trend follow up and monitoring

- *TMB-01 Sheet. Biotic environment trend follow up and monitoring of the flora element*

BIOTIC ENVIRONMENT TREND FOLLOW UP AND MONITORING OF THE FLORA ELEMENT					TMB-01
Objective	Establish procedures to measure follow up and monitoring indicators to determine the evolution of the management measures established and optimize the actions contained in the programs, to ensure the execution of the same.				
ENVIRONMENTAL COMPONENTS TO MONITOR					
Biotic	**FAUNA**		**FLORA**		
			[redacted]		
Indicators	**Goal**	**Value**	**Indicator**	**Control and / or registration mechanism**	**Responsible**
	Sampling of the permanent monitoring parcels in the compensated areas	100% of the monitoring parcels	Number of sampled parcels / number of parcels installed	Analysis report of forest structure and growth rates of planted individuals	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Reseeding of the dead individuals	100% of dead individuals	Number of death individuals / Number of individuals reseeded	Forest inventory of reseeded individuals	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Measurement of the increase in the extension of the vegetation cover	100% of the degraded areas and / or with little vegetation	Area (m2) of initial vegetation coverage / Area (m2) of final vegetation coverage	Multitemporal analysis of vegatation coverage	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
Location of monitoring sites	The permanent monitoring parcels are proposed to be carried out within the Forest Reserve of Leon and Suriquí Rivers Wetlands and in the areas of the León River delta on the Caribbean Sea where compensation for loss of biodiversity will be made (Figure No 11.55); In the same way, a growth parcel monitoring will be established close to the area intervened by the construction of the viaduct. These areas will be selected after the agreement with the corresponding environmental authority.				

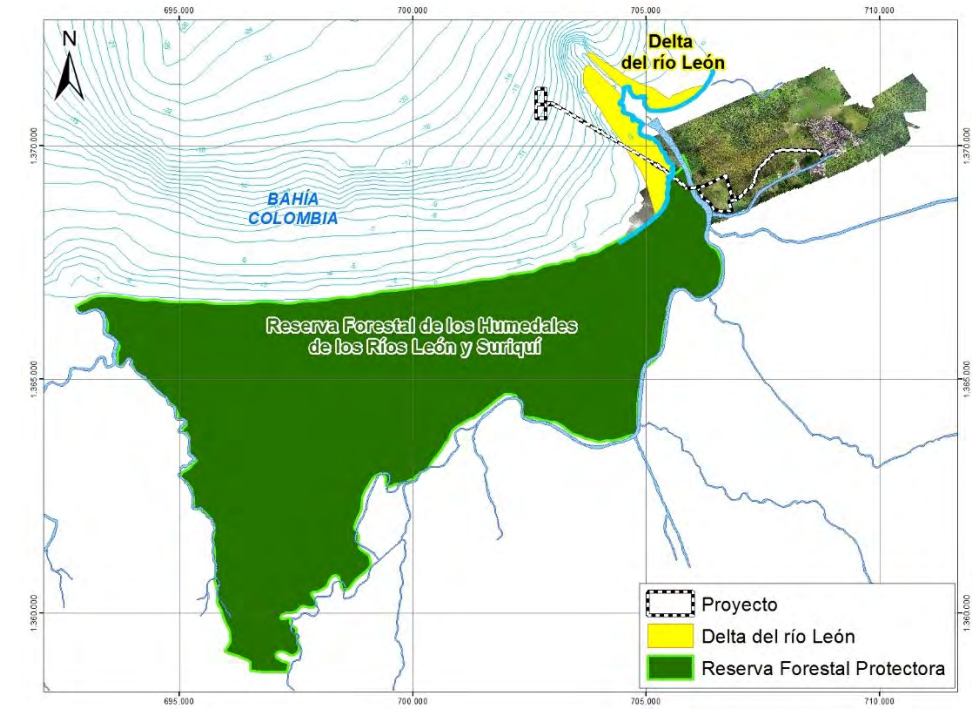


Figure No. 11.31 Proposed area to be compensated
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Identification of PMA measures	The present monitoring and follow-up plan is related to the measures proposed in the files of the Environmental Management Plan PMB-01 (Management of the vegetation coverage and the stripping activities program), PMB-02 (Environmental management of the forest use program) and PMB-04 (Compensation program for loss of biodiversity).
Procedures and / or instruments description	**1. Installation of permanent growth parcels (PPC)** For the evaluation of the structural attributes of the compensated forest, permanent monitoring parcels will be installed to measure the growth of the planted trees and evaluate the recovered ecosystems. The methodology proposed by Pinelo will be used, where parcels of 0.25 ha (50 m long x 50 m wide) will be installed, which will be georeferenced and, as far as possible, delimited from the marking of the trees corresponding to the vertices with oil paint. There, the phytosanitary status of each tree will be measured, as well as the diameter and total height, this in order to determine growth rates and structural analysis of the forest, these results will also be the basis for taking corrective measures in case of finding deficiencies with respect to the monitored areas. **2. Multitemporal Analysis** For the Measurement of the increase of extension of the vegetation coverage will be made by means of the multitemporal analysis using satellite images of different dates with the objective of quantifying the gains of wooded zones and identifying foci of intervention that could be affecting the natural ecosystems of the zone. 3. **Reseeding** Overseeding of dead individuals in the areas of revegetation, restoration and enrichment.

Periodicity and duration	Activity	Bimonthly	Quarerly	Half-yearly	Annual
	Installation of			PPC	PPC

	permanent growth parcels (PPC				
	Multitemporal analysis				ICV
	Reseeding			R	
	PPC, The permanent growth parcels will be measured every 6 months for the first 3 years, then every year for two more years. Finally, upon completing the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas. R, These measurements will be made every six months, the first 3 years, then every year for two more years. In this activity the dead trees will be replaced. ICV, The measurement of the increase of extension of the vegetal cover in the recovered and compensated areas, is made from satellite images every year during five years.				
Analysis and results interpretation criteria	If the follow up and monitoring indicators results are outside the values established as an evaluation parameter, corrective measures must be taken accompanied by improvement actions, in order to guarantee the success of the follow up and monitoring plan.				

- *TMB-02 Sheet. Follow upo and monitoring of the biotic environment trend in relation to habitat protection*

BIOTIC ENVIRONMENT TREND FOLLOW-UP AND MONITORING IN RELATION TO THE PROTECTION OF HABITATS					TMB-02
Objectives	1. Propose quantifiable criteria to measure the effectiveness of the proposed measures for habitat protection and connectivity between them 2. Corroborate the use of underpasses and arboreal through wildlife 3. Corroborate that the design of the viaduct avoids the fragmentation of the habitat and allows the geographic connectivity of the floristic and faunistic species				
Environmental components to monitor	**ECOSISTEMAS** [redacted]		**FAUNA Y FLORA** [redacted]		
Indicators	**Goal**	**Vaue**	**Indicator**	**Control and / or registration mechanism**	**Responsible**
	Goal 1: Installation, construction and / or adaptation of at least 80% of the lower fauna and arboreal passages	>80%	Bottom and arboreal passages built and / or installed / Construction and / or installation of projected underpasses and arboreal* 100	Field verification, photographic and / or film record formats	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Goal 2: Fauna report using the passage structures	>3	Report at least 3 species of fauna using the passage structures	Field format containing field to fill: wealth, abundance and taxonomic classification. Photographic and / or film record	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Goal 3: Verification of floristic growth in the area of the viaduct that allows connectivity	>50%	Record that at least 50% of the viaduct area has natural regeneration	Field formats and photographic and / or film record	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
Location of monitoring sites	The monitoring will be done where the lower and arboreal passages are established and in the area of the viaduct.				
Identification of PMA measures	This environmental trend follow up and monitoring plan is directly related to the PMA PMB-03 Environmental management program for the management of wildlife and habitat protection and indirectly with the PMA PMB-01 Environmental management program of the vegetation coverage and the stripping activities.				
Procedures and / or instruments description	Goal 1: The guidelines established in the SMB-02 will be followed. Follow up and monitoring of the wildlife and habitat protection management plan. A verification will be carried out one month after the completion of the works and half-yearly in the structures of the underpass and the arboreal passes I for five years, then annually for five years.				

BIOTIC ENVIRONMENT TREND FOLLOW-UP AND MONITORING IN RELATION TO THE PROTECTION OF HABITATS										TMB-02
	Goal 2: The guidelines established in the SMB-02 will be followed. Follow up and monitoring of the wildlife management plan and habitat protection, and fauna monitoring will be carried out in the areas where the passage structures are established, registering wealth, abundance and identification of species that make use of these. For this, biotic professionals, field formats, camera and / or trap cameras are required to register the fauna. These monitoring will take place three months after completion of the works, half-yearly for five years and then annually for five years. Goal 3: The guidelines established in SMB-02 and SMB-01 will be followed. Follow up and monitoring of wildlife management and habitat protection, and natural flora regeneration will be monitored over the area occupied by the viaduct. For which the establishment of permanent parcels is proposed. For this activity, professionals in the floristic area, field formats, photographic registration are required. Monitoring must be done quarterly for one year, half-yearly for five years and then annually for five years									
Periodicity and duration Periodicity and duration Periodicity and duration	**Activities associated with goals**	**Weekly**	**Monthly**	**Bimonthlyl**	**Quarterly**	**Half-yearly**	**Annual**	**Biannual**	**triennial**	**Quinquennial**
	Goal 1		**X**			**X**	**X**			
	Goal 2				**X**	**X**	**X**			
	Goal 3				**X**	**X**	**X**			
Analysis and results interpretation criteria	1. The correct establishment of the temporary structures will be verified with the percentage of success of its installation in relation to the projected ones. 2. A wealth of species greater than 3 that are using the installed fauna steps will be indicating the measures effectiveness; otherwise, corrective measures will be tried, such as priming the arboreal steps, revegetalizing the entrances and exits of the underpasses, among others, depending on what is identified in the field. 3. Percentage of natural regeneration at least 50% over the area occupied by the viaduct. If it is less than or close to the 50% limit, corrective measures will be implemented such as revegetating the area with native species to help the system with its natural succession process.									

- *TMB-3 Sheet. Biotic environment trend Follow up and monitoring in relation to the hydrobiological community*

BIOTIC ENVIRONMENT TREND FOLLOW UP AND MONITORING IN RELATION TO THE HYDROBIOLOGICAL COMMUNITY					TMB-03
Objectives	1. Propose quantifiable criteria to measure the effectiveness of the measures proposed in PMB-05.				
Environmental components to monitor	**ECOSYSTEMS**		**FAUNA AND FLORA**		
	[redacted]		[redacted]		
Indicators	**Goal**	**Value**	**Indicator**	**Control and / or registration mechanism**	**Responsible**
	Goal 1: Monitor the structure and composition of the hydrobiological community during the construction and operation of the port terminal on the León and Bahía Colombia rivers .	>50%	Percentage of abundance, resource and diversity of species is not less than 50% obtained for these parameters in the previous samplings executed in PMB-05	Field formats, photographic and / or film record. Reports with calculations and indexes.	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Goal 2: Monitor the biomass of the planktonic community during the construction and operation of the port terminal on the León and Bahía Colombia rivers.	>50%	Percentage of biomass of the plankton species is not less than 50% obtained for this parameter in the previous samplings executed in PMB-05	Field formats, photographic and / or film record. Reports with calculations and indexes.	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Goal 3: Monitor the wealth, abundance and diversity of the hydrobiological community during and after dredging in Bahía Colombia.	>50%	Percentage of abundance, wealth and diversity of species is not less than 50% obtained for these parameters in the previous samplings executed in PMB-05	Field formats, photographic and / or film record. Reports with calculations and indexes.	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
	Goal 4: Establish the biomass of the planktonic community	>50%	Percentage of biomass of the plankton species	Field formats, photographic and / or film	SOCIEDAD COPPUERTO BAHÍA

	during and after dredging in Bahía Colombia.		is not less than 50% obtained for this parameter in the previous samplings executed in PMB-05	record. Reports with calculations and indexes.	COLOMBIA DE URABÁ S.A

Location of monitoring sites

Figure No. 11.32 and Table No. 11.40 show the geographic location of the monitoring stations of the hydrobiological community during the construction and operation stages of the onshore terminal, the viaduct and the marine platform on the León River and Bahía Colombia. It is noteworthy that for the case of deepening dredging, the monitoring of the hydrobiological community must be carried out in the seven marine stations shown in Figure No. 11.32.

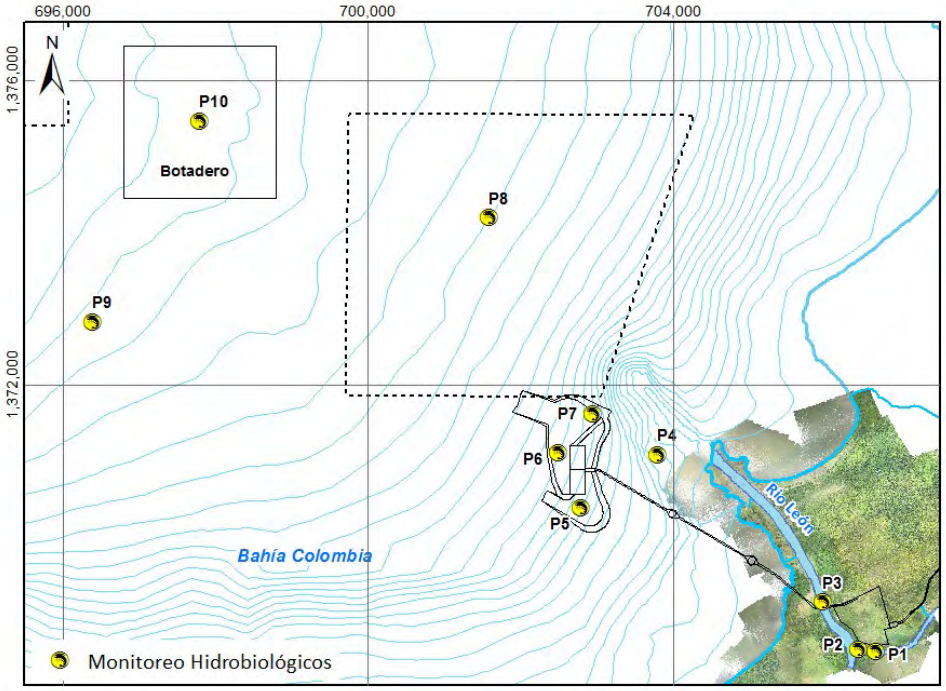


Figure No. 11.32 Monitoring stations of the hydrobiological community
Source: Prepared by Aqua & Terra Consultores Asociados S.A.S., 2015

Table No. 11.40 Geographical location of monitoring stations of the hydrobiological community (periphyton, benthos, plankton and fish)

ECOSYSTEM	ID	MAGNA SIRGAS FLAT COORDINATES Origin BOGOTÁ	
		East	North
Aquatic continental	P1	706.648,2	1.368.501,9
	P2	706.422,3	1.368.536,0
	P3	705.959,8	1.369.149,3
Marine	P4	703.792,9	1.371.083,5
	P5	702.783,7	1.370.390,9
	P6	702.487,9	1.371.110,6
	P7	702.943,7	1.371.628,0

	P8 701.577,0 1.374.197,1 P9 696.387,8 1.372.825,3 P10 697.792,4 1.375.464,0 Source: Prepared by Aqua & Terra Consultores Asociados S.A.S., 2015
Identification of PMA measures	This follow up and monitoring plan of the environmental trend is directly related to the PMA PMB-05 Environmental management program for the management of the hydrobiological communities
Procedures and / or instruments description	For the hydrobiological community monitoring, the procedures, guidelines and methodologies established in the PMB-05 Environmental Management Plan will be followed.
Periodicity and duration	1. For the construction and operation stage of the onshore terminal, viaduct and marine platform, follow ups and monitoring of the biotic environment in relation to the hydrobiological community will be carried out every six months. 2. For the deepening dredging activity, a follow up and monitoring of the biotic environment trend in relation to the hydrobiological community will be carried out during the development of this activity and after the end of the activity. Monitoring during dredging will be done when 50% of the total volume to be dredged is reached. 3. For maintenance dredging the monitoring of the hydrobiological community will take place one month before starting the dredging, when 50% of the total volume is dredged and one month after the end of the activity
Analysis and results interpretation criteria	1. Negative changes in the hydrobiological community assembly cannot be greater than 50%. 2. Negative changes in the biomass of the planktonic community cannot be greater than 50%. 3. Hydrobiological community follow up Analysis and interpretation of the results of the behavior of the hydrobiological community will be carried out taking into account resource, abundance and diversity, in order to validate its behavior over time and trend.

1.1.2.3 *Socioeconomic Environment*

Table No. 11.41 shows the equivalence of the monitoring and monitoring plans authorized by the ANLA through Resolution 0032 of 2012 those proposed for the socioeconomic environment, which include the requests made by the Authority and the respective adjustments according to the project needs. These follow-up and monitoring plans include the verification of the behavior and effectiveness of the management plans and the monitoring and monitoring of the trend of the environment.

Table No. 11.41 Equivalence of the follow up and monitoring plans authorized by Resolution 0032 of 2012 and those proposed in this study

Code Plan Resolution 0032	Name of the environmental management program and/or plan (Resolution 0032)	Code Plan in the current study	Name of the proposed environmental management program and/or plan
S-6 SHEET	Monitoring the management of the project´s social impacts	FICHA SMS-1	Follow up and monitoring program for the cultural and spatial element management plan
S-7 SHEET	Effectiveness of the environmental management plan monitoring	FICHA SMS-2	Follow up and monitoring program for the demographic, spatial and political-organizational element management plan
S-8 SHEET	Social conflicts monitoring generated during the different stages of the project	FICHA SMS-3	Follow up and monitoring program for the spatial element management plan
S-9 SHEET	Attention to concerns, requests or claims from communities	FICHA SMS-4	Follow up and monitoring program for the cultural element management plan
S-10 SHEET	Participation and timely information of the communities	FICHA SMS-5	Follow up and monitoring program for the cultural, spatial and political-organizational element management plan
		FICHA SMS-6	Follow up and monitoring program for the spatial element management plan
		FICHA TMS-1	Socio-economic environment trend follow up and monitoring of the demographic element
		FICHA TMS-2	Socioeconomic environment trend follow up and monitoring of the spatial element
		FICHA TMS-3	Socio-economic cultural environment trend follow up and monitoring
		FICHA TMS-4	Socio-economic environment trend follow up and monitoring of the community organization element

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015

- Socioeconomic environment follow up and Monitoring Program sheets

A. Plans and programs follow up and monitoring

- *SMS-1 Sheet. Follow up and monitoring program for the cultural and spatial element management plan*

FOLLOW UP AND MONITORING OF THE CULTURAL AND SPATIAL ELEMENT MANAGEMENT PLAN	SMS-01
FOLLOW UP AND MONITORING PROGRAM FOR THE ENVIRONMENTAL EDUCATION FOR PERSONNEL LINKED TO THE PROJECT	

FOLLOW UP AND MONITORING OF THE CULTURAL AND SPATIAL ELEMENT MANAGEMENT PLAN	SMS-01
FOLLOW UP AND MONITORING PROGRAM FOR THE ENVIRONMENTAL EDUCATION FOR PERSONNEL LINKED TO THE PROJECT	
Objectives	1. Verify the awareness, education and training workshops effectiveness for personnel involved in the project in socio-environmental issues. 2. Corroborate the realization of the workshops proposed for the sensitization, education and training of the personnel linked to the project. 3. Evaluate the adequate labor development of the personnel linked to the project as well as its relationship with the communities of the area of influence.
Actions to develop	1. Verification of the workshops effectiveness A methodology must be proposed that allows an efficient and effective work of the environmental themes proposed for the workshops. This methodology should take into account the number of personnel in each workshop, their level of studies and performance area. An evaluation of the topics of each one of the proposed workshops must be carried out, so that a management of the socio-environmental knowledge associated to the project can be demonstrated by the linked personnel. This evaluation has a formative character aimed primarily at the personnel to learn and internalize the importance of environmental and social management in accordance with the precepts of environmental sustainability. The evaluation scale will be done at the individual level. An evaluation must be made (written or oral) whose approval will be averaged over 80% of the approved knowledge of the particular subject for this purpose, a format must be prepared that allows monitoring of each of the linked persons, where the evaluation percentage is indicated in relation to the topic addressed. 2. Realization of the workshops control It will be necessary to carry out an accompaniment to the sensitization, education and training workshops on the socio-environmental issues. To do this, a record will be kept that evidences the number of workers attending the workshops in relation to the total number of workers. The registration will be made through attendance lists, photographic and / or film record. Likewise, the methodology implemented in the workshops will be evaluated based on their evaluation by the linked personnel. The above can be reflected in the measurement of the workshops effectiveness, that if its low, should be guided towards a change in methodology that allows a better appropriation of the knowledge imparted. 3. Work aspect assessment and relationship with the communities The effectiveness of the scheduled workshops in relation to work safety and relationship with the communities will be verified through the User Attention Office and the HSE reports. In this way, the occurrence of bad labor practices or conflicts with the communities can be evidenced, a situation that should be corrected according to the internal policies of the contractor.
Used Criteria	Training of personnel linked to the project and approval of the evaluations applied for each socio-environmental theme.

FOLLOW UP AND MONITORING OF THE CULTURAL AND SPATIAL ELEMENT MANAGEMENT PLAN	SMS-01
FOLLOW UP AND MONITORING PROGRAM FOR THE ENVIRONMENTAL EDUCATION FOR PERSONNEL LINKED TO THE PROJECT	
Measurement frequency	The activities will be carried out during the construction and operation stage
Justification of the indicator´s representativeness	The indicators related to the environmental education program of the personnel linked to the project are aimed at controlling the socio-environmental impacts that may be caused by the presence of foreigners and that will be responsible for the execution thereof. The proposed workshops and trainings are aimed at understanding the environmental and social conditions that allow assessing the local context and thus achieve a sustainable and legitimate project management.
Responsible for the execution	Contractor personnel in charge of executing this plan.

- *SMS-2 Sheet. Follow up and monitoring program for the management plan of the demographic, spatial and political-organizational element*

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN OF THE DEMOGRAPHIC, SPATIAL AND POLITICAL-ORGANIZATIONAL ELEMENT	SMS-02
FOLLOW UP AND MONITORING OF INFORMATION PROGRAM AND COMMUNITY PARTICIPATION	
Objectives	1. Check the efficiency of the Citizen Service Office (OAC)). 2. Corroborate the realization of the workshops to be developed with the different social actors of the area of influence.
Actions to develop	1. Verification of the OAC efficiency The entities and communities of the area of influence must be informed, prior to the start of activities, the existence of the OAC and its objectives. In addition, the presence of qualified personnel will be guaranteed for its functioning as it represents a contact space with authorities and local communities. The route must be informed by means of which the communities and authorities of the area of influence may file complaints and claims related to the construction and operation of the project. In order to guarantee an adequate response to complaints and claims, a route and protocol must be created to meet the response times stipulated by law. 2. Conducting workshops with social actors Calls or invitations must be made by writing a week in advance to enable the participation of government entities in the meetings convened. To do this, it is important to follow up on them in order to know in advance the accompaniment of the different entities. In these calls, the theme, date and place of the meeting must be stipulated. Therefore, a prior planning of the activity is required, as well as guaranteeing the logistical aspects for the development of the meeting. As for the local communities, calls or invitations must be made in writing for those community organizations, while alternative communication channels should be used as a means of communication or local means of communication for the rest of the population. For this, advance notice will be given seeking the greatest possible participation. All programmed meetings must be accompanied, in which a follow-up format (meeting minutes, attendance list and photographic and / or film record) will show compliance with the issues addressed and their relevance. Every six months a report should be made with the workshops performed.
Used Criteria	1. Formalization of complaints and claims received through the OAC. 2. Participation of government entities and communities in the project´s area of influence.
Measurement frequency	1. The OAC efficiency will be evidenced through a report, which will contain the formalization of the complaints and claims received, every 4 months during the construction phase and 1 report every 6 months during the operation stage. 2. The workshops will be carried out during the construction and operative stage. A report of the activities carried out will be made every six months.
Justification of the indicator´s representativeness	The Citizen Service Office is an important space for interrelation between the project, local authorities and the communities in the area of influence. Within this, the complaints and grievance attention mechanisms are fundamental in that they represent the way in which the problems caused by the project will be

FOLLOW UP AND MONITORING OF THE MANAGEMENT PLAN OF THE DEMOGRAPHIC, SPATIAL AND POLITICAL-ORGANIZATIONAL ELEMENT	SMS-02
FOLLOW UP AND MONITORING OF INFORMATION PROGRAM AND COMMUNITY PARTICIPATION	
	answered and that they result in the daily life of the local social actors. For this reason, the proposed indicators are aimed at guaranteeing the correct functioning and direction of the OAC to the extent that it guarantees the timely response of complaints and claims issued by the authorities and communities in the area of influence. Likewise, the indicators related to the meetings to be programmed with local authorities and communities in the area of influence demonstrate the importance of maintaining a constant communication between the project and the social actors in group spaces directed mainly to an understanding of the processes performed in the project, in addition to the knowledge of requests or complaints from local actors.
Responsible for the execution	Contractor personnel in charge of executing this plan.

- *SMS-3 Sheet. Follow-up and monitoring program for the spatial element management plan*

FOLLOW UP AND MONITORING OF THE SPATIAL ELEMENT MANAGEMENT PLAN	SMS-03
FOLLOW UP AND SUPPORT MONITORING PROGRAM FOR INSTITUTIONAL MANAGEMENT CAPACITY	
Objectives	1. Corroborate the implementation of community strengthening workshops for institutional management. 2. Verify the effectiveness of the proposed communication channels.
Actions to develop	1. Verification of community strengthening workshops. The beneficiary population must be identified through an initial call in which the people who will accompany the process will be designated, whether they belong to community organizations or are part of civil society. In the same way, it will be carried out with the government entities that could accompany the process. An organization chart must be made in which the order of the topics to be developed is indicated, the personnel suitable for its development and the possible accompaniment of the governmental entities that can be articulated with the theme raised. The presence of qualified professionals will be guaranteed for each of the themes. All programmed meetings must be accompanied, in which a follow-up format (meeting minutes, attendance list and photographic and / or film record) will show compliance with the issues addressed and their relevance. Every six months a report should be made with the workshops performed. 2. Verification of communication channels Social actors must be mapped before the calls, which include government entities and other institutions that have interference or develop programs in the area of influence. A report will be drawn up in which the communities and entities convened will be drawn up in contrast to the communities and entities attending the workshops. In case of low participation, the type of meeting must be modified. If, when modifying it, the averages are not improved, the participants will be changed to give opportunity to new ones. These will be included in the corresponding directories.
Used Criteria	1. Relevance of the themes in relation to the needs of the community. 2. Participation of entities in community strengthening processes.
Measurement frequency	1. The workshops and communication channels will be measured every six months during the construction phase.
Justification of the indicator´s representativeness	The indicators proposed to support the institutional management capacity are aimed at community strengthening through the training of leaders and people interested in knowing the functioning of government entities, the plans and projects proposed by them, the rights and duties of citizens and the mechanisms through which activities aimed at social development can be requested. In addition, and recognizing the importance of the participation of government entities, it is proposed to link them as a binding element between entities and communities.
Responsible for the execution	Contractor personnel in charge of executing this plan.

- *SMS-4 Sheet. Follow up and monitoring program for the cultural element management plan*

FOLLOW UP AND MONITORING OF THE CULTURAL ELEMENT MANAGEMENT PLAN	SMS-04
FOLLOW UP AND MONITORING PROGRAM OF ENVIRONMENTAL EDUCATION TO THE COMMUNITIES OF THE AREA OF INFLUENCE	
Objectives	1. Evaluate the relevance of the training in the proposed environmental issues. 2. Monitor the development of the proposed and executed environmental project.
Actions to develop	1. Training evaluation. The population participating in the environmental education project will be identified through meetings with organized groups and communities in general. An accompaniment to the programmed trainings must be carried out. To this end, an accompanying format will be prepared, stating the theme, number of participants and commitments for the next training. An evaluation format of the environmental themes of the workshops and the methodology used will be built, in order to demonstrate co-responsibility with the participants. 2. Follow up of the environmental project. A participatory process should be generated with the organized groups or people from the community of the area of influence who are interested in participating in the environmental project. The result will be the community environmental diagnosis which can be worked through the Participatory Action Research and other community environmental diagnostic methodologies such as the tools proposed by Frans Geilfus in relation to the management of natural resources. The presence of qualified personnel for the implementation of the participatory community methodology will be guaranteed. A timeline should be drawn up in which temporalities are established for the different stages of the environmental project, from its approach to its implementation. Said temporality cannot exceed the construction phase of the project. The proposed project must be the result of the agreement of the participants, which will be recorded in the minutes. The final measurement will be represented in the presentation of the final results of the project (both in environmental terms and from the community experience).
Used Criteria	1. Training needed for the awareness process. 2. Appropriation of natural resources and environmental sustainability based on community participation.
Measurement frequency	A measurement of the trainings and the evolution of the project will be made every six months during the construction stage.
Justification of the indicator´s representativeness	The indicators proposed for the environmental education program to the community of the area of influence are aimed at generating sensitivity and appropriation of natural resources in a process of environmental transformation due to the occurrence of the project. The training in environmental issues of the communities that results in a sustainable management of natural resources is considered essential. However, the knowledge that these communities have developed over the years in relation to their environment is also recognized, which is why the participatory exercise is considered as a transversal element that legitimizes the data generated by the activities in terms of training and the environmental project to be developed, because the data and processes will arise from the same community, the latter responsible for giving it legitimacy.

FOLLOW UP AND MONITORING OF THE CULTURAL ELEMENT MANAGEMENT PLAN	SMS-04
FOLLOW UP AND MONITORING PROGRAM OF ENVIRONMENTAL EDUCATION TO THE COMMUNITIES OF THE AREA OF INFLUENCE	
Responsible for the execution	Contractor personnel in charge of executing this plan.

- *SMS-5 Sheet. Follow up and monitoring program for the management plan of the cultural, spatial and political-organizational element*

FOLLOW-UP AND MONITORING OF THE MANAGEMENT PLAN OF THE CULTURAL, SPATIAL AND POLITICAL-ORGANIZATIONAL ELEMENT	SMS-05
FOLLOW UP AND MONITORING PROGRAM FOR THE STRENGTHENING AND MANAGEMENT OF ARTISAN FISHING ACTIVITIES	
Objectives	1. Corroborate the completion of scheduled workshops with the fishermen of Nueva Colonia and El Canal. 2. Check the effectiveness of the fishing monitoring. 3. Verify the effectiveness of fishing efforts.
Actions to develop	1. Verification of fishermen workshops. For the meeting, the fishermen database that is in the socioeconomic environment of the EIA baseline should be used as a result of the fishing efforts made (if new applications are submitted, they should be corroborated to be incorporated). The invitations must be made by written means (in the case of the fishermen's association) or by the other fishermen of the database with the relevant days in advance to ensure their participation. In these calls, the theme, date and place of the meeting must be stipulated. Therefore, a prior planning of the activity is required, as well as guaranteeing the logistical aspects for the development of the meeting. All programmed meetings must be accompanied, in which, through a follow-up format, compliance with the topics discussed and their relevance will be evidenced. For each one of the workshops, a report must be made, to which the record of calls and attendance lists will be attached. 2. Verification of fishing monitoring. The days of the monitoring will be previously agreed with the fishermen. 3. Verification of fishing efforts A survey should be designed and applied to account for the fishing effort. The survey should be applied by qualified personnel for the relationship with the fishing community. A longitudinal analysis of the different fishing efforts will be carried out to demonstrate continuities and transformations of the artisanal fishing activity. For the analysis of the information, evaluation criteria should be elaborated based on the changes identified for each of the proposed topics, being of special interest the fishing activity (number of fishermen, fishing places, frequency, traditional practices of the activity) , species, quantity and sizes, costs and productive chain (or production system).
Used Criteria	1. Protection of artisanal fishing activity. 2. Protection of the fishing community due to alteration of maritime traffic.
Measurement frequency	The workshops with the fishermen will be carried out in three moments during the construction phase. For monitoring and fishing efforts, measurements will be taken every six months

FOLLOW-UP AND MONITORING OF THE MANAGEMENT PLAN OF THE CULTURAL, SPATIAL AND POLITICAL-ORGANIZATIONAL ELEMENT	SMS-05
FOLLOW UP AND MONITORING PROGRAM FOR THE STRENGTHENING AND MANAGEMENT OF ARTISAN FISHING ACTIVITIES	
	during the construction stage. While for the operation stage they will be made annually.
Justification of the indicator´s representativeness	The indicators proposed for the program of strengthening and management of traditional fishing activities are due to the recognition of the importance of artisanal fishing for families dedicated to economic activity. The alteration of the current fishing conditions will lead to a decrease in the family economic income originated by the artisanal activity, which is why the monitoring and effort activities for the quantification and control of the characteristics of the productive system are proposed. In this sense the surveys (fishing effort) and the monitoring from its longitudinal analysis give account of the evolution of the production system that allow a prospective analysis of the possible transformations to the natural-economic environment.
Responsible for the execution	Contractor personnel in charge of executing this plan.

- *SMS-6 Sheet. Follow-up and monitoring program for the spatial element management plan*

FOLLOW UP AND MONITORING OF THE SPATIAL ELEMENT MANAGEMENT PLAN	SMS-06
FOLLOW UP AND MONITORING PROGRAM FOR NEIGHBORHOOD RECORDS	
Objectives	1. Verify the proper implementation and monitoring of neighborhood records. 2. Verify the effectiveness of the restoration of constructive conditions. 3. Verify the effectiveness of the implemented information strategies.
Actions to develop	1. Verification of neighborhood records. A preliminary information survey will be carried out in which the susceptible owners to be affected are related. Once the list is available, the information meeting will be convened, which will be recorded in the minutes with attendance list. A sheet of the neighborhood record must be drawn up that gives an account of what is established in the current regulations. The neighborhood records should be made with the appropriate personnel, the relevant technologies, in the time stipulated previously for the activity. Likewise, the reception of related requests. An inspection Visit Format should be developed and made known to the owners. 2. Verification of the restoration of constructive conditions. An inspection visit should be made in case the owner of a property adjudicates an affectation due to the occurrence of the project If the affectation is verified, the policies and / or agreements with the owners should be applied. The restoration process will be evidenced in the minutes and in the photographic record. 3. Verification of implemented information strategies A registry must be implemented in which it is evidenced that the information reaches the persons susceptible of affectation. This record must contain the date of the statement and a photographic record. The reiteration of the information in the cases that the owner is not on the day of the visit should be evidenced by the same format indicated..
Used Criteria	1. Protection of infrastructure and families that may be affected by the alteration of vehicular traffic.
Measurement frequency	The neighborhood records must be made prior to the start of the activity and will be completed once the operation phase ends. During that time, the frequency will be determined by the occurrence of the events that are requested by the owner through the completion of the inspection visit format.
Justification of the indicator´s representativeness	The indicators proposed for the Neighborhood records program point to the effective attention of the complaints or claims of the home owners of Nueva Colonia that inhabit the sides of the road that will be used by the project and that will increase its vehicular flow. This mechanism will allow to have control over the possible affectations caused by vehicular traffic in two senses: on the one hand, there is control over the actual affectations generated by the project, mainly from its operation; on the other hand, mechanisms are created for the protection of those residents who own their property or live on the sides of the marked road.
Responsible for the	Contractor personnel in charge of executing this plan.

FOLLOW UP AND MONITORING OF THE SPATIAL ELEMENT MANAGEMENT PLAN	SMS-06
FOLLOW UP AND MONITORING PROGRAM FOR NEIGHBORHOOD RECORDS	
execution	

B. Follow up and monitoring of the biotic environment trend

- *TMS-1 Sheet. Follow up and monitoring of the socio-economic environment demographic element trend*

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND									TMS-01
Objectives	1. Analyze the demographic dynamics through time according to the possible migration to the area caused by the project.								
Environmental components to monitor	**Cultural**		**Economic**		**Demographic**		**Spatial**		**Political - organizational**
					[redacted]				
Indicators	**Goal**		**Value**		**Indicator**		**Control mechanism and / or registration**		**Responsible**
	Identify the changes presented in the population dynamics in terms of the increase in the migrant population (workers and settlers)		100% of the smallest territorial unit		Number of inhabitants identified annually in the smallest territorial units / Number of inhabitants identified in the Baseline characterization		SISBEN Database with a cutoff to December of each evaluated period. Characterization survey of the smallest territorial area.		SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
Location of monitoring sites	Territorial units of the area of influence.								
Identification of PMA measures	The present monitoring and follow up Plan of the socioeconomic environment trend is related to the measures proposed in the PMS-2 Management Plan Sheets(Community Information and Participation Program).).								
Procedures and / or instruments description	Each year the social team of PUERTO BAHÍA COLOMBIA DE URABÁ S.A will conduct a random population survey in the smaller territorial units in order to verify the changes presented in the medium. This activity should take into account: the information of the population linked to the project and the relationship with their place of residence; information obtained by community action boards and other social organizations that handle demographic information; secondary information obtained from government entities, the SISBEN data being of main relevance. Based on the information collected, a report will be made in which the identified changes and effects will be analyzed, according to the numerical result generated from the proposed indicators.								
Periodicity and	**Daily**	**Weekly**	**Monthly**	**Bimonthly**	**Quarterly**	**Half-yearly**	**Annual**	**Biannual**	**Triennial**	**Quinquenni**

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND	TMS-01									
duration										al
							X			
Criteria for analysis and results interpretation	To measure the medium´s trend, the following criteria will be established for the analysis of the indicator: Less than 0.8 indicates that there is a decrease in the number of inhabitants. Between 0.8 and 1.1 indicates that the trend of the medium is relatively stable. Greater than 1.1 indicates that there is an increase in the population due to the arrival of the migrant population.									

- *TMS-2 Sheet. Follow up and monitoring the socioeconomic environment spatial element trend*

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND	TMS-02				
Objectives	Identify the presence and evolution of changes in the quality and coverage of home public services by demographic pressure in the smaller territorial area.				
Environmental components to monitor	**Cultural**	**Economic**	**Demographic**	**Spatial**	**Political - organizational**
				[redacted]	
Indicators	**Goal**	**Value**	**Indicator**	**Control mechanism and / or registration**	**Responsible**
	Identify the changes presented in the quality and coverage of public services in 100% of the smaller territorial units that are part of the area of direct influence.	100% of the smallest territorial units of the area of influence	Percentage of coverage in home public services in each smaller territorial unit that is part of the area of direct influence / Percentage of coverage in public utilities in the EIA characterizatio n	SISBEN Database with a cutoff to December of each evaluated period. Characterization survey of the minor territorial area	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A
Location of monitoring sites	Territorial units of the area of influence.				
Identification of PMA measures	The present monitoring and follow-up plan is related to the measures proposed in the Environmental Management Plan Sheet PS-3 (Program to support institutional management capacity).				
Procedures and / or instruments description	Each year the social team of PUERTO BAHÍA COLOMBIA DE URABÁ S.A will carry out a survey of quality and coverage of residential public services in the smaller territorial units in order to verify the changes presented in the medium. This activity should take into account: the information of the population linked to the project and the relationship with their place of residence; information obtained by community action boards and other social organizations;				

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND										TMS-02
	secondary information obtained from government entities, the SISBEN data being of main relevance. Based on the information collected, a report will be made in which the identified changes and effects will be analyzed, according to the numerical result generated from the proposed indicators.									
Periodicity and duration	**Daily**	**Weekly**	**Monthly**	**Bimonthly**	**Quarterly**	**Half-yearly**	**Annual**	**Biannual**	**Triennial**	**Quinquennial**
							X			
Criteria for analysis and results interpretation	To measure the medium´s trend, the following criteria will be established: Less than 1 indicates that the trend of the medium has been altered, diminishing the provision of public and social services. Between 1 and 1.1 means that the provision of public and social services has remained stable. Greater than 1.1 indicates that the trend of the medium has been altered, increasing the provision of public services.									

- *TMS-3 Sheet. Follow up and monitoring the socio-economic cultural environment trend*

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND					TMS-03
Objectives	1. Analyze the transformations in the cultural practice of artisanal fishing over time according to the results of the actions proposed in the management and monitoring plan.				
Environmental components to monitor	**Cultural**	**Economic**	**Demographic**	**Spatial**	**Political - organizational**
	[redacted]				
Indicators	**Goal**	**Value**	**Indicator**	**Control mechanism and / or registration**	**Responsible**
	Identify the changes presented in traditional fishing economic activities in 100% of smaller territorial units that are part of the area of influence.	100% of the smallest territorial units of the area of influence	Traditional economic fishing activities per year in each smaller territorial unit that is part of the area of influence / traditional economic fishing activities present in the characterization of the socioeconomic environment.	Fishing effort survey of the minor territorial area. Economic information at the municipal level.	SOCIEDAD PUERTO BAHÍA COLOMBIA DE URABÁ S.A
Location of monitoring sites	Territorial units of the area of influence.				
Identification of PMA measures	The present monitoring and follow-up plan is related to the measures proposed in the environmental management plan sheets, PS-5 (Program for the strengthening and management of artisanal fishing activities).				
Procedures and / or instruments description	Each year, two fishing efforts will be carried out in which information related to traditional fishing activities will be collected. This information will allow to point out the transformation over time regarding the behavior of the production system and the alterations of traditional fishing practices. Secondary information that contains information related to fishing activity will also be reviewed. Based on the information collected, a report will be made in which the changes and effects identified will be analyzed, according to the numerical result generated from the proposed indicators.				
Periodicity and	**Daily**	**Weekly**	**Monthly**	**Bimonthl**	**Quarterly**	**Half-yearly**	**Annual**	**Biannu**	**Triennia**	**Quinq**

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND							TMS-03			
duration				y				al	l	uenni al
							X			
Criteria for analysis and results interpretation	To measure the medium´s trend, the following criteria will be established: Less than 1 indicates that the trend of the medium has been altered, decreasing economic activities. Between 1 and 1.1 means that economic activities have remained stable. Greater than 1.1 indicates that the trend of the medium has been altered, increasing economic activities.									

- *TMS-4 Sheet. Follow up and monitoring of the trend of the socioeconomic environment element of community organization*

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND					TMS-04
Objectives	1. Identify the transformations and the scope of social and community organizations following the plans and programs proposed in the environmental impact study.				
Environmental components to monitor	**Cultural**	**Economic**	**Demographic**	**Spatial**	**Political - organizational**
					[redacted]

Indicators	**Goal**	**Value**	**Indicator**	**Control mechanism and / or registration**	**Responsible**
	Identify changes in social and community organizations in 100% of the smaller territorial units that are part of the area of influence.	100% of the smallest territorial units of the area of influence	Community organizations and scope per year in each smaller territorial unit that is part of the area of influence / Community organizations and scope present in the characterization of the socioeconomic environment.	Participatory diagnosis with community organizations. Matrix of Strengths Opportunities Weaknesses and Threats related to the stages of the project.	SOCIEDAD COPPUERTO BAHÍA COLOMBIA DE URABÁ S.A

Location of monitoring sites	Territorial units of the area of influence.
Identification of PMA measures	This monitoring and follow-up plan is related to the measures set out in the Environmental Management Plan PS-2 (Community Information and Participation Program), PS-5 Sheets(Program to strengthen and manage small-scale fishing activities).
Procedures and / or instruments description	Each year a participatory diagnosis will be made with the community organizations present in the area in order to determine the scope in relation to the community strengthening activities proposed in the management plan. Likewise, a SWOT Matrix will be made to assess the perception that communities have in relation to the project.

Periodicity and duration	Daily	Weekly	Monthly	Bimonthly	Quarterly	Half-yearly	Annual	Biannual	Triennial	Quinquennial
							X			

FOLLOW UP AND MONITORING OF THE SOCIOECONOMIC ENVIRONMENT TREND	TMS-04
Criteria for analysis and results interpretation	To measure the medium´s trend, the following criteria will be established: Less than 1 indicates that the trend of the medium has been altered, decreasing the scope of social organizations. Between 1 and 1.1 means that the scope of social organizations has remained stable. Greater than 1.1 indicates that the trend of the medium has been altered, increasing the scope of social organizations. Less than 1 indicates that the trend of the medium has been altered, decreasing the scope and acceptance of the project. Between 1 and 1.1 means that the acceptance of the project has remained stable. Greater than 1.1 indicates that the trend of the medium has been altered, increasing the acceptance of the project.

1.1.3 Risk Management Plan

The Risk Management Plan presented below was approved by Resolution 032 of 2012 for the "Construction and Operation project of a Port Terminal of Solid Bulk Cargoes of the Municipality of Turbo" and is updated according to the activities included in the current environmental license modification.

This Plan is a planning tool that allows to counteract and minimize the adverse consequences that occur in emergency situations related to accidents, defective operations and external phenomena that may occur during the construction and operation of a Port Terminal of solid Bulk Cargoes of the municipality of Turbo, which can affect the safety of people, the environment and the facilities and / or assets of the company.

The plan is designed with the purpose of having planned quick and effective response measures in case of any emergency event that occurs during the execution of the different stages of the project. This plan must be periodically reviewed to be updated and adjusted to the legal requirements, to the characteristics of the activities developed and in accordance with social responsibility agreed with the social actors involved. This plan will contain the basic guidelines for the identification and attention of risks, contingencies according to the level of emergency and the affected component, as well as the organization of the response team and the procedures to be followed.

- Objectives
- General objective

Formulate a risk management plan to control the risks identified within the area of influence for the construction and operation phases of a Port Terminal of solid bulk cargoes in the municipality of Turbo.

- Specific objectives

Identify activities that may lead to an emergency in the port terminal.

Determine the risk of the activities developed in the port terminal according to their probability of occurrence and severity, and define the control measures.

Establish a contingency plan in which the guidelines and procedures to effectively respond to an accident and / or emergency at the port terminal are presented.

- Basic concepts

Below is the meaning of the main concepts used for the formulation of the Risk Management Plan of the Port Terminal of solid bulk cargoes of the municipality of Turbo in accordance with Law 1523 of 2012[29]:

Threat: Latent danger that a physical event of natural origin, or caused, or induced by human action accidentally, is presented with a sufficient severity to cause loss of life, injury or other health impacts, as well as damages and losses in goods, infrastructure, livelihoods, service provision and environmental resources.

Disaster: It is the result that is triggered by the manifestation of one or several natural or anthropogenic unintentional events that by finding propitious conditions of vulnerability in people, goods, infrastructure, livelihoods, the provision of services or environmental resources, causes damage or human, material, economic or environmental loss, generating an intense, serious and widespread alteration in the normal conditions of operation of society, which requires the State and the national system to carry out emergency response actions, rehabilitation and reconstruction.

Emergency: Situation characterized by the alteration or intense and serious interruption of the normal conditions of operation or performance of a community, caused by an adverse event or by the imminence of it, which forces an immediate reaction and requires the response of State institutions, the media and the community in general.

Risk management: It is the social process of planning, execution, monitoring and evaluation of policies and permanent actions for the knowledge of risk and promotion of a greater awareness of it, to prevent or stop it from being generated, to reduce or control it when it already exists and to prepare and manage the disaster situations, as well as for the subsequent recovery, understand: rehabilitation and reconstruction. These actions have the explicit purpose of contributing to the safety, well-being and quality of life of people and to sustainable development.

[29] COLOMBIA. CONGRESS OF THE REPUBLIC. Law 1523 (April 24, 2012). By which the national disaster risk management policy is adopted and the National Disaster Risk Management System is established and other provisions are issued. Bogotá: Congress of the Republic, 2012.

Risk prevention: Measures and actions of restrictive or prospective intervention arranged in advance in order to avoid generating risk. It can focus on avoiding or neutralizing the threat or exposure and the vulnerability to it in a definitive way to prevent the creation of a new risk. The essential instruments of prevention are those provided for in planning, public investment and territorial environmental management, which aim to regulate the use and occupation of land in a safe and sustainable manner.

Disaster risk: Corresponds to the potential damages or losses that may occur due to physical hazard events of natural, socio-natural, technological, bio sanitary or unintentional human origin, in a specific period of time and that are determined by the vulnerability of the exposed elements; therefore, disaster risk is derived from the combination of threat and vulnerability.

- Regulatory framework

Source	Year	Description
Law 08	1.980	Ratification of the 1974 International Agreement on the Safety of Human Life at Sea and its Protocol / 78. SOLAS 74/78.
Law 12	1.981	Ratification of the 1973 International Agreement for the Prevention of Pollution from Ships and its Protocol / 78. MARPOL 73/78.
Decree 2324	1.984	By which the General Maritime and Port Directorate is reorganized
Law 46	1.988	Creation of the National System for the Prevention and Attention of Disasters
Resolution 1016	1.989	Regulates the organization, operation and forms the Occupational Health Programs that must be developed by employers or superiors in the country.
Law 99	1.993	Creation of the Ministry of the Environment
Decree 2190	1.995	By which the elaboration and development of the National Contingency Plan is ordered against Hydrocarbons, Derivatives and Harmful Substances spills in marine, fluvial and lacustrine waters.
Decree 93	1.998	By which it adopts the National Plan for the Prevention and Attention of Disasters
Decree 321	1.999	By which the National Plan of Contingency against Hydrocarbons, Derivatives and Harmful Substances spills is adopted
Law 1523	2.012	Whereby the national disaster risk management policy is adopted and the National Disaster Risk Management System is established and other provisions are issued

Source: Prepared by Aqua & Terra Consultores Asociados S.A.S, 2015.

- Geographic coverage

Figure No. 11.33 shows the area of the project that may be affected by an emergency and then describes the areas where discriminated activities take place on land, on the river and in the sea.

– On land: All the activities that are developed in the project land. In the construction phase there are the clearing, cleaning, landfills, construction and operation of temporary facilities and associated with the operation of the project; and in the operational phase the loading and unloading of trucks, operation and maintenance of infrastructure, machinery and equipment.

– On the river: All the activities that take place at the crossing of its channel, during the construction and operation of the viaduct, installation of conveyor belt, laying of the dock´s service connections and during the transit of tugboats, naval artifacts or smaller support vessels from the work´s dock on land to the mouth of the river.

– At sea: All the activities that take place in the project´s accessory maritime zone, from the shore to where the dock will be built and operated, for the construction of the viaduct with its conveyor belt. Likewise, the operations carried out by the tugboats, naval artifacts and auxiliary vessels at the service of the project, from and to, the dock towards the mouth of the León River. Within these marine activities, there are also those associated with deepening dredging, including the transport and disposal of dredged material in the authorized landfill. Finally, during the operative phase there is the transit of the units to the service of the terminal and the operations carried out by the user vessels within the maneuvering area of the terminal.

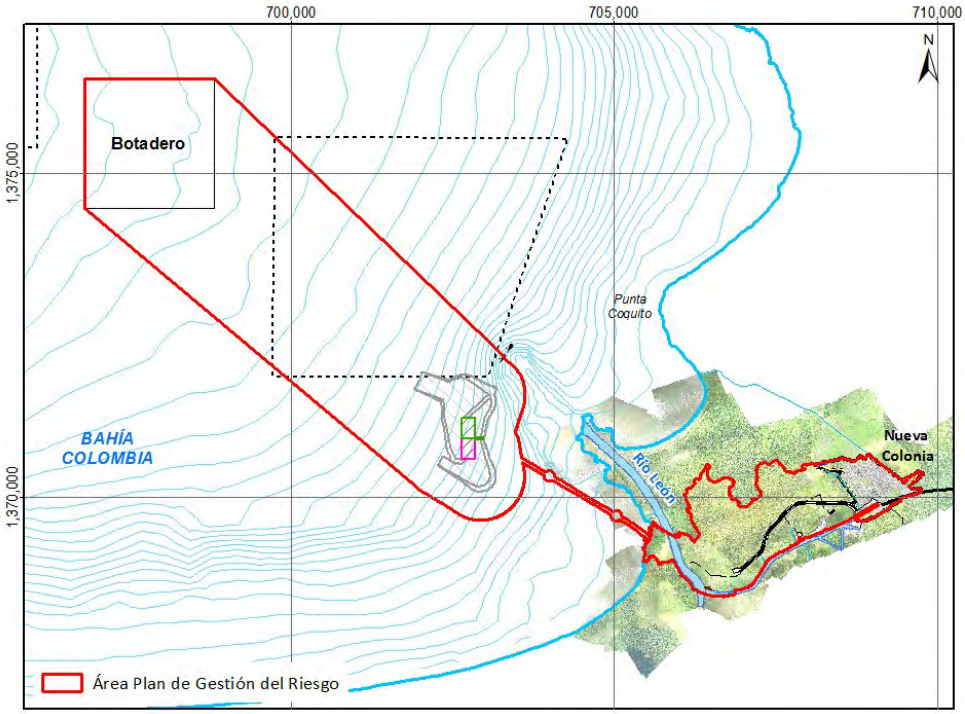


Figure Num. 11.8 Coverage of the risk management plan
Source: Elaborated by Aqua & Terra Consultores Asociados S.A.S., 2015

1.1.3.1 *Risk knowledge*

The objective of risk knowledge is to identify, prioritize and evaluate which events or conditions may cause an emergency at the port terminal, in such a way that preventive measures and control of the risks associated with the activities can be established. that are executed in the construction and operation phases[30].

Identification, prioritization and characterization of risk scenarios

During this identification process, a series of factors were considered which could be determining in the generation of an emergency. These factors can be classified as internal, which are those that the port terminal can control and develop improvement actions and external factors are those in which the project has no control.

[30] REPUBLIC OF COLOMBIA. Manual for the elaboration of emergency and contingency business plans and their integration with the National System for the prevention and attention of disasters. Bogotá, 2003. 88p

Internal factors (controllable) – Industrial safety[31]:

- Staff training.
- Personal protective equipment.
- Dredging operation regime.
- Control systems: application of the clauses of the safety checklist.
- Type of operation, work or activity.
- Protection equipment, first aid, fire protection, damage control, containment, recovery and cleaning.

External factors (non-internal control):[32]:

- Time and place of the incident.
- Climatic and hydrodynamics.
- External response equipment and services.
- Coordination with the environmental, port, maritime authorities and with the Local Emergency Committee.
- Public outside the Project.

In the same way, the risk factors external to the project activities that can be defined as disasters are:

- Seismic risk
- Flood risk
- Risk derived from problems of physical security and public order.

- Risks assessment

To evaluate the risk, the methodology proposed by CORMAGDALENA[33] was adopted, which is an adaptation of the Standard NTC 5254 Annex E [34] and It consists of assessing the severity and the probability to establish an estimated level of risk and the priority of response (See Table Num. 11.42 and Table Num. 11.43).

Table Num. 11.2 Risk rating keys: severity and probability

[31] REGIONAL AUTONOMOUS CORPORATION OF RIO GRANDE OF MAGDALENA - CORMAGDALENA and NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p.
[32] Ibid.
[33] REGIONAL AUTONOMOUS CORPORATION OF THE GRANDE RIVER OF MAGDALENA - CORMAGDALENA and NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p

[34] COLOMBIAN INSTITUTE OF TECHNICAL STANDARDS AND CERTIFICATION (ICONTEC). Risk management. Bogotá: ICONTEC, 1997. NTC 5254. Annex E.

Severity		Probability	
A	Death, major injury or major damage to the environment, property or equipment.	1	Extremely likely to happen.
B	Reportable injury (that is: more than 3 days of absence) or damage to the environment, property or equipment.	2	It is often likely to happen.
C	Minor injury or minor damage to the environment, property or equipment.	3	Low chance that it will happen

Source: CORMAGDALENA, 2011[35]

[35] CORMAGDALENA and NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p.

Table Num. 11.3 Risk rating keys: priority

		Likelihood		
		1	2	3
Severity	A			
	B			
	C			

	Unacceptable. Immediate action to reduce risk (1 week).
	Urgent care to reduce risk (1 month).
	It should act to reduce the risk (3 months).
	No additional actions are required. The controls are considered appropriate to minimize the risk.

Source: CORMAGDALENA, 2011[36]

- Analysis and risk assessments - Construction phase

During the construction phase, the most significant risks are related, in the first instance, to the safety and health of workers as listed below:

- In the performance of activities in height, due to the dangers of falling (for example during the construction of the silos) or the risks associated with the fall of tools.
- In case of falling of debris or structural parts.
- Blows, punctures, cuts or entrapment due to misuse or poor maintenance of work tools.
- Exposure to sunlight without proper protection.
- Exposure or contact with chemical products without protection and observance of safety sheets.
- Hazards present due to fire and explosion events if the generating factors (fire tetrahedron) are not taken into account, to which permanent attention must be given to reduce the risks.
- Fuel spills.

[36] Ibid.

In second instance are other dangers that would not have consequences as significant as those that can be generated by the hazards cited above, but also must be kept in mind, requiring staff to comply with the procedures and construction plans and the use of the elements of personal protection:

- The risks present in welding works.
- The exposure to noise.
- The ergonomic risks.
- Stress.

All the risks presented so far indicate a level of intervention, which, within the framework of this evaluation, indicates the need for permanent monitoring of activities, through the implementation of an HSE (Health, Safety, Environment) audit during the construction phase.

With reference to the dangers to which crewmembers, naval artifacts (barges, boats), vessels, motorboats or tugs can be exposed to the service of the project, it is mentioned that the Project will require the Shipowner(s) that the Marine Pollution Prevention and Safety System has been implemented and maintained, both on board and within its organization.

Thus, in the event that an event occurs during the performance of operations in the Project area, the respective Captains, Employers or Foremen would be responsible for executing in the first instance the response tasks on board, in accordance with the emergency ID card, the on-board Emergency Plan against sea pollution from hydrocarbons or liquid harmful substances (SOPEP) and, if the event exceeds its response capacity, request the support of the Project Contingency Plan.

The events that will be presented with a vehicle, machinery, naval device, vessel, motorboat or tugboat at the service of the Project, during the mobilization or demobilization, or outside the project, will be the exclusive responsibility of the contractor, owner or shipowner, both in the preventive, corrective, improvement or emergency response actions.

Within external risks, the following are considered relevant:

- Seismic risk: The project is located in a tectonically active zone, with a high seismic threat [37], as it can be seen in the Figure Num. 11.34.

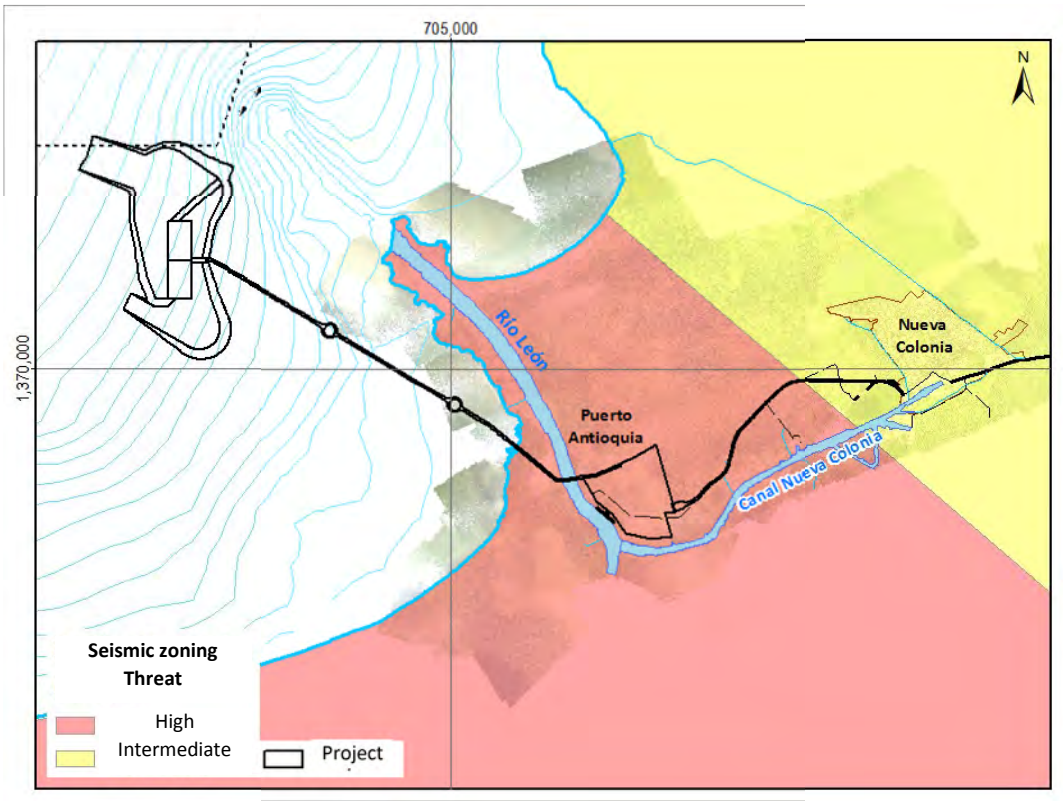


Figure Num. 11.9 Seismic zoning in the project intervention area
Source: SIGOT, 1999[38] y Aqua & Terra Consultores Asociados S.A.S., 2015

- Flood risk: The area where the port facilities will be located is bordering the León River. In addition, it is topographically a very low area, badly drained and affected by the daily fluctuations of the tides, so the flood threat could occur in case of an increase in the water level of the Leon River during a high tide. However, the site where the facilities will be built is separated from the León River by the presence of a high dam that protects it from possible flooding, therefore the threat is considered average. While in the areas

[37] COLOMBIAN ASSOCIATION OF SEISMIC ENGINEERING, Committee AIS-300. General Study of Seismic Hazard of Colombia. Bogotá, 2009, 220p.
[38] GEOGRAPHICAL INFORMATION SYSTEM FOR PLANNING AND LAND MANAGEMENT - SIGOT. Available at: [Online] http://sigotn.igac.gov.co/sigotn [Retrieved 31, August, 2015]

adjacent to the coast as well as the natural and artificial drainages a high flood threat was assigned as detailed in the Figure Num. 11.35 .

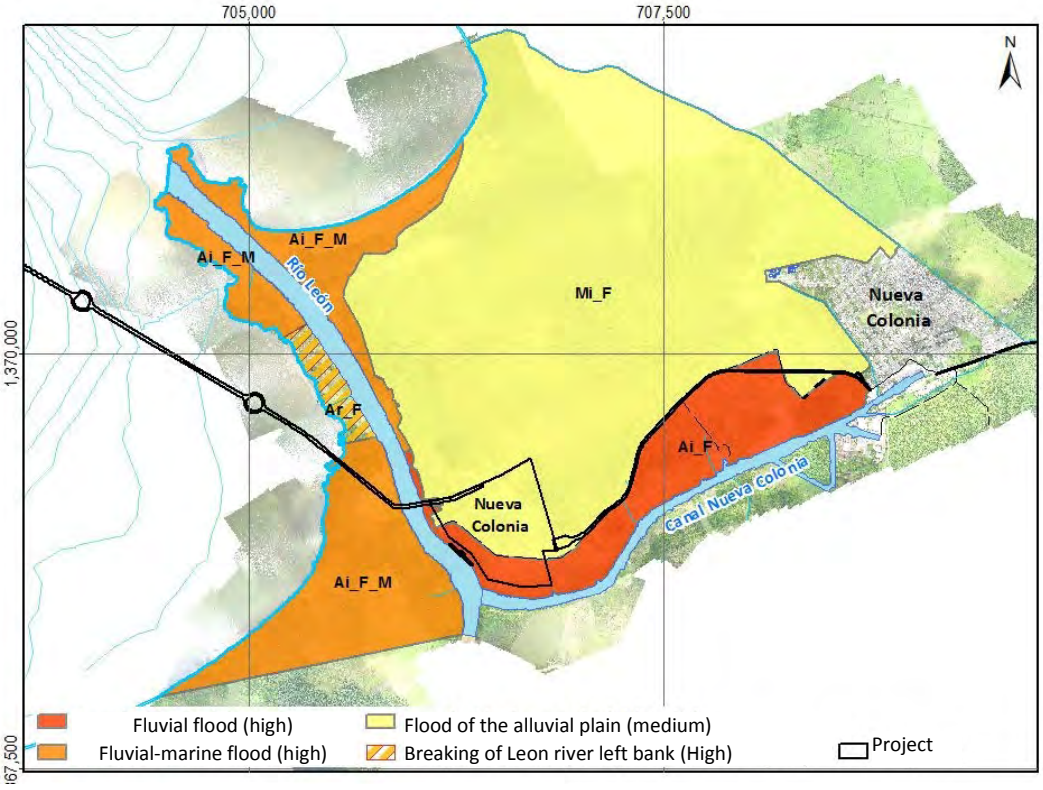


Figure Num. 11.10 Geo-threats identified in the project area
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Risk arising from physical security problems and public order: This risk includes civic strikes due to disagreement with the community surrounding the implementation of the project, causing the cessation of activities due to the partial or total blockage of the project and the attacks against the equipment and machinery, which causes delays in the schedules and additional costs.

In the Table Num. 11.44 an analysis and risk assessment of the activities carried out for the construction phase with control actions is made, taking into account the established criteria of the Table Num. 11.42 and Table Num. 11.43.

Table Num. 11.4 Analysis and risk assessment for the construction phase

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
The activities carried out aboard the tugboats, artifacts or auxiliary vessels. The activities carried out less than 1 m from the water, or over the water mirror of both the León River and the port sector of Bahía Colombia.	Man overboard.	A	3	A3	Competent personnel. Use of life jacket during opera Lifebuoy ring, with cape. On-board emergency ID card Response brigade. Medical emergency plan.
Activities both on land and on board, where staff can trip or slip.	Falls from the same level.	B	3	B3	Competent personnel. Order and cleanliness. Use of safety boots with non- Emergency ID card. Response brigade. Medical emergency plan
All the activities that are developed in heights higher than 1.5 m in scaffolding, stairs, structures, buildings, silos, etc..; also works as ditch and well openings, among others.	Falls from height.	A	2	A2	Competent personnel. Compliance Technical Regula Heights. Resolution 1409 of 2 Emergency ID card. Response brigade. Medical emergency plan.
Any activity where objects can fall from a higher level, such as tools, construction materials, rubble, etc.	Shocks, impacts and falls of objects.	B	2	A2	Competent personnel. Signaling. Protective meshes. Roofed areas. Use of protective helmet. Emergency ID card. Response brigade. Medical emergency plan.
Any activity that involves the use of tools, machinery or	Cuts, punctures, bruises, entrapment.	B	2	B2	Competent personnel. Tools, machinery or equipme

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
equipment.					maintenance conditions.
					Guards, screens, insurance, c source.
					Use of leather gloves, steel m
					Emergency ID card.
					Response brigade.
					Medical emergency plan.
All activity that takes place in the open, under the influence of the sun's rays.	Burns by solar radiation.	C	2	C2	Competent personnel.
					Wearing coveralls or long-sle
					Use of sunscreen.
					Emergency ID card.
					Response brigade.
					Medical emergency plan.
Electric welding and cutting work.	Burns, affectation of the eyes by exposure to ultraviolet and luminous radiation, smoke inhalation.	B	2	B2	Competent personnel.
					Bulkheads or screens.
					Grounding of welding machin
					Operational inspection of equ
					Use of personal protection ele pailer.
					Emergency ID card.
					Response brigade.
					Medical emergency plan.
Use of chemical products or hazardous materials.	Inhalation of vapors and gases, burns, fire.	B	1	B1	Competent personnel.
					Security sheets.
					Containers properly identified
					Storage and employment pro
					Minimization of the quantities agents present in the workpla
					Minimization of the number of who may be exposed.
					Minimization of duration and i
					Use of adequate personal pro when the previous measures exposure or contact with the a avoided by other means.

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
					Response brigade.
					Medical emergency plan.
Any activity where the noise levels exceed the maximum permissible limits.	Impairment of hearing, headaches, stress.	C	2	C2	Competent personnel.
					Vehicles, machinery, equipme attenuation systems from its c
					Maintenance program.
					Operational inspections
					Noise monitoring.
					Bulkheads.
					Control of exposure time.
					Personal protection items.
					Response brigade.
					Medical emergency plan.
Any activity that affects ergonomic conditions.	Risk factor by physical load. Muscle pain, fatigue.	C	2	C2	Competent personnel.
					Adequate workstation.
					Active pauses.
					Operational monitoring
					Response brigade.
					Medical emergency plan.
Any activity that affects psycho-labor conditions.	Stress, job dissatisfaction	C	3	C3	Competent personnel.
					Adequate work environment.
					Increase the sense of belongi productivity and the fulfillment Construction Project of the So of the municipality of Turbo.
					Response brigade.
					Medical emergency plan.
All operation of receipt or handling of fuels or lubricants. During the operation of vehicles, machinery, equipment, motorboats, tugboats, auxiliary vessels and naval artifacts.	Spills of fuels, oil and lubricants.	B	3	A3	Competent personnel.
					Control in fuel and lubricants
					Maintenance plan for fuel sys refrigeration: valves, pipes, ta
					Operational inspection during drops" policy.
					On-board emergency ID card
					Spill response brigade.

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
					Response team. Absorbent m buckets.
Electrical or combustion installations. Spills or sources of fuel. Sources of heat. Explosive atmosphere, by concentration of fuel vapors in an enclosure	Fire or explosion.	A	3	A2	Competent personnel.
					Controlled fuel sources.
					Controlled heat sources.
					Maintenance plan for machine
					Operational inspections
					Emergency ID card.
					Evacuation plan.
					Fire response brigade.
					Response team. Fire extingui
Driving Transit Operation	Vehicle risk factor or machinery within the building site.	A	3	A3	Competent personnel.
					Defensive driving course.
					Driving license.
					Certificate of operator suitabil
					Certificate of technical-mecha
					Maintenance plan.
					Operational monitoring
					Preventive and restrictive sign
					Response brigade.
					Medical emergency plan.
Motorboat, tugboat, naval artifact or auxiliary vessel operation.	Collision against another motor ship, vessel, naval artifact at the service of the project or third parties (banana operation, fisherman, passenger and cargo transport) and/or against the infrastructure under construction.	A	3	A3	Competent personnel.
					Captaincy of Puerto de Turbo
					Circular and notice to the nav
					Communications and operatio
					Communications equipment i
					Day and night signs according
					Code that warn mariners abou dredger and its restrictions.
					Security boat
					On-board emergency ID card
					Medical emergency plan.
	Grounding in the León river and/or in the accessory	B	3	B3	Safety and Prevention of Mar implemented and maintained.
					Competent personnel.

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
	maritime zone of the project.				Updated bathymetries of the v
					Signaling.
					Operative tugboat and with ar pull for the project teams.
					Auxiliary vessels.
					Tugboat anchoring system.
					On-board emergency ID card
					Medical emergency plan.
	Sinking in the León river and/or in the accessory maritime zone of the project.	A	3	A3	Safety and Prevention of Mar implemented and maintained.
					Competent personnel.
					Major maintenance plan.
					Operational inspection
					Evacuation plan.
					On-board emergency ID card
					Fault control response brigad
					Response team. Rescue.
					Medical emergency plan.
Dredges, tugboats, naval devices or auxiliary vessels	Drifting dredger, tugboat, fluvial device or auxiliary vessel	A	3	A3	Competent personnel
					Anchoring system
					Communications and operatio
					Safety boat
	Collision of a dredger, tugboat, fluvial device or auxiliary vessel	A	3	A3	Competent personnel
					Communications and operatio
					Daytime and nighttime signals about the location of the dred
					On-board emergency ID card
					Safety boat
	Grounding of a dredger, tugboat, river device or auxiliary vessel	B	3	B3	Competent personnel
					Updated bathymetries of th areas
					Signaling
					On-board emergency ID card brigade
					Operating tugboat and with ar

Activities	Threat	Risk			Control ac
		Severity	Probability	Priority	
					pull for the dredging equipme
					Auxiliary vessels
					Tugboat anchoring system
	Sinking of a dredger, tugboat, fluvial device or auxiliary vessel	A	3	A3	Competent personnel
					Major maintenance plan
					Operational inspection
					Evacuation plan
					On-board emergency ID card brigade
					Response team. Rescue
During the performance of the works	Earthquake	A	3	A3	Competent personnel.
					Evacuation plan.
					Contingency plan.
					Response brigades.
					Medical emergency plan.
During the performance of the works	Flooding	B	2	B2	Hydrological study of the Leó
					Competent personnel.
					Evacuation plan.
					Contingency plan.
					Response brigades.
					Medical emergency plan.
During the performance of the works	Civic strike	C	3	A3	Security brigade
					Communications brigade
					Competent personnel.
					Medical emergency plan.
During the performance of the works	Attacks against equipment and machinery	B	3	B3	Security brigade
					Communications brigade
					Competent personnel.
					Medical emergency plan.

Source: Araujo Ibarra & Asociados S.A, ,2010[39], Adapted by Aqua y Terra Consultores Asociados S.A.S

[39] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and o of solid bulk. Turbo. 2010. 428 p.

- Risk analysis and evaluation - Operation phase

During the operation phase of the terminal, the different risks identified have practically the same significance (lower than for the construction phase), with a slight probability of occurrence, if all the preventive actions of the system are implemented and maintained.

Special care must be taken in the handling of the load, giving an adequate maintenance to the cranes, conveyor belts and other components of the bulk handling system, to avoid the risk of spills.

Likewise, the silos must be free of accumulations of dust to avoid the risk of explosion and the personnel that perform height maintenance tasks must strictly comply with Resolution 1409 of 2012 of the Ministry of Labor.

With reference to the dangers to which crew members and user vessels may be exposed, the Operating Technical Regulations will express the operating conditions and safety requirements for the nominated vessels, which will be strictly enforced.

Likewise, the scope of the Terminal's Contingency Plan and its geographical coverage were established, as well as the obligation on the part of ships, naval devices (barges, boats), vessels, motorboats or tugboats, to have established, implemented and maintained the NGS Pollution Prevention and Safety System, the on-board emergency ID card and the SOPEP, with the purpose that, if faced with an emergency, in the first instance they activate their response plans and, if necessary, they can receive support from the Terminal through their Contingency Plan or resort to other instances of the National Contingency Plan if the response capacity of the terminal is exceeded. Likewise, it will be expressly stated in the Operations Technical Regulations that any emergency suffered by the user vessel outside the maritime accessory area will be addressed directly by the vessel and its owner, with its own means and under its responsibility.

The events that are presented to a vehicle, machinery, naval artifact, vessel, motorboat or tug at the service of the terminal, during the mobilization or demobilization, or outside the terminal, will be the exclusive responsibility of the contractor, owner or shipowner, both in the preventive, corrective, improvement or emergency response actions.

Next, it is presented in the Table Num. 11.45 an analysis and risk assessment of the activities that are developed for the operation phase, taking into account the criteria of the Table Num. 11.42 y Table Num. 11.43 .

Table Num. 11.5 Analysis and risk assessment for the operation phase of the Port Terminal

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
The activities that are carried out aboard the dredges, tugboats, artifacts or auxiliary vessels. The activities that are carried out less than 1 m from the water, or over the water mirror of both the León River and the port sector of Bahía Colombia.	Man overboard.	A	3	A3	Competent personnel. Use of life jacket during c Lifebuoy ring, with cape. NGS Pollution Prevention Management System (on On-board emergency ID Response brigade. Medical emergency plan.
Activities both on land and on board, where staff can trip or slip.	Falls from the same level.	B	3	B3	Competent personnel. Order and cleanliness on Use of safety boots with Response brigade. Medical emergency plan.
Activities both on land and on board, in all activities that take place at heights that exceed 1.5 m in scaffolding, stairs, structures, buildings, silos, etc..; also works such as ditch and well openings, among others, where personnel may trip or slip.	Falls from height.	A	3	A3	Competent personnel. Compliance Technical Re in Heights. Resolution 14 Labor. Response brigade. Medical emergency plan.
All activities where objects can fall from a higher level, such as tools, construction materials, debris, etc..	Shocks, impacts and falls of objects.	B	3	B3	Competent personnel. Signaling. Protective meshes. Roofed areas. Use of protective helmet. Response brigade. Medical emergency plan.
Any activity that involves the use of tools, machinery or equipment.	Cuts, punctures, bruises, entrapment.	B	3	B3	Competent personnel. Tools, machinery or equi and maintenance conditi

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					Guards, insurance, contr source.
					Use of personal protectio gloves, steel mesh, etc.)
					Response brigade.
					Medical emergency plan.
All activity carried out in the open sky, under the influence of the sun's rays.	Burns by solar radiation.	B	3	B3	Use of personal protectio long-sleeved shirt).
					Use of sunscreen.
					Response brigade.
					Medical emergency plan
Electric welding and cutting work.	Burns, affectation of the eyes by exposure to ultraviolet and luminous radiation, smoke inhalation.	B	3	B3	Competent personnel.
					Grounding of welding ma
					Operational inspection of elements.
					Use of personal protectio welder or pailer.
Use of chemical products or hazardous materials.	Inhalation of vapors and gases, burns, fire.	B	2	B2	Competent personnel.
					Security sheets.
					Containers properly ident
					Storage and employment
					Minimization of the quant chemical agents present
					Minimization of the numb or who may be exposed.
					Minimization of duration a exposures.
					Use of adequate persona when the previous measu exposure or contact with avoided by other means.

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					NGS Pollution Prevention Management System (on
					Response brigade.
					Medical emergency plan.
Any activity where the noise levels exceed the maximum permissible limits.	Impairment of hearing, headache, stress.	C	3	C3	Competent personnel.
					Vehicles, machinery, equ attenuation systems from acquisition.
					Maintenance program.
					Operational inspections
					Noise monitoring.
					Bulkheads.
					Control of exposure time.
					Personal protection items
					NGS Pollution Prevention Management System (on
					Response brigade.
					Medical emergency plan.
Any activity that affects ergonomic conditions.	Risk factor by physical load. Muscle pain, fatigue.	C	3	C3	Competent personnel.
					Adequate workstation.
					Active pauses.
					Operational monitoring
					NGS Pollution Prevention Management System (on
					Response brigade.
					Medical emergency plan.
Any activity that affects the psycho-labor conditions.	Stress, job dissatisfaction.	C	3	C3	Competent personnel.
					Adequate work environm
					Increase the sense of bel productivity and the fulfill of the Construction and o Solid Bulk Port Terminal

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					Turbo.
					NGS Pollution Prevention Management System (on
					Response brigade.
					Medical emergency plan.
All receiving operations or handling of fuels or lubricants. During the operation of vehicles, machinery, equipment, motorboats, tugboats, auxiliary vessels and naval artifacts at the service of the terminal.	Spills of fuels, oil and lubricants.	B	3	B3	Competent personnel.
					Control in fuel and lubrica operations.
					Maintenance plan for fue refrigeration: valves, pipe
					Operational inspection du "Zero drops" policy.
					NGS Pollution Prevention Management System (on
					Spill response brigade.
					Response team. Absorbe buckets.
					Technical Operating Reg will not be supplied with f terminal.
All activities that involve electrical or combustion installations. Spills or sources of fuel. Sources of heat.	Explosive atmosphere, by concentration of fuel vapors in an enclosure or dust in the storage silos.	A	3	A3	Competent personnel.
					Controlled fuel sources.
					Controlled heat sources.
					It is recommended that th avoid turbulence and pos
					Extraction of dust in bulk
					Maintenance plan for ma
					Operational inspections
					NGS Pollution Prevention Management System (on
					Emergency ID card.
					Evacuation plan.

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					Firefighting Response Br the port terminal.
					Response team Fire extinguishers, fixed s
					Technical Operating Reg
Load and unload liquid bulk	Explosive atmosphere, by concentration of fuel vapors in an enclosure	A	3	A3	At least five (5) fire extinc discharge shall be provid
					Water-foam monitors
					Minimum Two (2) fire sys dam
					Competent personnel
					Technical Operating Reg
Download, transport, storage and unload solid bulk.	Spill of bulk cargo. In the system download-transport-storage-load.	C	3	C3	Load and unload silos in emissions
					Competent personnel
					Collection trays
					Maintenance plan for the conveyor belts, machiner
					Response team
					Operational inspections
Activities in the motorboats and / or tugboats, naval devices or auxiliary vessels in operation.	Collision of the user vessel against a tugboat or dock. Collision of a tugboat, naval device or auxiliary vessel at the service of the terminal, against a user vessel, against the dock or against a vessel,	A	3	A3	NGS Pollution Prevention (on board), implemented
					Competent personnel.
					Captaincy of Puerto de T Circular and notice to the
					Communications and ope
					Communications equipm contact. Radios VHF can
					Day and night signs acco International Code that w location of the dredger ar
					Security boat

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
	tugboat or naval device of the banana operation, fishing boat or against a passenger transport boat.				Technical Operating Reg
Activities in the motorboats and / or tugboats, naval artifacts or auxiliary vessels in operation	Grounding in the accessory maritime zone or in the León River.	B	3	B3	Competent personnel. Updated bathymetries of Signaling. Operative tugboat and wi bollard pull for the projec Auxiliary vessels. Tugboat anchoring syste Technical Operating Reg
Activities in the motorboats and / or tugboats, naval devices or auxiliary vessels in operation.	Sinking in the accessory maritime zone or in the León River.	A	3	A3	Competent personnel. Major maintenance plan. Operational inspection Evacuation plan. Fault control response br Response team. Rescue NGS Pollution Prevention (on board), implemented Technical Operating Reg
Activities in dredgers, tugboats, naval devices or auxiliary vessels	Drifting dredger, tugboat, fluvial device or auxiliary vessel	A	2	A2	Competent personnel Anchoring system Communications and ope Safety boat
	Collision of a dredger, tugboat, fluvial device or auxiliary vessel	A	2	A2	Competent personnel Communications and ope Daytime and nighttime si about the location of the

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					restrictions
					On-board emergency ID
					Safety boat
	Grounding of a dredger, tugboat, fluvial device or auxiliary vessel	B	3	B3	Competent personnel
					Updated bathymetry of th area
					Signaling
					On-board emergency ID response brigade
					Operating tugboat and wi bollard pull for the dredgi
					Auxiliary vessels
					Tugboat anchoring syste
	Sinking of a dredger, tugboat, fluvial device or auxiliary vessel	A	3	A3	Competent personnel
					Major maintenance plan
					Operational inspection
					Evacuation plan
					On-board emergency ID response brigade
					Response team. Rescue
During the operation of the terminal.	Earthquake.	A	3	A3	Constructions complying Code of Earthquake resis Decrees 33 of 1998, 34 c and 52 of 2002, and is ca
					Earthquake Resistant Co
					Competent personnel.
					Evacuation plan.
					Contingency plan.
					Response brigades.
					Medical emergency plan.
During the operation of the terminal.	Flooding	A	3	A3	Hydrological study of the
					Competent personnel.

Activities	Threat	Risk			Control
		Severity	Probability	Priority	
					Evacuation plan.
					Contingency plan.
					Response brigades.
					Medical emergency plan.
During the performance of the works	Civic strike	B	3	C3	Security brigade
					Communications brigade
					Competent personnel.
					Medical emergency plan.
During the performance of the works	Attacks against equipment and machinery	B	3	B3	Security brigade
					Communications brigade
					Competent personnel.
					Medical emergency plan.
During the operation of the terminal.	Physical security.	A	3	A3	Physical Security Study.
					Physical Security Assura
					Code of Protection of Shi PBIP, established, certifie maintained.
					Competent personnel.
					Medical emergency plan.

Source: Araujo Ibarra & Asociados S.A, ,2010[40]. Adapted by Aqua y Terra Consultores Asociados S.A.S

[40] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and o of solid bulk. Turbo. 2010. 428 p.

1.1.3.2 *Contingency management*

- Objective

The objective of the Contingency Management Plan is to provide the employees of the port terminal of Bahía Colombia in the phases of construction and operation, the guidelines, requirements, training and necessary procedures, to respond effectively to various emergencies and/or accidents. that compromise the physical integrity of the project's personnel, the facilities, the neighboring communities and the natural environment of the work throughout the lifespan of the project.

- Scope

The events that are answered through the activation of this Contingency Plan are related to the type of events, the site where the emergency may occur and the phase of the Project, construction or operation of the Port Terminal in Bahía Colombia.

Regarding emergencies that may arise outside the Area of Direct Influence of the Project, from the environmental point of view, that is, outside the premises of the viaduct corridor and the accessory maritime zone (maneuvering area), the responsibility for the attention of the events will be of vehicles, ships or naval artifacts, by activating their own Contingency plan. In any case, it will be their responsibility to perform the tasks of first response.

- Logistical support information

The port terminal will have a team of firefighters in charge of security and prevention in the event of a fire contingency inside the facilities.

According to the classification of the emergency and levels of activation of the contingency plan, it will be possible to resort to the following support entities:

Table Num. 11.6 Telephone logistic support directory

Entity	Phone
Turbo Mayor's Office	(4) 8273273
Local Committee for disaster prevention and response - CLOPAD	(4) 3856532
Regional Committee for disaster prevention and response - CREPAD	(4) 3838000
Captaincy of the port of Turbo	(4) 8221571 / 8274038
Command Coast Guard Station of Urabá	(4) 8272476
Marine Infantry Battalion. Turbo.	018000116969/ cel: 3138386823
National Police	(4) 8272040 / cel:3005979739 - Emergency 112 y 123
Civil defense	(4) 2924708 - Emergency: 144
Turbo Fire Station	(4) 8272070 / 3117194701

Entity	Phone
CORPOURABÁ	(4) 8281022
Antioquia Red Cross	(4) 8276100 / 8220648
ECOPETROL	(1) 2344000
OCENSA	(1) 3250200
Antonio Roldán Betancur Hospital - Apartadó	(4) 8283101
Panamericana Clinic - Apartadó	(4) 829 07 90

Source: Aqua y Terra Consultores Asociados S.A.S., 2015

Table Num. 11.7 Scope of contingency plan

Scope	Phase of the project	Event area

Scope	Phase of the project	Event area
Wounded	Construction and operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Fire	Construction and operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Explosion	Construction and operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Pollution by spill of liquid substances	Construction and operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Pollution by spillage of load	Operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Vehicle or machinery risk factor.	Construction and operation	On land, inside the terminal.
Collision	Construction and operation	In the river (project, mouth) or in the sea (accessory maritime zone of the project).
Grounding	Construction and operation	In the river (project, mouth) or in the sea (accessory maritime zone of the project).
Sinking	Construction and operation	In the river (project, mouth) or in the sea (accessory maritime zone of the project).
Seismic event	Construction and operation	In all areas of the project. On land, in the river (project, mouth) or in the sea (accessory maritime zone of the project).
Flooding	Construction and operation	
Physical security	Construction and operation	

Source: Araujo Ibarra & Asociados S.A, ,2010[41].

- Classification of emergencies and levels of activation of the Contingency Plan

  - **Low-grade Emergency - The National Contingency Plan is not activated**

The Colombia Bay Contingency Plan will be activated, without the simultaneous activation of the National Contingency Plan, to deal with events that do not significantly affect people, the environment or the infrastructure within the Project areas, in which they are sufficient

[41] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact Assessment for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

own resources, with some help from response institutions of the Municipality of Apartadó[42], such as its Fire Department and the hospital network of the Municipality, without requiring the activation of the Local Committees for Disaster Prevention and Attention - CLOPAD and much less the Regional Committee of Disaster Prevention and Care CREPAD.

Within the low-grade emergencies:

- ✓ Accidents with a maximum number of injured of 2 workers
- ✓ Spills of operational fuel or lubricant of up to 10 barrels, which may occur on land, due to the rupture of a tank or fuel system duct of a vehicle or machinery; in the León river from the service dock to its mouth, or in the ancillary maritime zone of the Port Terminal of Solid Bulks, product of the spillage of fuel or lubricant handled on board.
- ✓ The Project will establish and maintain the policy of zero drops, through operational control actions, so these spills will be slightly probable, for which the Project will have the resources to respond to a spill of fuel or lubricant of this size.
- ✓ In the operation phase, the spills of bulk cargo of operational type of up to 10 tons, produced by the presence of leaks in the system of suction, transport, storage and unloading of grains.

The project will establish and maintain the policy of zero spills of grain, so these events will be slightly probable. To prevent grain spill outside of confined systems, collection trays will be available.

The project recognizes the availability of resources of the National Contingency Plan, in the event that internal incidents exceed the capabilities of the Contingency Plan of the port terminal of Bahía Colombia.

- **Mid-grade Emergencies - Level 2 of the National Contingency Plan: Mid-grade emergencies cover the events where they are registered:**

- ✓ Several injured more than 2.
- ✓ Fires that exceed the capacity of the firefighting teams of the project and the Municipality of Apartadó.
- ✓ The explosion of a silo.

[42] It is clarified that the available resources of this Municipality would be used, because they are much closer to these facilities than to the Municipality of Turbo, where the Project is located in their rural area.

- ✓ Fuel spills that may exceed 10 barrels, generated by the rupture of a service tank of a tugboat or naval device at the service of the Project or of a user vessel, events that occur within the maritime adjacent area of the terminal or in the Leon river from the service dock to its mouth, as a consequence of the rupture of the hull of the vessel, tugboat or naval device, when colliding at the height of its service tank against an infrastructure or another boat, vessel, tugboat or naval artifact.

- ✓ The cargo spills, generated by the breakdown of the hull of one of the user vessels, at the height of one of its cargo holds, due to the collision of the ship against a tugboat or against the dock, an event that could pour more than 200 tons to the sea.

These types of events are slightly probable, due to the control actions that the Project will establish and maintain. However, if they were presented, they would exceed the response capacity of the terminal, requiring activation of the National Contingency Plan, in its Level 2, that is, with the activation of CREPAD.

As you can see, Level 1 of the National Contingency Plan would not be activated, because there is a firefighter's team in the terminal and because of the proximity and ease of access of the municipal capital of Apartadó, which implies that it is used from a principle to the resources offered by this municipality in case of a Mid-Grade emergency.

In the event of a fuel spill, you can request the support of companies such as ECOPETROL (Coveñas-Cartagena) and OCENSA (Coveñas), with their spill control equipment to deal with the emergency.

- **High-Grade Emergency - Level 3 of the National Contingency Plan:**

Higher-grade emergencies cover very slightly probable events that a user vessel may suffer within the maritime accessory area of the Port Terminal, such as a generalized fire or sinking of the motor ship, possibly generating large spills of fuel or cargo, requiring the activation of the National Contingency Plan against Spills of Hydrocarbons, Derivatives and Harmful Substances, in Maritime, Fluvial and Lacustrine Waters[43] in its Level 3.

[43] COLOMBIA. MINISTRY OF INTERIOR. Decree 321 (February 17, 1999). By which the National Contingency Plan is adopted against spills of Hydrocarbons, Derivatives and Harmful Substances. Bogotá, D.C., 1999. 7 p.

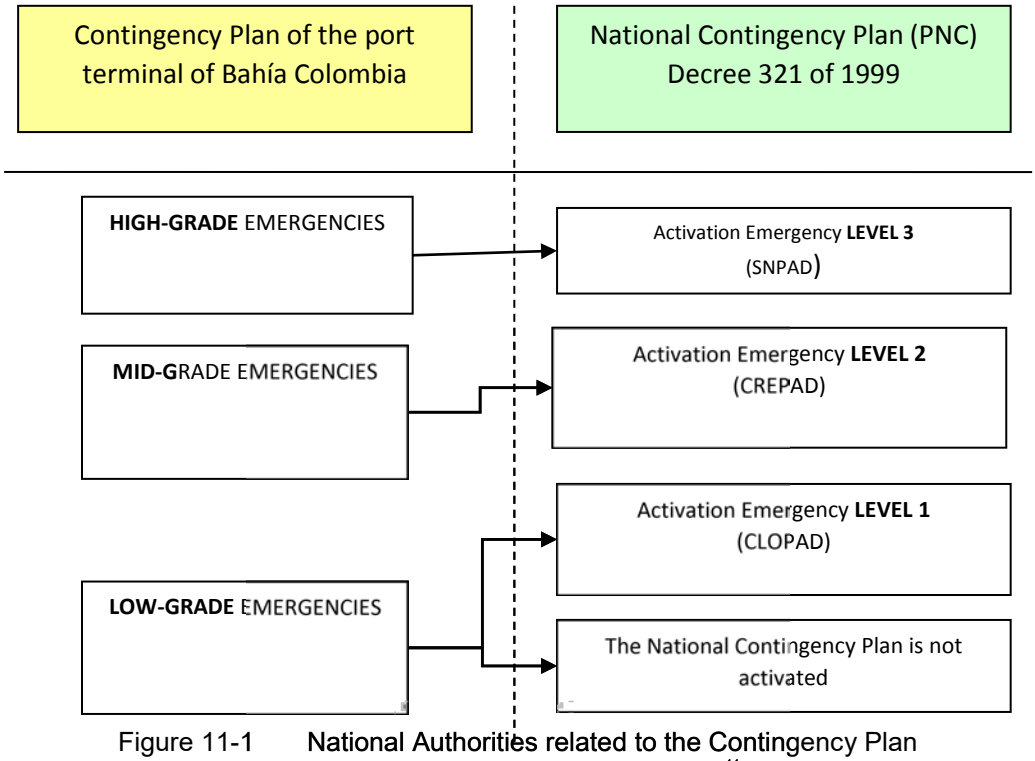


Figure 11-1 National Authorities related to the Contingency Plan
Source: Araujo Ibarra & Asociados S.A, ,2010[44].

[44] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

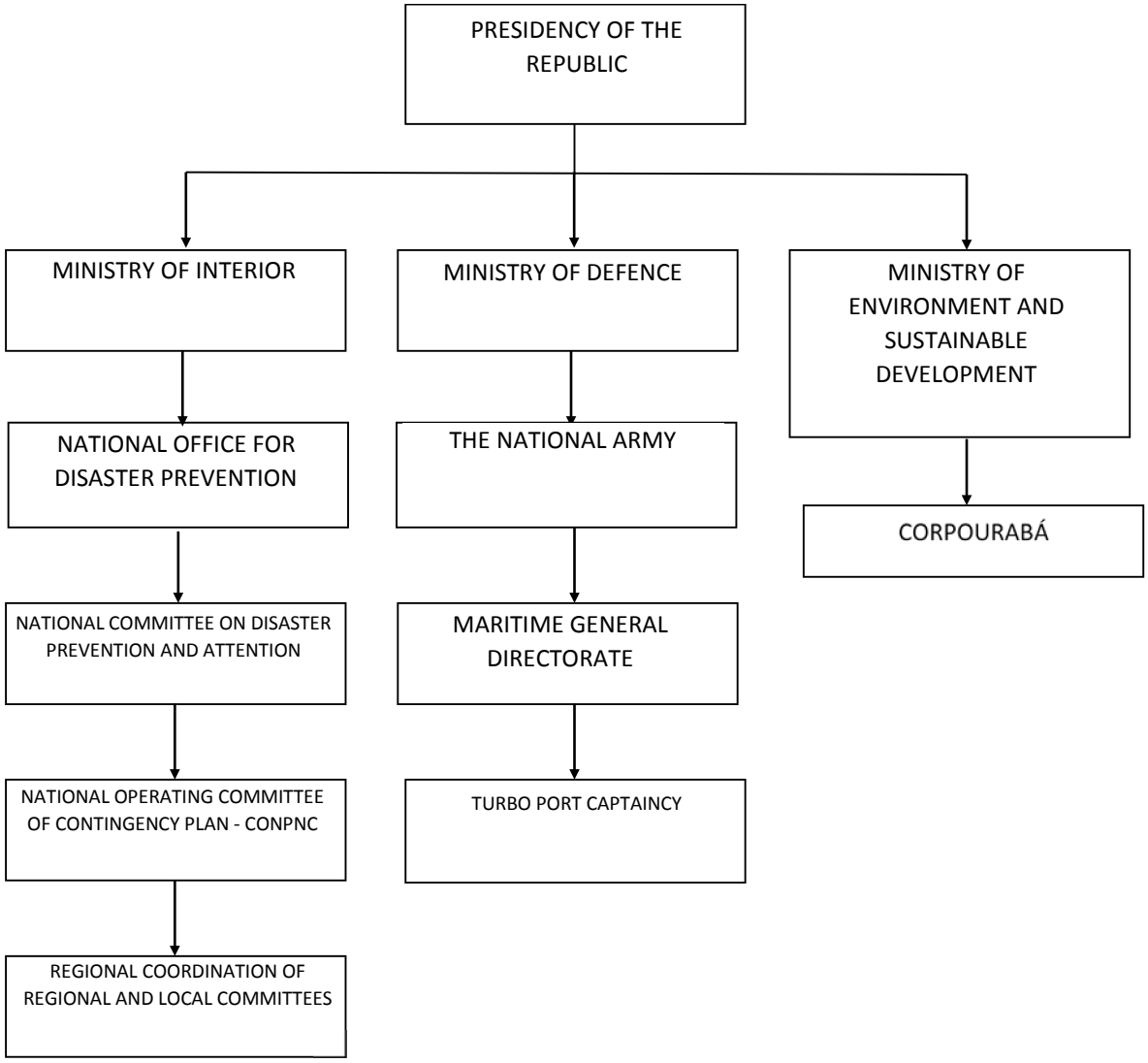


Figure Num. 11.11 National Authorities related to the Contingency Plan
Source: Araujo Ibarra & Asociados S.A, 2010[45]

- Emergency Committee

The conformation of an Emergency Committee is permanent, and its direction should be in charge of the administrative personnel of the Project (Figure Num. 11.37 and Figure Num. 11.38).

[45] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

Command structure for emergencies:

In case of an emergency that requires the implementation of procedures under this Emergency Response Plan, the response will be activated internally (low-grade emergencies) through an Emergency Committee, involving resources on the site.

In case of an emergency, the Resident Engineer will be alert during the construction phase and during the operations phase the Production Supervisor will assess the severity and magnitude of the incident, the size of the spill, the resources required, etc. Immediately mobilize the respective Emergency Committee, either the construction phase or the operations phase, the necessary human resources and the appropriate response team to handle the situation. Once studied and analyzed, they will notify the Project Director and the Production Manager respectively, who will be able to provide the necessary support if the situation warrants it.

The above includes the notification to the Manager, for the purposes of promoting the pertinent coordination before the departmental and regional authorities, if required.

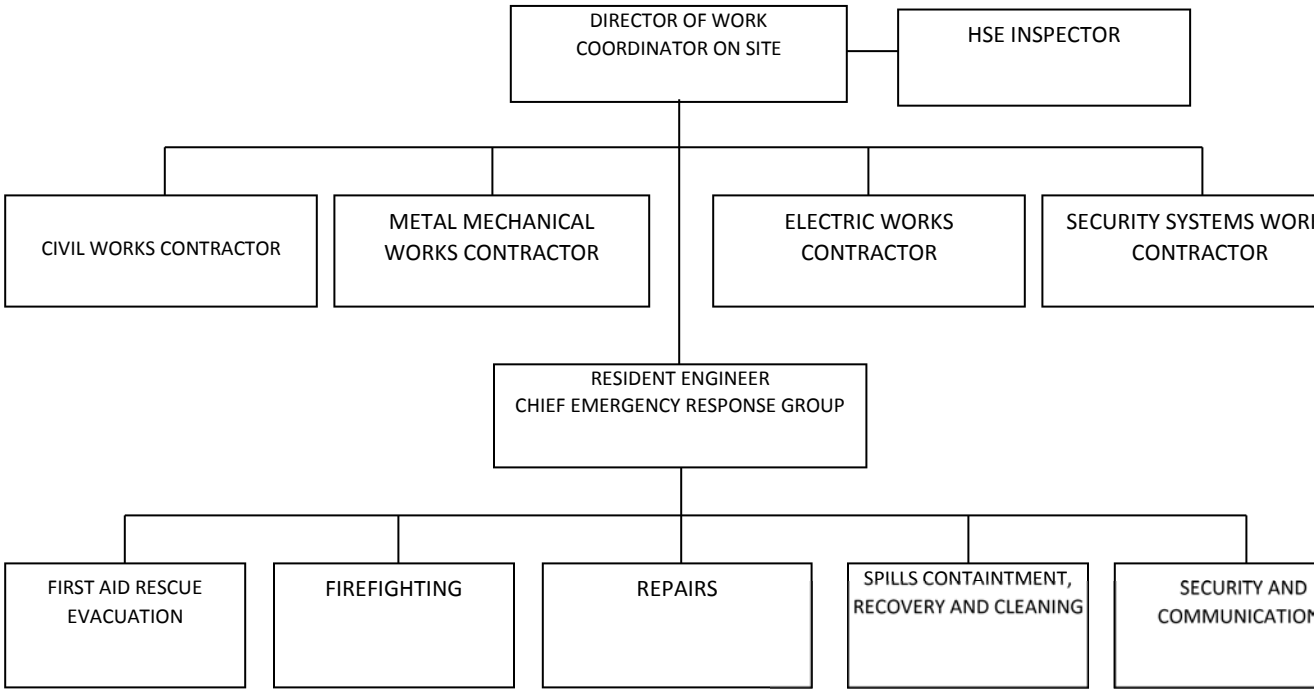


Figure Num. 11.12 Emergency Committee construction phase
Source: Araujo Ibarra & Asociados S.A, ,2010[46]

[46] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and op of solid bulk. Turbo. 2010. 428 p.

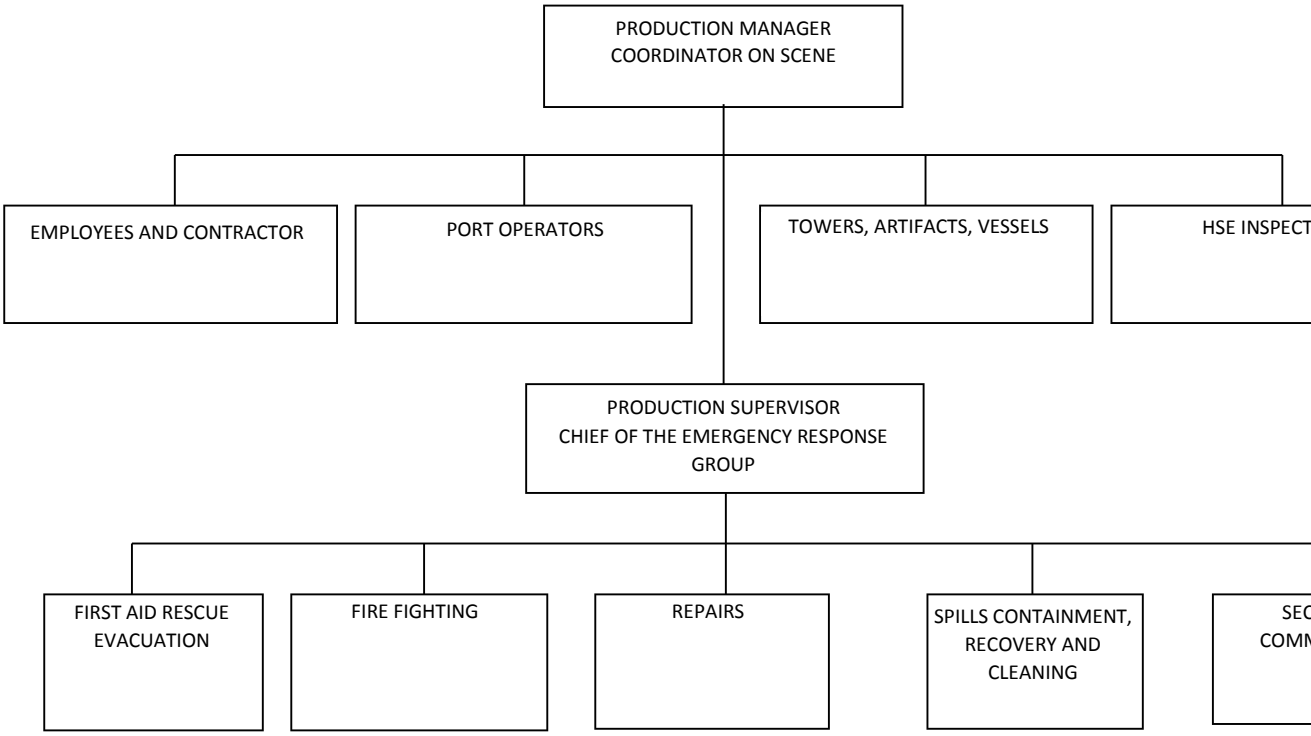


Figure Num. 11.13 Emergency Committee operations phase
Source: Araujo Ibarra & Asociados S. A. ,2010

Functions and responsibilities of the Director in Scene (Construction Director or Production Manager):

The Manager of the Construction and Operation Project of the Port Terminal will be responsible for ensuring that all activities associated with the implementation of the Project are carried out in full compliance with the terms of the Environmental License, other permits, regulations and other current regulations. For this reason, in an emergency, will occupy the role of Director in Scene, according to the organization established in the National Contingency Plan.

Its main functions will be the following:

- Verify the nature and severity of the emergency, based on the evaluation carried out by the technical coordinator of emergency care.
- Decide on the initiation of immediate actions to respond and control the incident, in particular on the need to suspend activities.
- If necessary, activate the National Contingency Plan at the appropriate level.
- Decide on the initial structure and the number of people required to attend the emergency.
- Prepare situation reports for the General Manager that include the registry of all important communications and decisions.
- Give notice to the competent authorities according to the type and level of the incident, in particular presenting the No. 1 form of initial report of spill established by the National Contingency Plan to the competent authorities.
- Manage communications with the media and the community in the technical aspects.
- Approve the resources required for emergency care.
- Request equipment loans and expert support.
- Present the final report of the spill to the competent authorities in the terms and terms established by the National Contingency Plan.

Roles and responsibilities of the Head of the Response Group:

- During the construction phase, the Resident Engineer will act as Head of the Response Group and during the operation phase, the Production Supervisor.
- Direct response actions to the emergency through the Response Group.
- Evaluate the incident and agree on a response strategy with the Construction Manager, during the construction phase or with the Production Manager, during the operations phase, taking into account:

  - ✓ Meteorological, hydrologic or oceanographic conditions.
  - ✓ Type and magnitude of the incident.
  - ✓ Resources at risk
  - ✓ Establishes and maintains contacts with the foreman, supervisor, crew leader, tugboat captain or skipper of the vessel reporting the emergency.
  - ✓ Establishes and maintains contacts with contractors for emergency response.
  - ✓ Organizes the mobilization and operation of the emergency response team.
  - ✓ Directs and coordinates the response actions with the brigade chiefs.
  - ✓ Supplies the information required by the foreman, supervisor, gang chief, tugboat captain or skipper of the vessel reporting the emergency and by the brigade chiefs.
  - ✓ Keeps track of environmental climatic conditions in order to evaluate its incidence in the response to an incident and the possible environmental impacts derived from it.
  - ✓ Oversees the location of checkpoints, the position of floating barriers and collection systems in the event of a fuel spill.
  - ✓ Coordinates Emergency Response Team staff relays with contractors.
  - ✓ Coordinates the transport of equipment and resources.
  - ✓ Watch for safety during the emergency, increase where necessary.
  - ✓ Takes appropriate measures to prevent unnecessary and dangerous health risks for personnel, ordering to suspend operations until safety conditions are restored.
  - ✓ Organizes the provision of additional personal protective equipment for the specific tasks of each brigade.
  - ✓ Check the availability of material and first aid equipment.
  - ✓ Reports the effectiveness of the response operations to the project manager during the construction phase or to the production manager during the operations phase.
  - ✓ Recommends paths for external help.
  - ✓ Keeps the data directory updated, telephone list of firefighters, police, Civil defense, ambulances, hospitals and Red Cross.

- ✓ Determines the patient's fate.
- ✓ Prepares written reports on response activities, identifying the number of people employed, the equipment and the material used.
- ✓ Establishes practical emergency response training and spill management programs.

Roles and responsibilities of the HSE Inspector:

- ✓ Keep track of all important communications and decisions and make sure the time is accurately recorded.
- ✓ Attends to the environmental aspects that arise because of the incident.
- ✓ Plans and executes the action plan to minimize environmental impact.
- ✓ Plans and implements the protection mechanisms of flora and fauna.
- ✓ Plans and executes actions for the protection of critical and sensitive areas.
- ✓ Keeps the project manager up to date, during the construction phase to the production manager, reporting the issues related to the incident and the affected environment.
- ✓ Organizes the support of specialists (environmentalists, experts in fauna and flora) to be available at the site of the incident, if required.
- ✓ In association with external counseling, determines the magnitude of the cleanliness required to restore the affected areas and return them environmentally acceptable.
- ✓ At the order of the project manager, during the construction phase or the production manager, during the operations phase, it fulfils the functions and responsibilities of the head of the response group.

Functions and responsibilities of the foreman, supervisor, crew chief, captain of the tugboat or vessel owner reporting an incident:

- They report the incident to the resident engineer, during the construction phase or with the production Supervisor, during the operations phase, filling in

the initial report format.

- They evaluate the incident and agree on a response strategy with the resident engineer, during the construction phase or with the production Supervisor, during the operations phase, taking into account:

  ✓ Meteorological, hydrologic and oceanographic conditions.
  ✓ Type and magnitude of the incident.
  ✓ Resources at risk.

- They activate the emergency ID card.

- The coordinator is kept informed on the scene of:

✓ The effectiveness of response actions.
✓ The news of personnel, material and equipment.
✓ The support requirements.

- Keep track of all important communications and decisions, making sure the time is accurately recorded.

Emergency Response Group:

The Emergency Response Group will act in response to the indications of the Head of the Response Group. It will be integrated by the personnel of workers, contractors, port operators and crew of the Project of Construction and operation of the Port Terminal Bahia Colombia, forming the brigades of:

- Rescue – First aid – evacuation.
- Firefighting.
- Repairs.
- Spill containment. Recovery and cleaning.
- Security and communications.

- Operational maintenance and implementation program

Training and emergency exercises:

All the personnel that participate in the Construction and Operation Project of the Port Terminal will receive a personalized induction now of its connection to the Project and during the development of its activities.

The Response Brigades will receive training each month.

All personnel will also participate in a simulation during the construction phase, at the beginning of the work and at the end of the induction workshops; then a general drill will be held every three months during this phase.

For the operation phase, a simulation will be developed at the beginning of operations and then every 6 months.

External disclosure of the Contingency Plan:

At the beginning of the construction phase and after the operation phase, the Project Contingency Plan will be presented to at least the following entities and interested parties:

- CORPOURABÁ.
- Turbo city hall.
- Apartadó city hall.
- Governorate of Antioquia.
- Banana associations.
- Community Action Board of El Canal village.
- Community Action Board of the township of Nueva Colonia.
- Local Committees for the Prevention and Attention of Disasters (CLOPAD) of Turbo and Apartadó.
- Regional Committee for the Prevention and Attention of Disasters (CREPAD).

Plan Review:

The Resident Engineer, during the construction phase, and the Production Supervisor, during the operation phase, will be responsible for keeping the Emergency Response Plan of the Construction and Operation Project of the Port Terminal of Bahía Colombia reviewed and updated. with a minimum frequency of one (1) time a year during the operation phase.

In any case, it was established that after a simulation or activation of the Contingency Plan, the required adjustments were made to it, according to the results and observations of these emergency response actions.

- Operational Plan of the Contingency Plan

At the time of the initial notification of an incident, the magnitude and implications of the emergency will not normally be known. It is recommended to immediately gather the Emergency Committee and alert your Emergency Response Group. Once the nature, magnitude and extent of the incident are known, the Resident Engineer during the construction phase and the Production Supervisor during the construction phase will then be able to give the Construction / Production Manager the details available, keeping it informed and updated.

An effective response will always be easier to organize if all the members of the Emergency Committee meet at the beginning and are subsequently dissolved if they are not necessary.

It should be considered that the response to an incident could be prolonged for an indeterminate number of days and even weeks. Fatigue can affect the decision-making process and/or response, so you should consider the possibility of relieving staff as required.

- Internal reporting mechanisms and activation of the Contingency Plan

For the port terminal, a general sequence was established to report and respond to an incident (Figure Num. 11.57) and an internal reporting procedure and activation of the contingency plan (Figure Num. 11.58).

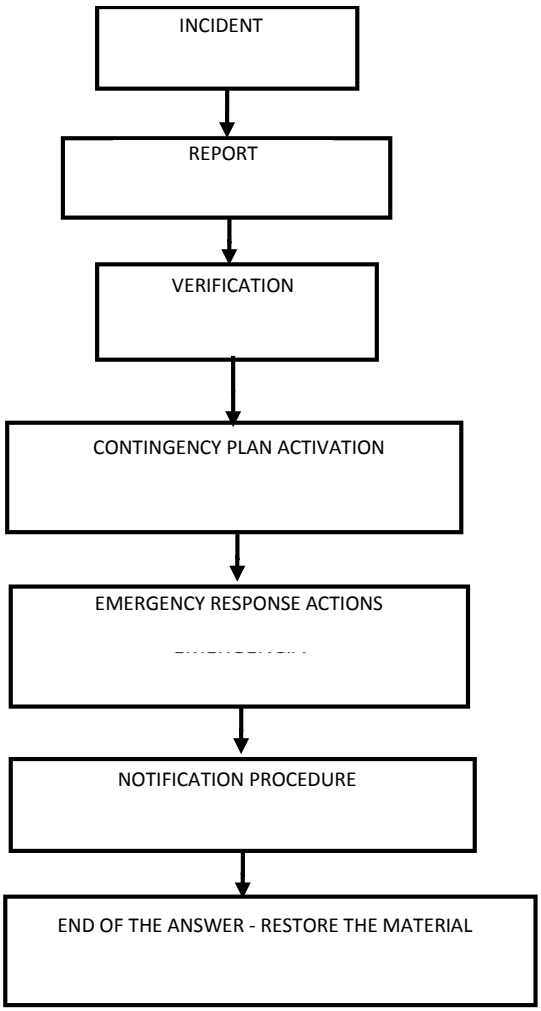


Figure Num. 11.14 General procedure for responding to an incident

Source: Araujo Ibarra & Asociados S.A., 2010[47]

[47] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental Impact Assessment for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

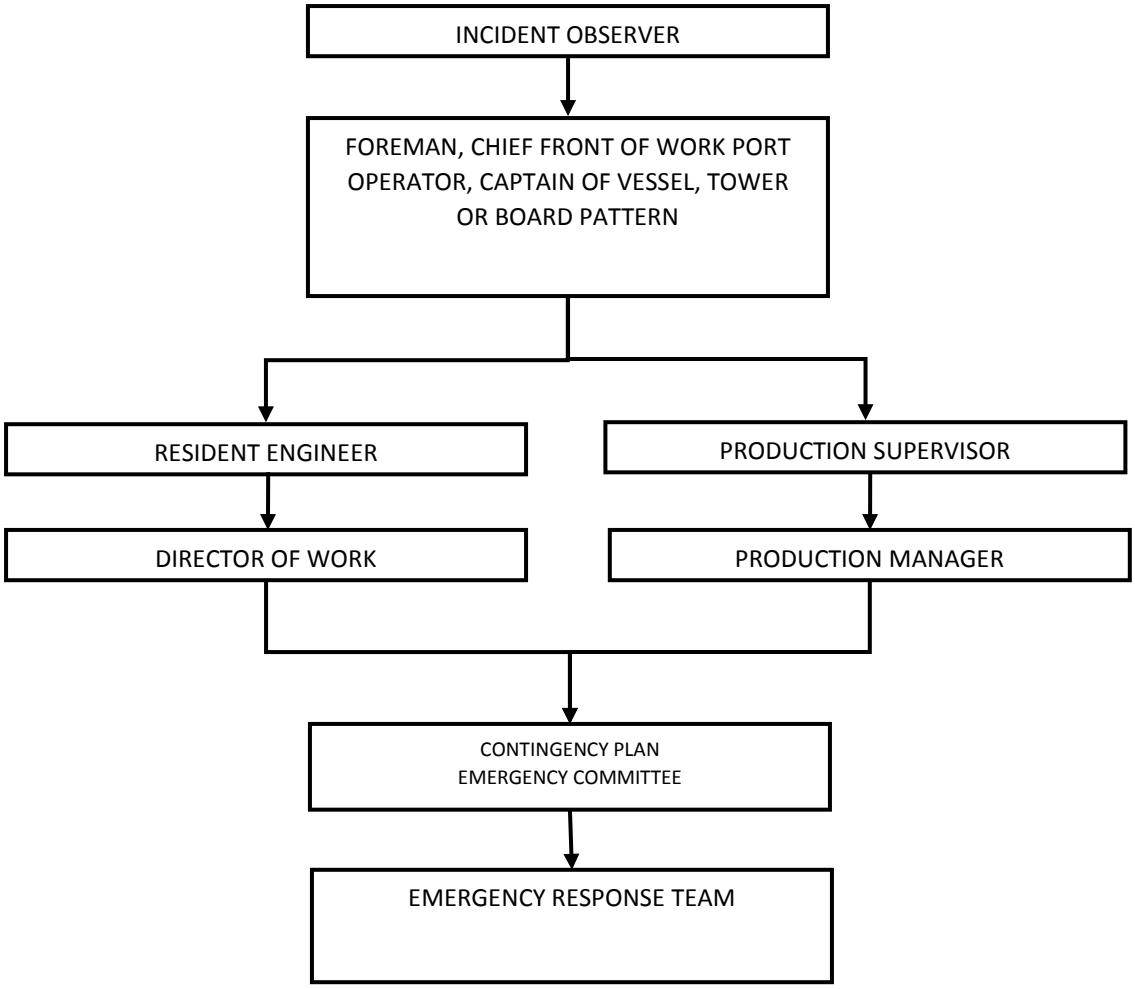


Figure Num. 11.15 General procedure for responding to an incident.
Source: Araujo Ibarra & Asociados S.A, ,2010

Information required to report an incident:

- Date and time of incident identification.
- Approximate location of the incident.
- Type of incident (personal injury, fire, explosion, spill, etc.).
- People involved, their physical condition.
- Vehicle, machinery, equipment, MV, tugboat, naval artifact or auxiliary vessel that suffered the incident.
- Steps taken to control the situation.
- direction and intensity of the wind.
- Level of the Lion River.

- State of the sea.
- Swell, currents, tide.
- Name and position of the informant.

- Mechanisms and activation of the National Contingency Plan

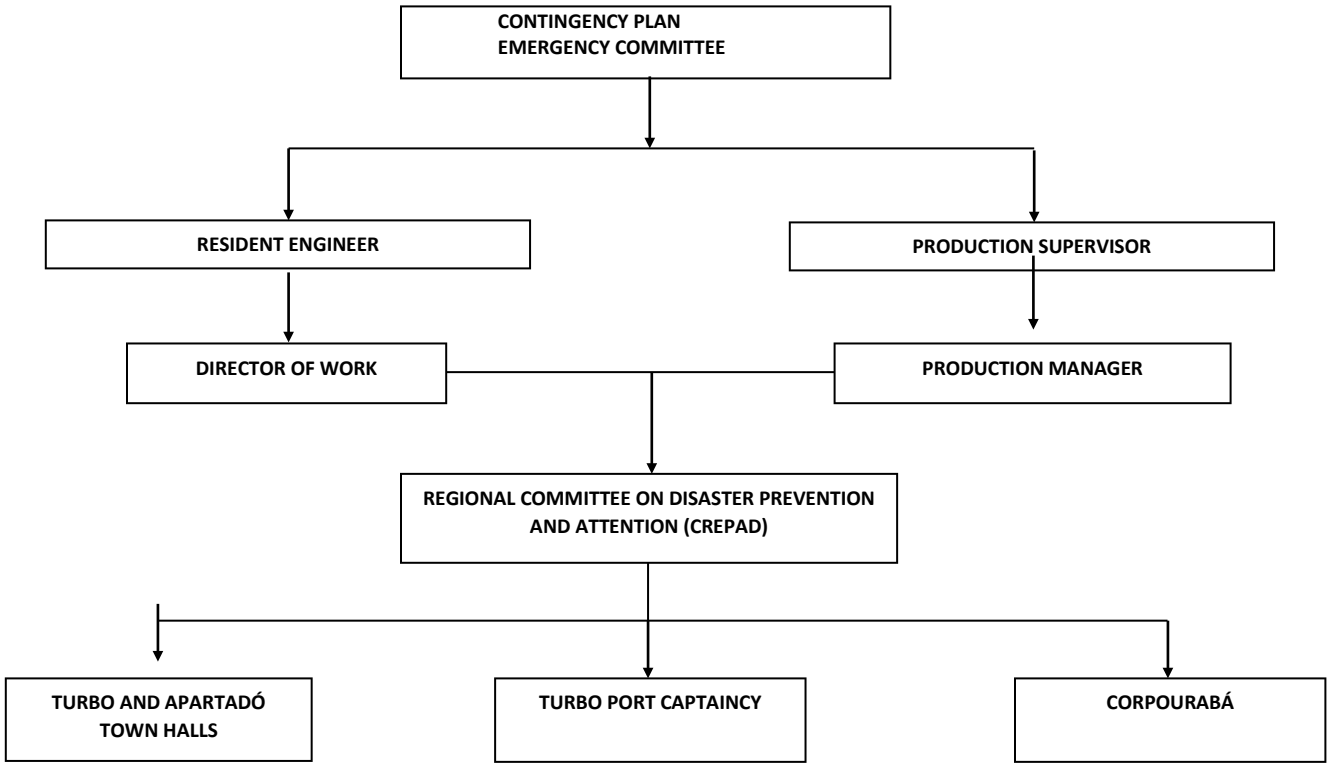


Figure Num. 11.16 Procedure for activating Level 2 of the National Contingency Plan (activation of the Local Committee for Disaster Prevention and Attention)
Source: Araujo Ibarra & Asociados S.A, ,2010

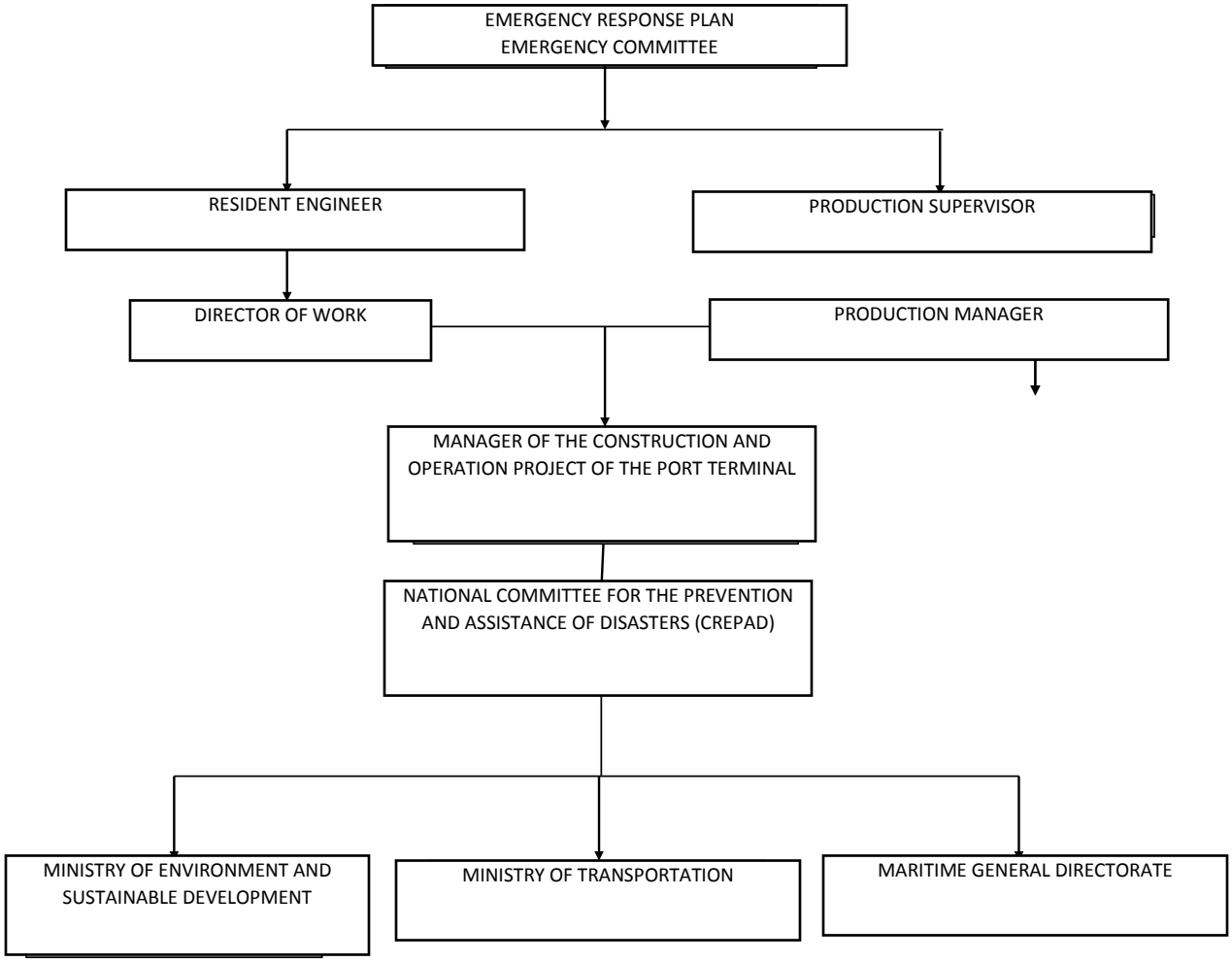


Figure Num. 11.17 Procedure of activation Level 3 of the National Committee of Prevention and Attention of Disasters
Source: Araujo Ibarra & Asociados S.A, ,2010

- Action plan for the control of the main emergencies that may arise

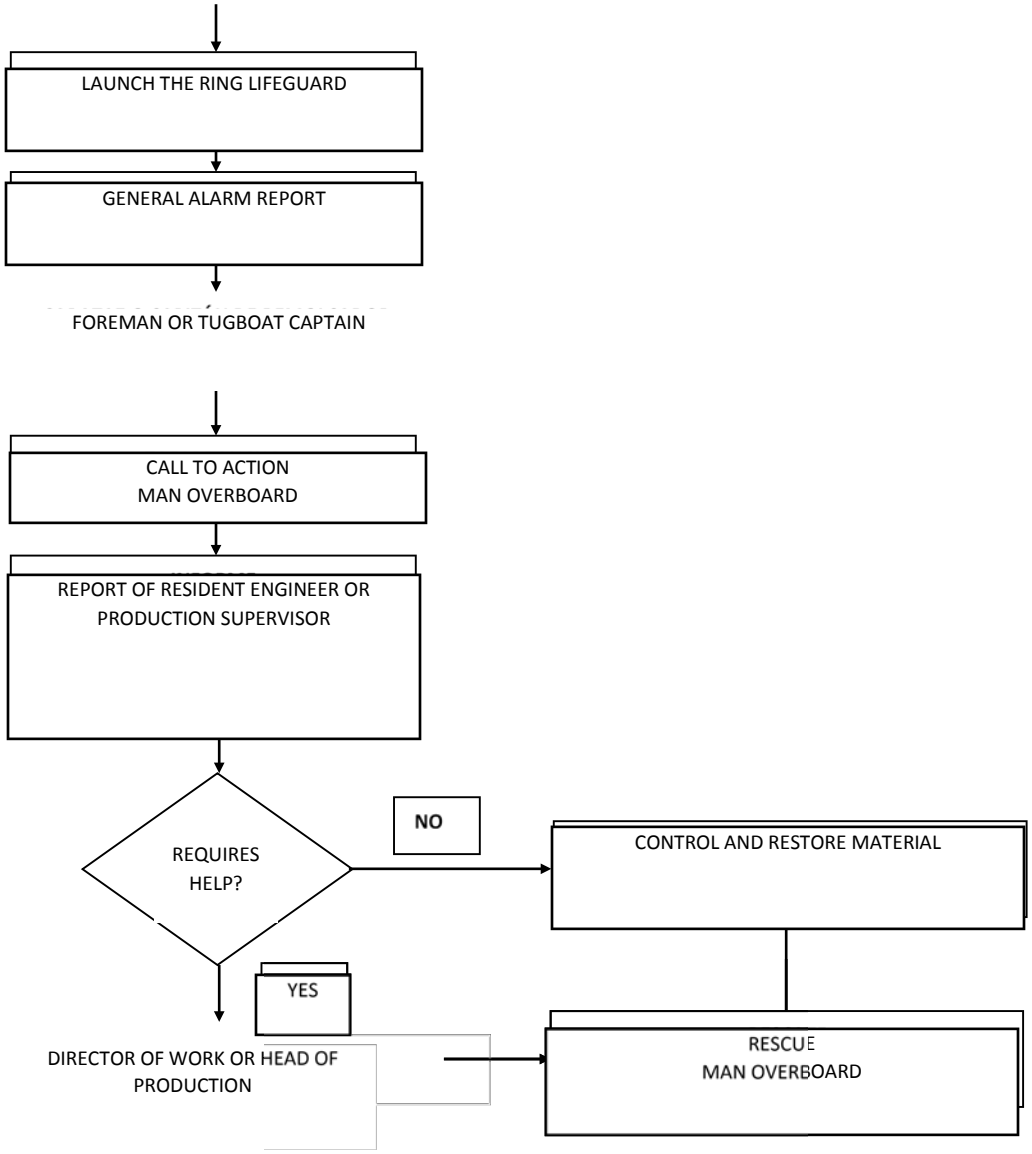


Figure Num. 11.18 Procedure to address the emergency "Man overboard"
Source: CORMAGDALENA, 2011 [48]

[48] CORMAGDALENA and NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p.

OBSERVER OF THE INJURED

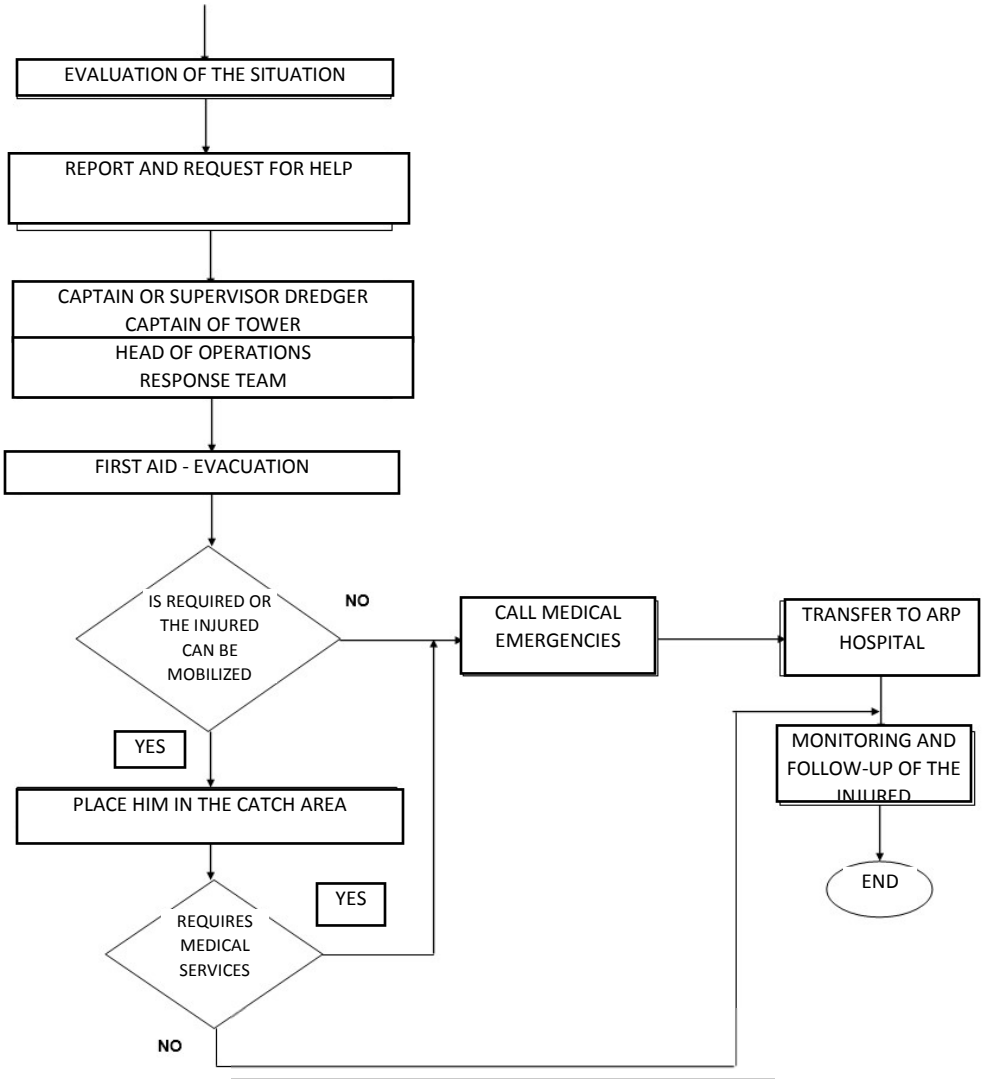


Figure Num. 11.19 Response procedure for the care and transport of injured
Source: Ibid[49]

[49] CORMAGDALENA and NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p.

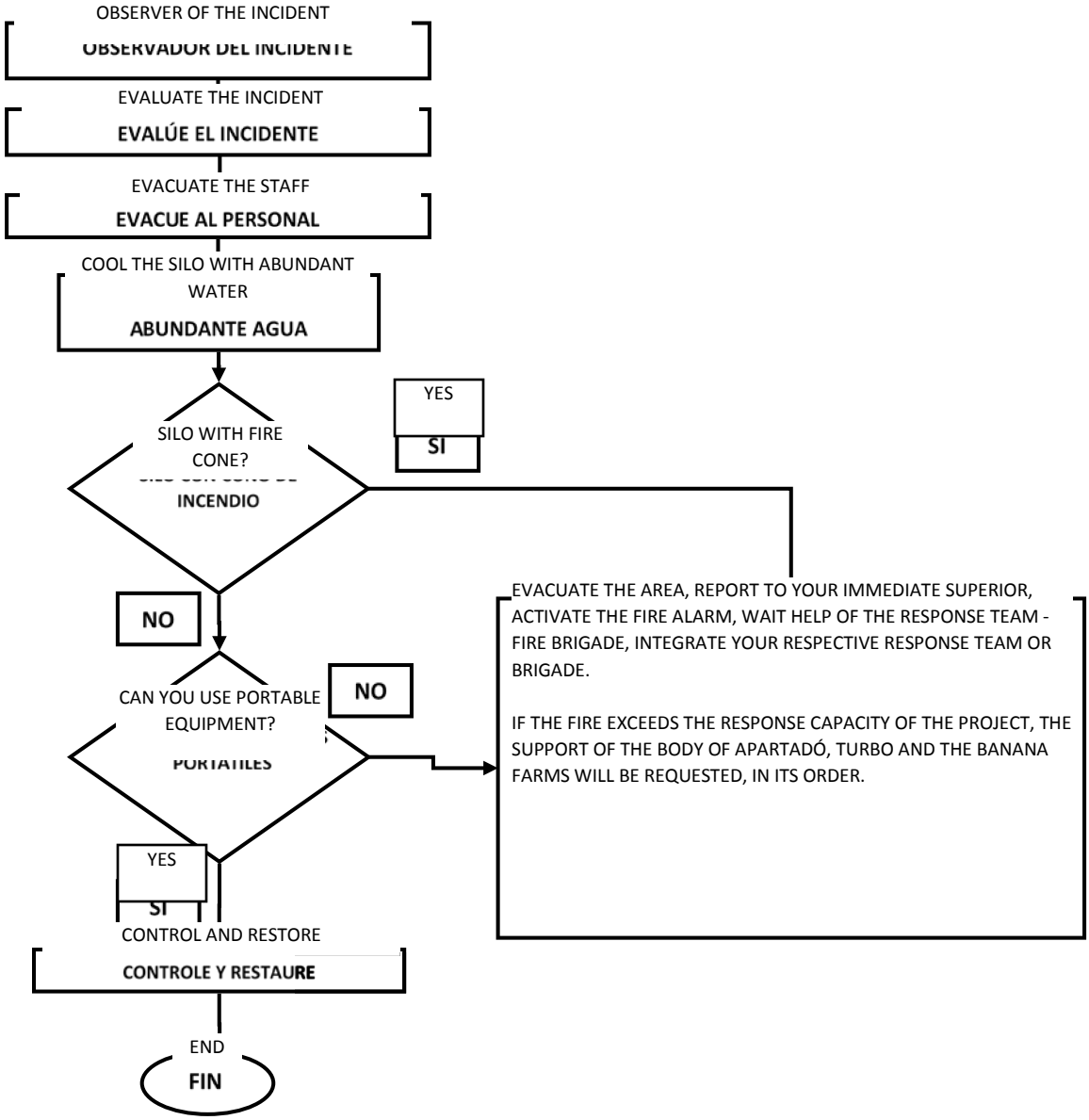


Figure Num. 11.20 Response procedure in case of heating or fire of a grain silo
Source: Source: Araujo Ibarra & Asociados S.A, ,2010[50]

[50] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

Note: The Project will appeal in the first instance to the Apartadó Fire Department, as it is closer to the Terminal facilities.

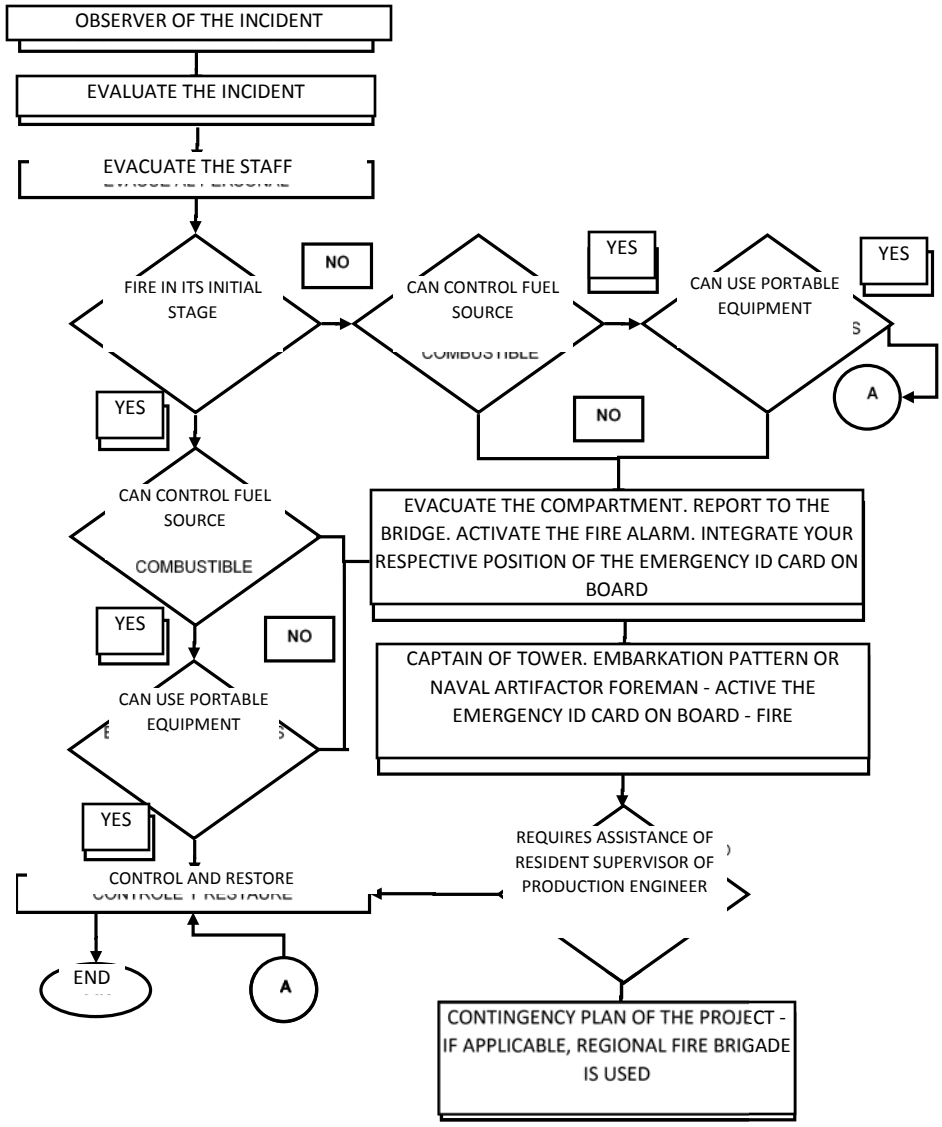


Figure Num. 11.21 Procedure to deal with the fire emergency on board a tugboat, naval device or auxiliary vessel at the service of the project
Source: Araujo Ibarra & Asociados S.A, ,2010[51]

[51] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

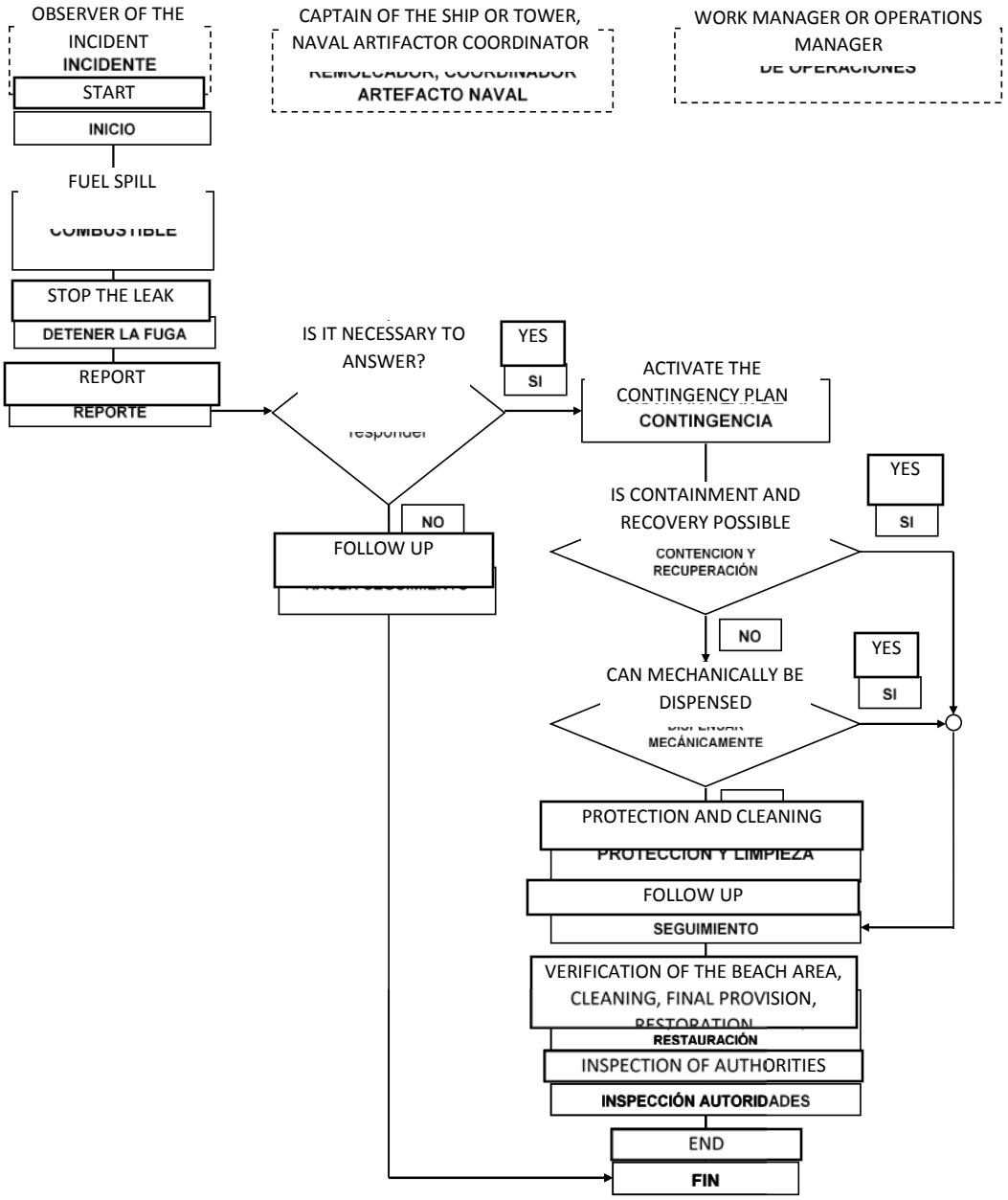


Figure Num. 11.22 Response procedure to a fuel spill to the river or the sea
Source: Araujo Ibarra & Asociados S.A., 2010[52]

[52] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

CAPTAIN OF TOWER
SHIP OR NAVAL ARTIFACT MASTER

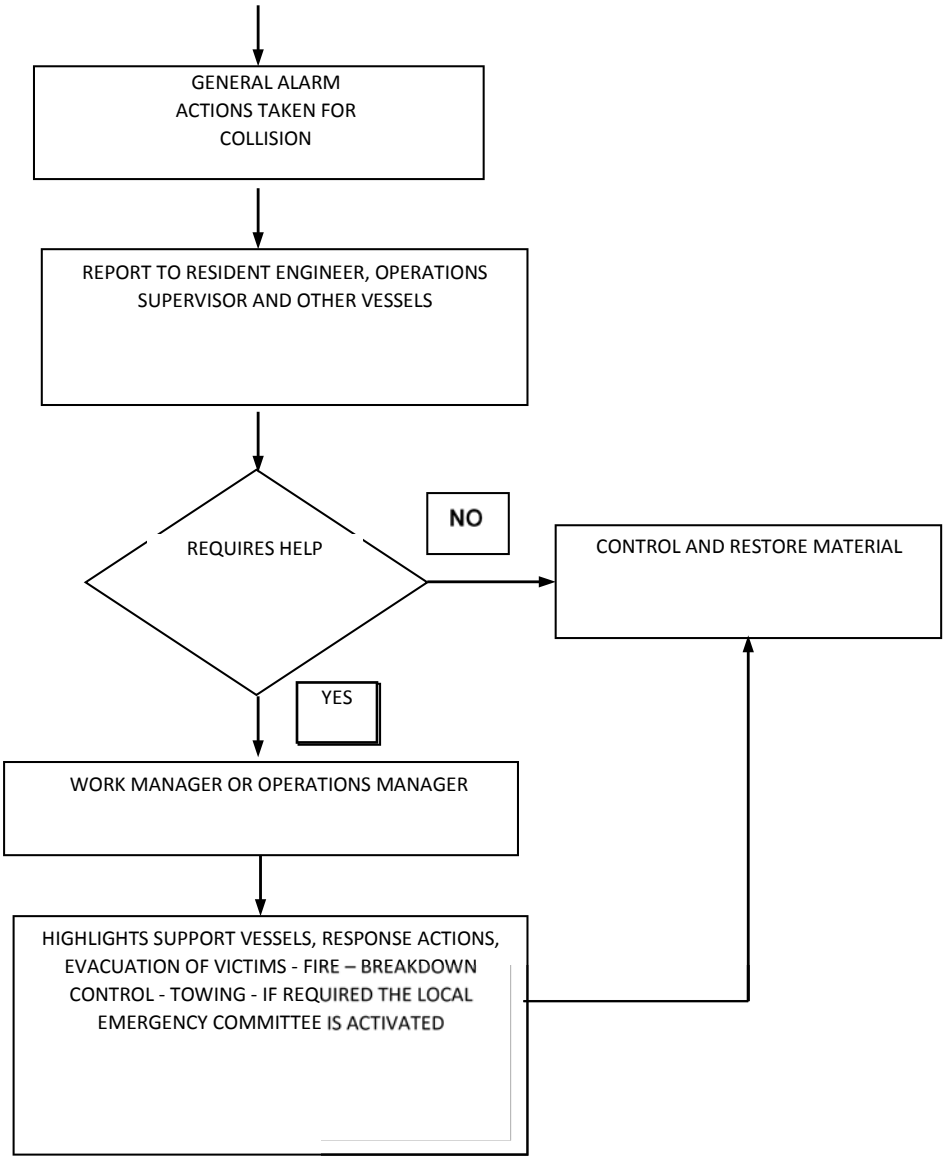


Figure Num. 11.23 Procedure to deal with the emergency "collision of vessels"
Source: Araujo Ibarra & Asociados S.A, ,2010[53]

[53] Ibid.

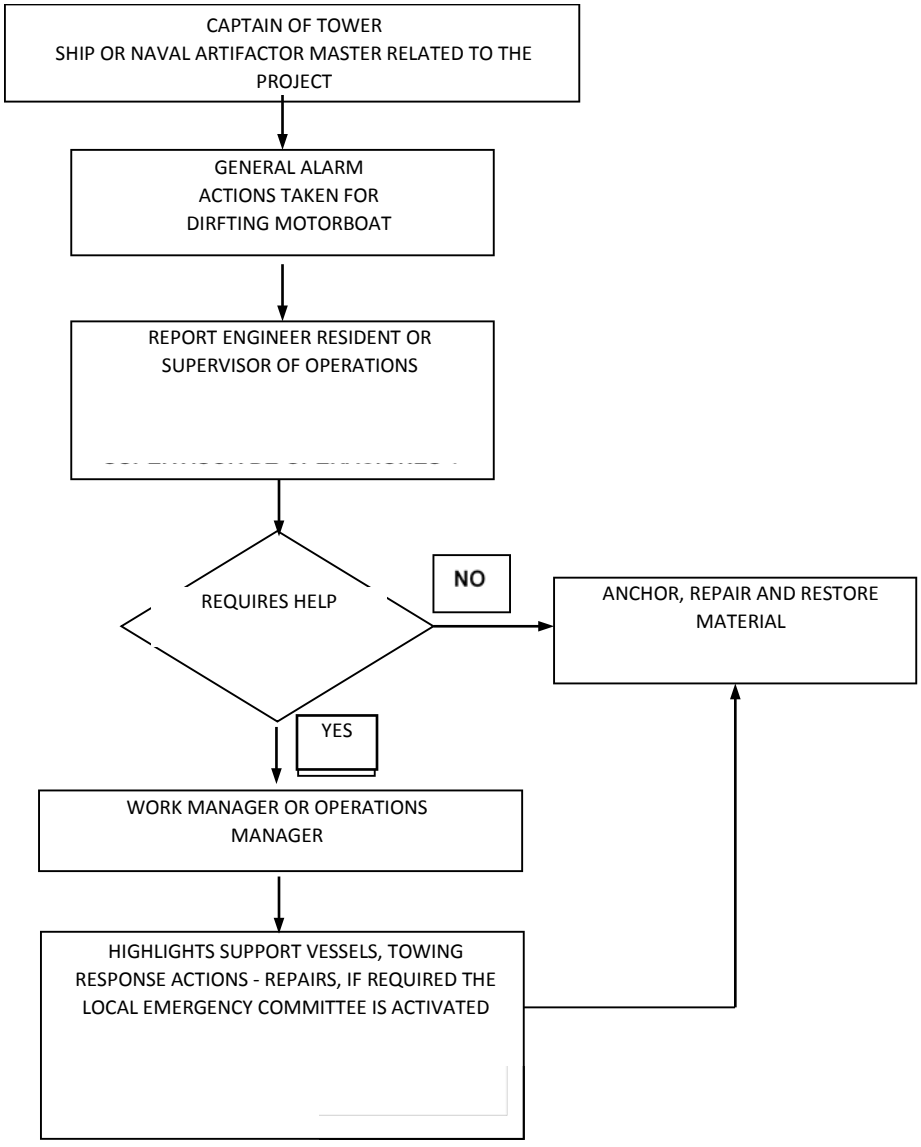


Figure Num. 11.24 Procedure to attend an emergency "vessel at service of the drifting project"
Source: Araujo Ibarra & Asociados S.A, ,2010[54]

[54] Ibid.

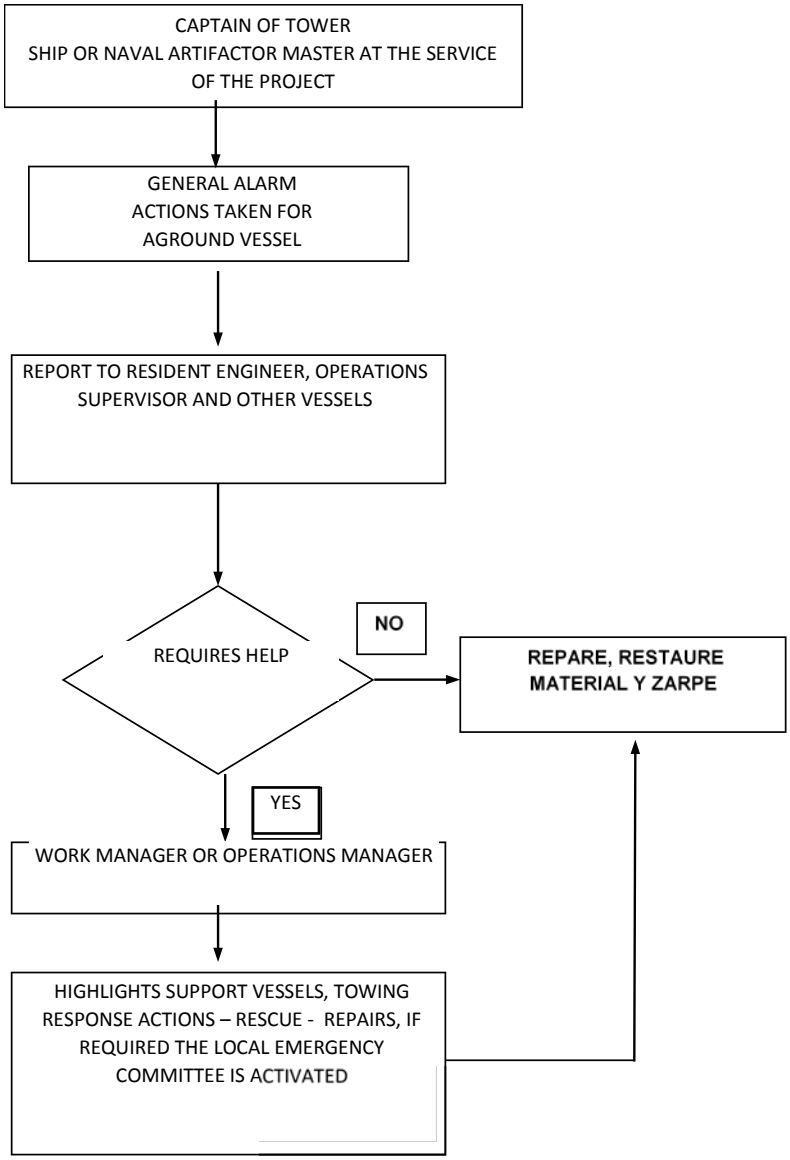


Figure Num. 11.25 Procedure to attend emergency "stranded from a boat to the service of the project"
Source: Araujo Ibarra & Asociados S.A, ,2010[55]

[55] Ibid.

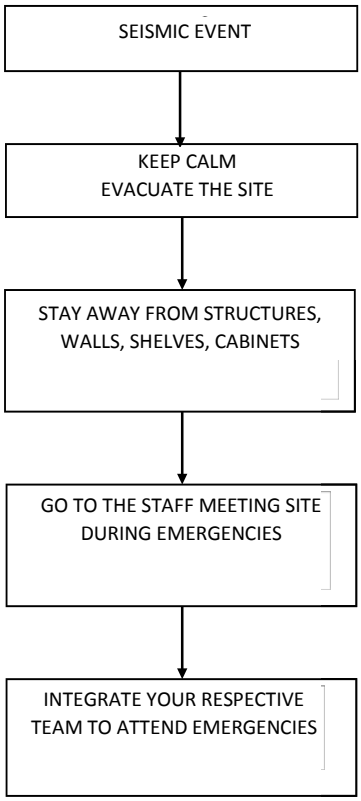


Figure Num. 11.26 Guide flow diagram to act during a seismic event
Source: Araujo Ibarra & Asociados S.A, ,2010[56]

- Press releases and customer service

The project, both in its construction and operation phase, will appoint a responsible person to speak with the media, which will be the only spokesperson of the Company on the scene, the other staff members who are at the scene of the incident will respond to the questions of the reporters referring to the spokesperson named responsible person.

For the attention to the public, the project will have a Complaints and Claims office, duly staffed with competent personnel for this work, where all project interactions will be received and attended to by non-staff.

[56] Ibid.

- Equipment and personnel available for the Contingency Plan

All workers, contractors, operators and crew serving the Project of Construction and operation of the Port Terminal, must be equipped with personal protection equipment and their emergency ID card where they clearly indicate their functions and put to occupy during the occurrence of an event.

Vehicles, machines, tugboats, naval devices and auxiliary vessels must be equipped with the fire and fault control equipment required by the competent authorities.

It will be the responsibility of the Resident Engineer, during the construction phase and the Production Supervisor, during the operational phase, to ensure that, in optimal conditions, the emergency control team guarantees a fuel spill, a fire, a road of water or any other emergency that occurs in the Project.

At the very least you should have:

- First aid kit.
- Emergency kit for control of fuel spills.
- Absorbing barriers.
- Absorbent material.
- Portable storage tanks.
- Emergency kit for damage control.
- Diesel and pneumatic pumps.
- Portable fire extinguishers made of chemical powder and foam.

Vehicles, machines, tugboats, naval devices and auxiliary vessels must be equipped with the fire and fault control equipment required by the competent authorities.

Evacuation Brigade:

In the different work or operation fronts, people will be appointed and trained as evacuation brigade members who will have the functions of preparing the evacuation, understanding as such the verification that the evacuation routes are clear, taking positions at strategic points of the routes of evacuation, etc. and direct the evacuation flow following the guidelines listed below:

- Driving and sweeping people towards the evacuation routes.
- On doors, controlling the speed of evacuation and preventing crowds.
- In accesses to stairs, controlling the flow of people.
- Preventing the use of elevators in case of fire.
- In exits to the outside, preventing the agglomerations of evacuated subjects near the doors.

– On board of naval devices, boats, motorboats or tugboats, verifying the signaling of the evacuation routes to the meeting points and guiding the crew personnel in case of an evacuation event.

The evacuation brigade member must also check the evacuation of their areas and check absences at the external meeting point once the evacuation has been carried out.

The number of people that make up the evacuation brigade can be very variable, because the components needed for sweeping work depend on the characteristics of the activity and the building, artifact, vessel or tugboat, occupation, number of plants, decks, compartments and surface thereof, etc. The profile of these people must be such that among other characteristics they have serenity and know how to infuse and transmit tranquility to others.

Next in the Figure Num. 11.52 A map with evacuation routes, meeting points and location of relevant infrastructure to respond to contingencies is shown.

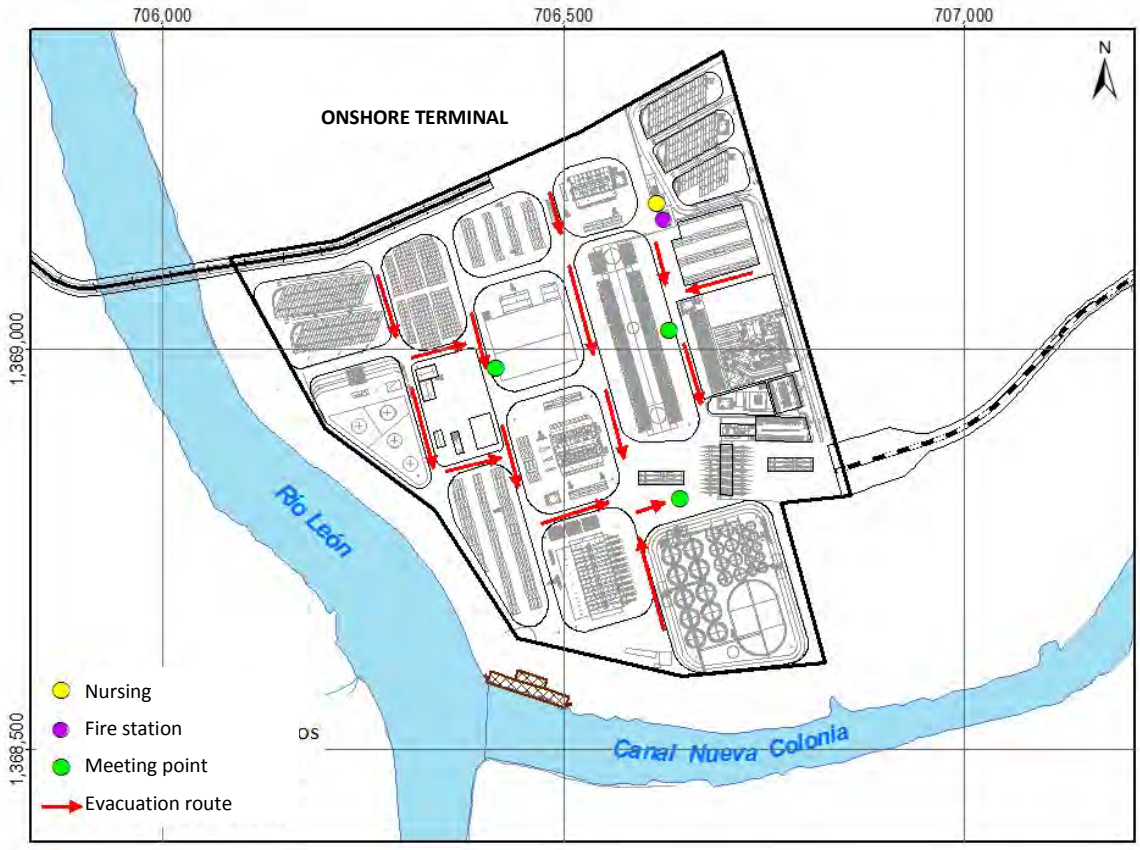


Figure Num. 11.27 Evacuation routes and meeting points
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Informative Plan of the Contingency Plan

In the Informative Plan of the Contingency Plan of the Construction and Operation Project, a Solid Bulk Port Terminal of the municipality of Turbo, the different formats for the administration of the emergency are presented, maintaining control over the response actions and communications with the personnel that make up the Response Group with its different brigades, the authorities, the external support entities and the affected community.

In the same way in the project will maintain the plans, navigation charts and other publications that allow to have the appropriate information to better cope with an emergency.

Observer report of an incident:

The Construction Manager during the construction phase or the Production Manager during the operational phase of the terminal, require a concise and accurate information of the observed event, in order to evaluate the incident and make the most effective and timely response decisions. it is requested to report as much as possible of the following information:

Table Num. 11.8 Initial report format of spill National Contingency Plan - PNC

FORMAT Nº 1

INITIAL SPILL REPORT
ENTITY OR COMPANY RESPONSIBLE FOR SPILL ATTENTION: _____
ECONOMIC ACTIVITY: _____
OFFICER RESPONSIBLE FOR THE REPORT: _____
PHONE: _____ FAX: _____
SPILL DETECTION DATE: HOUR: _____ DAY: _____ MONTH: _____ YEAR: _____
NAME PERSON WHO DETECTED SPILL: _____
ORIGIN OF SPILL (Source of spill, if determined): _____
LOCATION: (Department, Municipality, Town):
_____
REVIEW OF THE AFFECTED AREA: (Draw up a diagram of the site of the spill, affected area and area of influence)
_____
NAME OF SPILLED PRODUCT: _____
UNITED NATIONS CODE (If available): _____ DATA SAFETY DATA SHEET (If available): _____
(If not available) _____
PHYSICAL EVIDENCE OF SPILLED PRODUCT: _____
_____
CHARACTERIZATION OF THE SPILLED PRODUCT: TOXIC_____ CARCINOGENIC
_____
MUTAGENIC _____ TERATOGENIC _____
ESTIMATED AMOUNT OF SPILL: _____Bbls _____Tons
IDENTIFICATION OF CAUSES: DEFINED _____ TO DEFINE _____ NOT DEFINED _____
IS THERE ANYONE HANDLING THE SPILL? YES: _____ NO: _____
AFFECTATION OF NATURAL RESOURCES - LANDS - FACILITIES: _____
_____
_____
_____
_____
AFFECTATION OF COMMUNITIES: _____
_____
_____
ACTIONS TAKEN: _____
_____
EMERGENCY HAZARDS (Fire-Explosion, Other): _____
_____
SPILL DISPLACEMENT: _____
_____
_____
_____
REQUIRED SUPPORT: _____
_____
OBSERVATIONS: _____
_____

Source: CORMAGDALENA, 2011[57]

[57] Ibid.

Table Num. 11.9 Initial report format of the observer of an incident or accident

Item	Aspect	Information
1	Observer's name	
2	Job	
3	Date and time the incident occurred or was discovered	
4	Specific location of the incident: - On land - At sea	
5	Type of incident: - Work accident - Disease - Explosion - Fire - Fuel spill - Accident with hazardous materials - Maritime disaster: Dredge Tug Barge Auxiliary Vessel Ship or vessel in transit through the canal	
6	Name and role of the people involved or affected by the incident	
7	State of the people involved in the incident	
8	Affectation to third parties	
9	Substance or material spilled and (or) released: - Name of the substance or material - Establish if it is dangerous - Type of container - Source of spilled material - Cause of the release - Total unloaded amount - Material released to the air, soil, sea - Amount spilled in the water	
10	Weather conditions: - Weather - Wind direction and intensity - Cloudiness - Solar radiation	
11	Oceanographic conditions: - Sea conditions - Currents - Tide - Floating bodies	
12	First response actions developed	

Source: CORMAGDALENA, 2011[58], Adapted by Aqua and Terra Consultores Asociados S.A.S

[58] CORMAGDALENA y NATIONAL UNIVERSITY OF COLOMBIA. Environmental management plan for maintenance dredging of the navigable channel of the Magdalena River, Puerto Salgar - Puerto Berrio sector. Report CM-038-09-075 Version One. Bogotá D.C., 2011. 199 p.

Table Num. 11.10 Activity record sheet

Title of the emergency: _____ Date: _____ Page ____ of ____ Pages	
Time	Activity summary

Source: Ibid.

Table Num. 11.11 Incident response worksheet

information	Action	Feedback
IDENTIFY 1. Information about the incident date and time location - type of incident number of accident victims - status of accident victims - affected goods product spilled or released 2. Evaluation of the incident - safety - injuries and deaths - what is in danger - environmental impacts 3. Special concerns - meteorological/oceanographic conditions and considerations - floating bodies - areas in danger 4. Decisions - responsiveness and actions		
SITES TO PROTECT 1.Precautions - there is availability of adequate personal protection equipment 2. Decision making for protection action - isolate the area - control the source - evacuation, shelter - protective actions outside the dredging area		
ALERT 1. Responsive defensive actions - sound alarms - provide instructions - alert San Jose traffic control station and ships in transit 2. Offensive response actions - activate mutual port terminals aid plan - APELL - activate local support entities, firefighters, red cross		
COMMUNICATE 1. Initial notifications - personnel in imminent danger - required internal notifications - required external notifications 2. Follow-up actions - additional help needed - update of the situation - evaluation of the response - action and aspects open to criticism of the actions - schedule the next meeting of the emergency committee.		

Source: CORMAGDALENA, 2011[59], Adapted by Aqua and Terra Consultores Asociados S.A.S (2015)

Table No. 11.52 Check list local notifications

[59]Ibid.

Nº	NOTIFICATION	Hour	TEL	FAX	SENT	RECEIVED	OBSERVATIONS
1	TURBO MATORALITIES AND SECTION *						
2	HARBOR CAPTAINCY OF TURBO						
3	TURBO COAST GUARD STATION						
4	CORPORTATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ (CorporUrabá)						
5	LOCAL COMMITTEES FOR DISASTER ATTENTION. TURBO AND APARTADÓ.						
6	REGIONAL COMMITTEE ATTENTION OF DISASTERS. CAREPA.						
7	ARL (ACCIDENT REPORT)						
8	SECRETARIES OF HEALTH TURBO AND APARTADÓ						

Source: Araujo Ibarra & Asociados S.A, ,2010[60].

[60] PUERTO BAHÍA COLOMBIA DE URABÁ S.A. and ARAÚJO IBARRA & ASOCIADOS S.A. Environmental impact study for the construction and operation of a port terminal of solid bulk. Turbo. 2010. 428 p.

Table No. 11.53 Work accident report guide format

EMPLOYER IDENTIFICATION

Business name_____ NIT_____

Address_____ Municipality_____

Tel_____ Department _____

WORKER INFORMATION THAT ACCIDENTS

Last name and name_____Edad_____

Sex_____ Health entity to which you are affiliated _____

_____ Birthdate _____

ID_____from_____Address_____City_____

Telephone_____ Salary_____ Occupation _____ Seniority in the company ____ In charge at the time of the accident_____

INFORMATION ABOUT THE ACCIDENT OCCURRENCE

Date_____ Time of the accident _____ Day of the week in which the accident occurred (M, TUES, W, THU, F, SAT, SUN)

He was doing his usual work at the time of the accident YES___ NO ___ Which? _____

How many hours of work went by before the accident_____?

Working Day: Day Morning _____ Daytime Afternoon _____ Nocturnal _____

Accident Class: Physical___ Mechanic____ Chemical___ Other_____

Description of the accident: (What, When, Where, How and Why) _____

_____

_____

_____

IPS who attended _____ date of initial IPS care_____

Injury or injury to the worker_____

Parts of the body apparently affected _____ (See instructions)

PLACE WHERE THE ACCIDENT HAPPENED

1.Inside the work on the ground

Offices _____

Workshops _____

Construction areas _____

Others _____

2. Marine front

Aboard: _____

6. WHAT THE WORKER INJURED WITH

_____

_____

_____

7.PERSONS RESPONSIBLE FOR THE REPORT

Name and Last Name _____Position_____

Date of preparation of the report _____

Source: Ibid.

Table No. 11.54 Public information checklist

LOCATION:
_____
_____
_____

TIME OF THE INCIDENT: _____ DATE OF THE INCIDENT: _____

TYPE OF INCIDENT:
_____
_____

MEASURES THAT THE CONSTRUCTION AND OPERATION PROJECT HAS TAKEN A SOLID BULK PORT TERMINAL OF THE MUNICIPALITY OF TURBO, TO REFRIGERATE, CONTROL OR MANAGE THE INCIDENT:
_____
_____
_____

PERSONNEL OF THE CONSTRUCTION AND OPERATION PROJECT A SOLID BULK PORT TERMINAL OF THE MUNICIPALITY OF TURBO THAT ACCOMPANIES THE EMERGENCY RESPONSE BY THE PROJECT:
_____
_____
_____

CURRENT CLASSIFICATION OF THE EMERGENCY. INITIALLY, YOU MAY NOT KNOW THE TOTAL IMPACT OF THE INCIDENT. EXPLAIN THAT PEOPLE WILL BE PLACED ON NOTICE ALWAYS AND WHEN CLASSIFICATION IS CHANGED DUE TO NEW INFORMATION:
_____
_____
_____

AUTHORITIES TO WHOM THEY HAVE BEEN INFORMED: _____
_____

NOTE: ONLY THE PROJECT MANAGER DURING THE CONSTRUCTION OF THE TERMINAL OR THE TERMINAL MANAGER DURING THE OPERATING PHASE, OR ITS AUTHORIZED SPOKESMAN DELEGATES WILL BE ABLE TO TALK TO THE AUTHORITIES, THE MEANS OR PROVIDE INFORMATION OF THE INCIDENT TO THE COMMUNITY.
IF YOU ARE NOT AUTHORIZED AND ASKED, IN A POLITE WAY, INDICATE WHERE THE OFFICE OF INFORMATION IS, WHERE YOU WILL BE PROVIDED WITH THE INFORMATION YOU REQUIRE.

Source: Ibid.

Table No. 11.55 Incident status

INCIDENT'S NAME_____ DATE: / / TIME:_____

EMERGENCY CLASSIFICATION	DATE	TIME	EVENT DESCRIPTION:
LEVEL 0 INTERNAL			
LEVEL 1 LOCAL			
LEVEL 2 REGIONAL			
LEVEL 3 NATIONAL			

FORECAST	DATE	TIME	EMERGENCY ACTIONS TO BE PEFORMED
STABLE			NOTIFICATIONS:
INTENSIFYING			FIREFIGHTERS: _____
INTENSITY DECREASES			COASTGUARDS: _____
IT IS ABOUT TO BE OVER			REPLY CONTRACTORS: _____

PROTECTION ACTIONS	DATE	TIME	OPERATIONS:
AT THE WORKPLACE			
EVACUATION			METEOROLOGICAL DATA:
SHELTER			WEATHER: : WIND: DIRECTION:
PERSONAL PROTECTION EQUIPMENT			TEMPERATURE: CLOUDINESS: SOLAR
			24 HOURS FORECAST:
OUT OF THE WORKPLACE:			TYPE OF STABILITY:
EVACUATION			OCEANOGRAPHIC DATA:
SHELTER			SEA STATUS: STREAMS: TIDE:
SURVEILLANCE			24 HOURS FORECAST:
			TYPE OF STABILITY:
PLANNING OF EMERGENCY ZONE			
			HYDROLOGICAL DATA: LEON RIVER LEVEL:
AFFECTED AREA			STREAMS: FENCES:
DISTANCE			

Source: Ibid.

Table No. 11.56 Model format for application of equipment and materials

FORMAT Nº 2

MODEL FORMAT REQUEST FOR EQUIPMENT AND MATERIALS

Buenaventura, (date) **Hour: _____**

FOR: (Manager, Support Entity Director)

REFERENCE: Personal request and incident response team of (event type).

In order to strengthen the Response Team of the Contingency Plan for the Construction and Operation Project of a Solid Bulk Port Terminal in the municipality of Turbo, we request you to provide us with our responsibility and costing, the following personnel, equipment and material of response:

- Staff: (Required proficiency level __ Response Brigade _____, Advisor, etc.)
- Equipment:
  - ✓ Type of equipment with technical specifications
  - ✓ Specify if you are required to provide your operator
  - ✓ Quantity
  - ✓ Power source
  - ✓ Other specifications: (Type of transport to move it, etc.).
- Material:
  - ✓ Technical specifications
  - ✓ Kind
  - ✓ Quantity, etc.

NOTE:

It must be specified:

Approximate time of use (days)

- Type of transport and coordination actions to facilitate the transfer of the requested to the reception site of external assistance in response to the emergency
- Name, position, telephone number or means of contact

Source: National Plan against spills of hydrocarbons, derivatives and harmful substances [61]

[61] COLOMBIA. MINISTRY OF INTERIOR. Decree 321 (February 17, 1999). By which the National Contingency Plan is adopted against spills of Hydrocarbons, Derivatives and Harmful Substances. Bogotá, D.C., 1999. 7 p.

Table No. 11.57 Model of delivery and receipt of equipment and material

EQUIPMENT	RECEIVED		RETURNED		CLASS
	QUANTITY	STATE	QUANTITY	STATE	
MATERIALS					

DISPATCHED ENTITY LENDER	RECEIVED SCENE DIRECTOR CONTINGENCY	RETURNED SCENE DIRECTOR CONTINGENCY	RECEIVED ENTITY LENDER
PLACE: DATE: HOUR:	PLACE: DATE: HOUR:	PLACE: DATE: HOUR:	PLACE: DATE: HOUR:

OBSERVATIONS:

_____

_____

_____

____

Source: National Plan against spills of hydrocarbons, derivatives and harmful substances [62]

[62] Ibid

Checklists of members of the Emergency Response Group:

Check lists of each of the tasks or objectives of the administrators and Heads of the Emergency Response Group should be prepared to keep track of their compliance. These lists will facilitate the relays of personnel in the delivery of the functions to another member of the organization so that it finds out about the situation.

- Project staff directory
- Telephone directory PNC authorities (regional and local) and support entities.
- Telephone directory medical centers
- Phone directory of tug and salvage companies
- Telephone directory of response companies and equipment suppliers

1.1.1 Dismantling and Abandonment Plan

The National Agency of Infrastructure - ANI, is the entity responsible for granting port concessions. Said agency defines within its contracts that: "the obligation of the concessionaire to assign free and in good state of maintenance and operation, at the end of the concession contract or to be declared the expiration, to the Nation, all the constructions and real estate by destination that are usually installed in the area of public use object of the concession "[63]

According to the above, the Dismantling and abandonment Plan of the area includes two main scenarios:

a. Once the construction phase of the Port is completed and,
b. The culmination of the port concession

For these scenarios, efficient and environmentally safe administrative measures are established, so that the dismantling and abandonment of the construction process is carried out in an appropriate manner, controlling risks and preventing damage to natural and human resources.

In order to comply with this plan, an initial evaluation of the infrastructure must be carried out, which must be removed from the area once the different phases of the project have been completed.

Additionally, and taking into account the analysis presented in Chapter 8 - Impact Evaluation - in its separate analysis of cumulative and synergistic impacts for each

[63] MINISTRY OF TRANSPORTATION, Decree 4735 of December 2, 2009. "By means of which the procedure for requesting concessions for the development of port activities, provided for in Law 1 of 1991 and Law 1242 of 2008, is regulated"

component, it is presented in chapter 11.1.1 Environmental Management Program and 11.1.2 Monitoring and Monitoring Plans, the proposed indicators to track the impacts. Likewise, the follow-up plan to the trend of the environment, will allow to identify the results reached by the management plan and the changes generated in each one of the environments.

The dismantling and abandonment programs are then proposed for the phases defined above, however, it is important to mention that prior to the implementation of these programs it is necessary to make a diagnosis about the existence of environmental liabilities that allow an inventory of prioritized environmental liabilities, and based on the above, make decisions about their management.

DECOMMISSIONING AND ABANDONMENT PLAN			**PDA – 01**
TEMPORARY FACILITIES DISMANTLING PROGRAM			
JUSTIFICATION			
The constructive activities of any project have a significant impact on the different media. Once these activities are completed, it is necessary to take measures focused on reducing the effects of these activities on the environment.			
OBJECTIVES	Minimize the environmental impacts generated by the dismantling of the temporary facilities used during the construction process of the port terminal.		
GOALS	Execute 100% of the proposed measures.		
IMPACT	**ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT**	**ACTIVITY**	**ENVIRONMENTAL ELEMENT AFFECTED**
Alteration of air quality by gases and particulate matter	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Alteration of noise levels	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Modification in the structure (distribution, abundance and composition) of the peripheral communities.	Moderate	Demolition and Dismantling of temporary infrastructure	Fauna and Flora
Generation of expectations in the community	Moderate	Demolition and Dismantling of temporary infrastructure	Political - organizational
APPLICATION STAGE			
Previous activities		**Operation**	
Construction		**Dismantling**	**X**
TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
	X	X	
ACTIONS TO BE DEVELOPED			
Once the construction of the project is completed, the Contractor responsible for the project must lift the work camp, remove the temporary structures built, as well as all the remaining materials, tools, equipment and signage installed and proceed to move them outside the Port facilities. Similarly, you must remove the non-hazardous, hazardous and special waste generated during the process, making sure that the constructed area			

is completely clean.

- Recover the areas of camps and storage of temporary infrastructure that must be removed and that will not be used during the operation of the port.
- For sites where fuel storage has been carried out during the construction phase, the guidelines stipulated in the environmental management plan must be complied with.
- All solid waste, after classification, will be treated and disposed according to the provisions of the WFP solid waste management plan
- In case demolitions are carried out, the waste coming from these must be disposed of in the areas authorized and managed according to the provisions of the EMP.
- For the areas that are not going to be destined for patios, revegetation and trimming activities will be carried out. These activities will be carried out where the camps and collection areas were located (except for areas with cement).
- Prior to the dismantling of the infrastructure of temporary facilities necessary for the construction of the Port, informative meetings will be held with the communities and authorities of the area of influence in order to inform the completion of the works and the start of the operation of the port. This action will be developed in accordance with the stipulations of the PS-02 Community Information and Participation Program.

ESTIMATED SCHEDULE
Once the construction phase of the project is finished
PLACE OF APPLICATION
Work fronts and camp areas
RESPONSIBLE FOR THE EXECUTION
Contractor
REQUIRED STAFF
Environmental Chief, SISO Professional

MONITORING AND MONITORING INDICATORS

GOALS	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTER
MONITORING AND MONITORING INDICATORS	100%	Number of activities performed / Number of scheduled activities	Contractor	Records of compliance of the auditing.
Proper disposal of 100% of the waste generated.	100%	(Volume of waste properly disposed (solids or liquids) / Volume of waste generated) * 100		Minutes of companies providing the waste disposal service

QUANTIFICATION AND COSTS
Included in the Contractor's work contract

DECOMMISSIONING AND ABANDONMENT PLAN			PDA - 02
PORT FACILITIES DISMANTLING PROGRAM			
JUSTIFICATION			
Once the useful life of the project is completed, an abandonment plan is proposed, designing an information program for the communities and authorities in the area of influence, which seeks to leave the area under the best possible conditions and in accordance with the land use defined in your moment			
OBJECTIVES	Minimize the environmental impacts generated by the dismantling of the temporary facilities used during the construction process of the port terminal.		
GOALS	Execute 100% of the proposed measures. Leave the zone used according to the defined land use.		
IMPACT	**ENVIRONMENTAL**	**ACTIVITY**	**ENVIRONME**

	SIGNIFICANCE OF THE IMPACT		NTAL ELEMENT AFFECTED
Alteration of air quality by gases and particulate matter	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Alteration of noise levels	Moderate	Demolition and Dismantling of temporary infrastructure	Air
Modification in the structure (distribution, abundance and composition) of the peripheral communities.	Moderate	Demolition and Dismantling of temporary infrastructure	Fauna and Flora
Generation of expectations in the community	Moderate	Demolition and Dismantling of temporary infrastructure	Political - organizational

APPLICATION STAGE			
Previous activities		**Operation**	
Construction		**Dismantling**	**X**

TYPE OF MEASURE			
PREVENTION	**MITIGATION**	**CORRECTION**	**COMPENSATION**
	X	**X**	

ACTIONS TO BE DEVELOPED

The deployment of management measures for the dismantling of port facilities is a complex task because of concession terms and contracts

The term of the concession contract, on which a reversal process initiated by any of the parties, State or Concessionaire, could apply before the term established for the concession.

Generally, the state grants an extension of the contract, requesting the concessionaire to improve the infrastructure and equipment according to the technological progress and strengthening the country's port capacity.

Additionally, according to the current regulations (Law 1 of 1991 and its regulatory decrees), the works built by the Concessionaire in areas of public land space (strip of 50 meters wide from the line of maximum tide) and in the marine area (the viaducts and the main wharf) become the property of the Nation through the process of reversion of the concession.

In this context, designing measures for the dismantling and abandonment of port facilities does not make sense, since the Concessionaire cannot act on the elements built in the concession area because they are owned by the Nation; the elements belonging to the port facilities in the land area that are privately owned can be dismantled or not, according to their owner and whenever they affect the environmental conditions of the area.

The measures adopted for the dismantling and regarding the finalization or extension of the concession contract must be informed to the communities and authorities of the area of influence.

However, it is important that once the useful life of the project is completed, environmental liability analysis or due diligence studies are carried out in case the project passes a new owner. And from these studies it would

be possible to determine the best measures for the dismantling and abandonment of the infrastructure in accordance with the environmental conditions, dynamics of the region and current regulations
EXECUTION SCHEDULE
Once the project's useful life has ended
PLACE OF APPLICATION
Project area and area of influence
RESPONSIBLE FOR THE EXECUTION
Port of Urabá
REQUIRED STAFF
Environmental Chief, SISO Professional
MONITORING INDICATORS

GOAL	VALUE	INDICATOR	RESPONSIBLE	TYPE OF REGISTER
Execute 100% of the proposed measures	100%	Number of activities performed / Number of programmed activities.	Puerto Bahía de Urabá	Acts of compliance

QUANTIFICATION AND COSTS
Included in the port's social management plan

1.2 OTHER PLANS AND PROGRAMS

1.2.1 1% Investment Plan

During the construction and operation stages of the PUERTO BAHÍA COLOMBIA DE URABÁ project, it is required to capture surface water on the Leon River, for the development of industrial and domestic activities, for which the SOCIEDAD PORTUARIA PUERTO BAHIA COLOMBIA DE URABA SA, before PUERTO BAHÍA COLOMBIA DE URABÁ SA Company, in this chapter presents the 1% Environmental Investment Plan, in order to comply with the provisions of Resolution number 0032 of January 25, 2012 "By means of which it is granted the environmental license[64]" and with what is defined in article 4 of Decree 1900 of June 12, 2006[65], which regulates the paragraph of article 43 of Law 99 of 1993[66], in relation to this program.

In accordance with the regulatory decree in question, the cost of the investment that must be made has been calculated, and based on the characterization of the project area, the

[64] COLOMBIA. NATIONAL AUTHORITY OF ENVIRONMENTAL LICENSES - ANLA. Resolution 0032 (January 25, 2012). By means of which an environmental license is granted. Bogotá, D.C. 135 p.

[65] COLOMBIA. MINISTRY OF ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT. Decree 1900 (June 12, 2006). By which the paragraph of article 43 of the law 99 of 1993 is regulated and other dispositions are dictated. Bogotá D.C., 2006. P. 4.

[66] COLOMBIA. CONGRESS OF THE REPUBLIC. Law 99 (December 22, 1993). By which the Ministry of the Environment is created, the Public Sector in charge of the management and conservation of the environment and the renewable natural resources is reorganized, the National Environmental System, SINA is organized and other dispositions are dictated. Bogotá D.C., 1993. P. 44.

investment proposal is formulated identifying the programs that could be part of the plan investment of 1%.

The proposal that follows is due to the initial state (before the project) of the conditions found in the land cover units, hydrological status of the bodies of water, land use and environmental conditions of the municipalities of Turbo, Apartadó, Carepa, Mutatá and Chigorodó, which belong to the Leon river basin, as well as the quality of life conditions of the populations that live there, especially in relation to the quality of water they consume. The detailed description found in Chapter 5: Characterization of the area of influence of the present study.

Thus, the 1% Investment Plan proposes:

- Support program for the development of the Management Plan for the Protective Forest Reserve of the Wetlands between the Leon and Suriquí River.

- Plant enrichment program and isolation of areas to facilitate natural succession, conservation and protection of Mangrove areas.

- Support program for the management and management of the river basin of the Leon River.

- Program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon River basin

Below, the investment programs of 1% are detailed and CORPOURABÁ, as the competent environmental authority, is considered to integrate these programs or resources into its Triennial and Regional Management Plans, oriented towards management or to the integral management of water resources. The Corporation is invited to evaluate the relevance of these programs within its national policy framework on water resources and sustainable development, and joint work with communities can be established.

The 1% of the investment that will be made in the works of protection and recovery of the Leon river basin, was calculated based on the total investment cost of the project corresponding to the value for the acquisition of land and buildings, civil works, acquisition and rental of machinery used for civil works and constitution of easements; which corresponds to USD $ 1,961,425.

1.2.1.1 *Legal framework*

In compliance with resolution number 0032 of January 25, 2012 "Through which the environmental license is granted[67]" to the SOCIEDAD PORTUARIA PUERTO BAHÍA COLOMBIA DE URABA S.A, before the PUERTO BAHÍA COLOMBIA DE URABÁ S.A.

[67] Ibid.

and the guidelines of the investment program of 1% of the total cost of the project are established, in works for the protection and recovery of the Leon river basin; in accordance with the provisions of the following legal framework:

Law 99 of December 22, 1993

> "By which the Ministry of the Environment is created, the public sector in charge of the management and conservation of the environment and renewable natural resources is reorganized, the national environmental system SINA is organized and other dispositions are dictated.[68]"

Article 43 Fees for the use of water [69]

Paragraph: Any project that involves the use of water, taken directly from natural sources, whether for human consumption, recreation, irrigation or any other industrial or agricultural activity, must allocate not less than 1% of the total investment for the recovery, preservation and monitoring of the hydrographic basin that feeds the respective water source. The owner of the project must invest this 1% in the works and actions of recovery, preservation and conservation of the basin that are determined in the environmental license of the project.

Decree 1900 of June 12, 2006[70]

By which the paragraph of article 43 of Law 99 of 1993 is regulated and other dispositions are dictated.

"Article 1. Scope. Any project that involves the use of water taken directly from natural sources and that is subject to obtaining an environmental license, must allocate 1% of the total investment for the recovery, conservation, preservation and monitoring of the watershed that feeds the respective water source; in accordance with the paragraph of Article 43 of Law 99 of 1993.

Article 2 Of the projects subject to the 1% investment. For purposes of the application of this decree, it is considered that a project must make the investment of 1% as long as it complies with all of the following conditions:

a) That the water be taken directly from a natural source, whether superficial or underground;

b) That the project requires an environmental license;

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[68] COLOMBIA. CONGRESS OF THE REPUBLIC. Law 99., Óp. cit. P. 44.

[69] Ibid.

[70] COLOMBIA. MINISTRY OF ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT. Decree 1900., Óp. cit. P. 4.

c) That the project, work or activity uses the water in its execution stage, understanding by this, the activities corresponding to the construction and operation processes;

d) That the water taken is used in any of the following uses: human consumption, recreation, irrigation or any other industrial or agricultural activity.

Paragraph 1 °. The investment referred to in article 1 of this decree will be made only once, by the beneficiary of the environmental license.

Paragraph 2 °. The provisions of this decree do not apply to projects that take water directly from the aqueduct's home network operated by a service provider.

Article 3. Liquidation of the investment. The liquidation of the 1% investment referred to in article 1 of this decree will be made based on the following costs:

a) Acquisition of land and real estate;

b) Civil works;

c) Acquisition and rental of machinery and equipment used in civil works;

d) Constitution of easements.

Paragraph. The costs referred to in the preceding paragraphs correspond to the investments made in the construction and assembly stage, prior to the operation or production stage. Likewise, the works and activities included in these costs will be those carried out within the area of influence of the project subject to the environmental license.

Article 4. Approval of the investment. The applicant for the environmental license will submit simultaneously to the competent environmental authority, the Environmental Impact Study and the investment program corresponding to the 1% investment. The latter must contain at least the delimitation of the area where it will be executed, the value in constant pesos of the year in which it is presented, the activities to be developed and the respective execution schedule.

In the administrative act by which the competent environmental authority grants the environmental license, the investment program will be approved, which will be subject to monitoring and control activities.

Paragraph 2 °. In order to adjust the value of the investment of 1%, calculated based on the initial budget of the project, the holder of the environmental license must submit it to the competent environmental authority, within six (6) months of the date Upon entry into operation of the project, the liquidation of the investments actually made, which must be certified by the respective public accountant or fiscal auditor, in accordance with the provisions of article 3 of this decree. Based on the information provided, the competent environmental authority will proceed to adjust, if necessary, the investment program.

Article 5 Destination of resources. The investments referred to in this decree will be made in the hydrographic basin that is in the area of influence of the project subject to environmental licensing, in accordance with the provisions of the Plan for the Management and Management of the Hydrographic Basin that includes the respective water source from which the water is taken.

In the absence of the respective Plan for the Management and Management of the Hydrographic Basin, the resources may be invested in some of the following works or activities:

a) Preparation of the Plan for the Management and Management of the Hydrographic Basin in a percentage established by the Ministry of Environment, Housing and Territorial Development;

b) Restoration, conservation and protection of plant cover, plant enrichment and isolation of areas to facilitate natural succession;

c) Acquisition of land or improvements in areas of wasteland, fog forests and areas of influence of birth and recharge of aquifers, fluvial stars and water rounds. In this case, the ownership of the properties or improvements will be the responsibility of the environmental authorities;

d) Instrumentation and monitoring of water resources;

e) Limnological and hydro biological monitoring of the water source;

f) Construction of works and activities for the control of flows, rectification and management of channels, runoff control, erosion control, geotechnical works and other works and biomechanical activities for soil, water and vegetation management;

g) Interceptors and domestic wastewater treatment systems. To carry out the respective studies, you can invest up to 10% of the total value of this investment. In this case the ownership of the works and studies will be of the municipalities or districts according to the case;

h) Environmental training for the formation of promoters of the community in the topics related in the previous literals, in order to contribute to the environmental management of the watershed;

i) Preservation and conservation of the System of National Parks that are within the respective basin in accordance with the management plans.

Paragraph 1 °. The location of the previous works and activities must be supported by the technical, ecological, economic and social conditions that allow the recovery, preservation, conservation and environmental monitoring of the respective watershed.

Paragraph 2 °. The works and activities aimed at preventing, mitigating, correcting and compensating the impacts and environmental effects found in the Environmental Management Plan of the licensed project will not be part of the 1% Investment Program that this decree addresses. "

1.2.1.2 *Project location*

The PUERTO BAHÍA COLOMBIA DE URABÁ project is located in the basin of the Leon River, in the northwest of the department of Antioquia, under the jurisdiction of the Corporation for the Sustainable Development of Urabá - CORPOURABÁ, covering the municipalities of Turbo, Apartadó, Carepa, Mutatá and Chigorodó.

The Leon River is born to the north of the town of Mutatá in the south-western foothills of the Abibe Mountain Range, its course has a predominant orientation to the northwest and flows into the waters of the Caribbean Sea in Bahía Colombia in the Gulf of Urabá (Photo No. 11.4).

Photograph No. 11.4 Leon River before emptying into the waters of the Caribbean Sea
Source: Aqua y Terra Consultores Asociados S.A.S., 2015

The river is currently used to transport wood and bananas for export. The piedmont lands are being used for high-yield cultivation. The surface of the basin is 2250 km^2; the length of the main channel is 83 km and the multi-year average flow is 63.27 m^3/s at the Barranquillita station of the IDEAM. Its left margin is confused with the marshy plain of the

Atrato. All of its tributaries flow into the right bank. The main ones include the Carepa River, the Chigorodó River, the Vijagual River and the Guapa River[71].

1.2.1.3 *Causality of the project obligation PUERTO BAHÍA COLOMBIA DE URABÁ*

The causality, to determine the investment of 1%, obeys to the following aspects:

a) The water will be taken directly from a natural surface source (Leon River); The project aims to capture water during construction and operation for domestic and industrial activities.

b) The project requires an environmental license.

c) The project will use water for constructive and operational activities.

1.2.1.4 *Liquidation of the investment of 1%*

Decree 1900 of 2006[72] in the Third Article it establishes that the liquidation of the investment of 1% will be made "... based on the following costs:

a) Acquisition of land and real estate;

b) Civil works

c) Acquisition and rental of machinery and equipment used in civil works

d) Constitution of easements

Taking into account the above, the value estimated by the PUERTO BAHÍA COLOMBIA DE URABÁ S.A PORT SOCIETY is presented, for the investment of 1%, based on the costs established in Article Three of Decree 1900 of 2006[73] (Table No. 11.58):

Table No. 11.58 Estimated values for the construction and operation of the Project

[71] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA. Management Plan for the Protective Forest Reserve of the Wetlands between the León and Suriquí Rivers, Municipality of Turbo, Department of Antioquia. March 31, 2008. p. 40.

[72] COLOMBIA. MINISTRY OF ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT. Decree 1900., Óp. cit. P. 4.

[73] Ibid.

ACTIVITY	APPLICATION OF THE DECREE	ESTIMATED VALUE (USD $)
CONSTRUCTION AND OPERATION OF A PORT TERMINAL OF SOLID GRANELS OF GREAT CALADO IN BAHÍA COLOMBIA	a) Acquisition of land	120.690
	b) Civil Works	176.393.211
	c) Acquisition and rental of machinery and equipment used in civil Works	19.599.245
	d) Constitution of Easements	29.310
TOTAL		196.142.456
INVESTMENT VALUE OF 1%		1.961.425

Source: Aqua y Terra Consultores Asociados S.A.S., 2015

In accordance with the foregoing, and taking into account the provisions of Article 3° of Decree 1900 of 2006[74], the liquidation of the investment of 1%, for the construction and operation of the project will be USD $1,961,425 and will be invested in compliance with resolution number 0032 of January 25, 2012[75]:

80% is allocated to restoration, conservation and protection activities in the mangrove zone located at the mouth of the Leon River. According to the above, 20% of the investment will be directed to support the development of the Forest Reserve Management Plan Protector of the Wetlands between the Leon and Suriquí River, in the municipality of Turbo, department of Antioquia.

The other 20% will be assigned according to the percentages established in Article 5° of Decree 1900 of June 12, 2006 and Resolution 974 of June 5, 2007[76].

In accordance with the above, the destination of the investment is proposed in Table No. 11.59:

Table No. 11.60 Economic value allocated to the plans and programs for the recovery, preservation and conservation of the Leon River basin

PROTECTION PROGRAMS OF THE LEON RIVER BASIN	COST (USD $)	PERCENTAGE OF INVESTMENT

[74] Ibid.

[75] COLOMBIA. NATIONAL AUTHORITY OF ENVIRONMENTAL LICENSES - ANLA. Resolution 0032., Óp. cit. 135 p.

[76] COLOMBIA. MINISTRY OF ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT. Resolution 974 (June 1, 2007). "By which the percentage of what is dealt with in literal a) of article 5 of Decree 1900 of 2006. Bogotá, D.C.: The Ministry, 2007. 1 p.

Support for the development of the Management Plan for the Protective Forest Reserve of the Wetlands between Leon and Suriquí Rivers	392.285	20%
Plant enrichment and isolation of areas to facilitate natural succession, conservation and protection of Mangrove areas.	1.176.855	60%
Support for the management and management of the Leon River watershed	196.142	10%
Program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon River basin	196.142	10%
TOTAL INVESTMENT OF 1%	1.961.425	100%

Source: Aqua y Terra Consultores Asociados S.A.S., 2015

The destination of this investment for environmental activities will include the municipalities of Turbo, Apartadó, Carepa, Mutatá and Chigorodó and, therefore, object of environmental supervision of the Corporation for the Sustainable Development of Urabá - CORPOURABÁ.

1.2.1.5 *Investment Programs of 1%*

Below is a detailed description of the objectives, activities and schedules, among others, of each of the programs in which the 1% investment would be made.

- Support program for the development of the Management Plan for the Protective Forest Reserve of the Wetlands between Leon and Suriquí Rivers.

General purpose

To allocate 20% of the investment of 1% for the development of the Management Plan for the Protective Forest Reserve of the Wetlands between Leon and Suriquí rivers

Specific objectives

Develop recovery and conservation strategies that allow the permanence and increase of the natural ecosystems present in the Protective Forest Reserve of the Wetlands between Leon and Suriquí rivers

Establish appropriation mechanisms by local communities related to the recovery and preservation of the Protective Forest Reserve of the Wetlands between Leon and Suriquí rivers

Justification

The protection and conservation of wetlands is a global concern, given the great diversity associated with them and environmental services that are also derived from their proper and correct use, a situation that through different strategies, has been tried to empower by those who have his position in the management of these ecosystems: state, society, neighboring owners, fishing communities and different estates that in one way or another affect the conservation of the ecosystem qualities of wetlands[77].

The management plan for the protective forest reserve of the wetlands between Leon and Suriquí rivers is a physical ordering tool for the territory that helps to mitigate, conserve, compensate and prevent negative actions in the natural ecosystems that lie between these two rivers.

The management plan allowed defining the characteristics of 5,298.42 hectares of the wetland, identifying its potential in terms of great biological diversity; Likewise, it established strategies in order to guarantee the maintenance of its ecological characteristics and the supply of environmental goods and services, by means of its zoning. For this reason, 20% of the 1% investment will be used for the development of said plan.

Special coverage

The wetlands of the Leon and Suriquí rivers are located in the Gulf of Urabá, located north-west of the department of Antioquia, including the coastal municipality of Turbo. It has an extension of 5,298.42 hectares of which 3,213,546 belong to mangrove cover[78].

Specific environmental activities

In the management plan for the wetlands of Leon and Suriquí rivers [79] Four (4) strategies were considered taking into account the diagnosis and characterization of the biophysical and socioeconomic components, the social and institutional participation, the technical knowledge and the workshops held in the different sites that influence the wetland, it is the responsibility of CORPOURABÁ to carry out the designation and prioritization of each of these strategies for execution.

The four (4) strategies with their respective programmatic lines were designated as follows:

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[77] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA., Óp. cit. p. 40

[78] Ibíd.

[79] Ibíd.

Strategy 1: Management, recovery and conservation of ecosystems.

Management, recovery and conservation of ecosystems Management, recovery and conservation of ecosystems:

- Recovery and maintenance of wetland dynamics.

- Management and conservation of natural vegetation cover and wild species.

Strategy 2: Promotion of environmental culture and community participation.

Programmatic line:

- Strengthening community organizations around renewable natural resources

Strategy 3: Sustainable use of natural resources.

Programmatic lines:

- Management of the fishing resource.

- Promotion of ecotourism as a sustainable activity around the wetland.

Strategy 4: Environmental management to strengthen the administration of resources.

Programmatic line:

-Inter-institutional cooperation

Schedule

Support for the development of the management plan for the protective forest reserve of the wetlands between Leon and Suriquí rivers will be made 6 months after the start of the construction of PUERTO BAHÍA COLOMBIA DE URABÁ, and its duration should be defined with the CORPOURABÁ corporation. The foregoing is due to the fact that this environmental authority is responsible for defining the strategies to be carried out.

Costs

For the implementation of this program there is a budget of up to $ USD 392,285, which is equivalent to 20% of the investment of 1%.

Responsible

The development of this program will be in charge of CORPOURABÁ with the economic support that the company PUERTO BAHÍA COLOMBIA DE URABÁ S.A assigns for the execution of this one.

- Plant enrichment program and isolation of areas to facilitate natural succession, conservation and protection of Mangrove areas

General purpose

Allocate 60% of the 1% investment for plant enrichment and isolation of areas to facilitate the natural succession, conservation and protection of the mangrove areas present within the wetlands of Leon and Suriquí rivers.

Specific objectives

Carry out through the revegetation or reforestation of mangrove an increase in the forest cover of the mangrove ecosystem, in the wetlands of Leon and Suriquí rivers.

Perform the isolation of intervened areas within the protective forest reserve of Leon and Suriquí rivers wetlands to facilitate the natural succession of the mangrove areas.

Justification

Due to forestry activities such as illegal logging and other practices carried out in mangrove forests, deforestation and degradation are evident. With the above it is necessary to establish trials that promote the recovery and management of mangroves due to the current state they are in, through a system of forest enrichment and isolation of intervened areas, with the species of Avicennia germinans (Black Mangrove), Laguncularia racemosa (White mangle) and Rhizophora mangle (Red mangle); that allow the restoration of the ecological balance of this forest.

Special coverage

The wetland between Leon and Suriquí rivers has an extension of 5,298.42 hectares of which 3,213,546 belong to the mangrove forest [80], there they will identify those areas that present a high degree of intervention and need to be recovered through forest enrichment and the isolation of intervened areas.

Specific environmental activities

In general terms, three (3) activities have been considered for forest enrichment in deteriorated or newly formed areas and an activity for the isolation of intervened areas:

The restoration, in a restricted sense and referring to the mangrove, has to do with the removal of the tensors in the ecosystem, in order to induce normal conditions for the subsequent recovery of the vegetation cover and consequently of other affected elements. Basically there are two levels of intervention: the first is the deteriorated areas and in the process of degradation, where much of the dead trees are evident and only some

[80] Ibíd.

individuals remain standing, a situation caused by stressful conditions of a water imbalance in the area, and in the second instance, deteriorated areas in an advanced state of degradation, with hypersaline soils and all the dead trees, which have collapsed as a result of the natural loss of water flows and therefore of their dynamics, are presented.[81].

Revegetalization: is the activity related to the regeneration or restoration of the vegetation cover that was in the area, usually this activity is carried out in altered areas where the mangrove trees have been lost, generally by felling, and in which the vegetation cover has been replaced by invasive species such as the matatigre fern (Acrostichum aureum) and where the basic environmental conditions of salinity and water flow are still conserved and which are usually surrounded by mangrove areas in good conditions.

Enrichment: refers to the planting activity of seedlings in areas, without plant cover or with it, mainly of the graminoid type; generally in alluvial beaches of fluvial origin of recent formation and without evident alterations[82].

Isolation: The realization of this activity will be carried out through the identification, selection and acquisition of intervened areas where the forest cover has been lost, generally by anthropic intervention and where the environmental conditions for the natural regeneration of the mangrove are still conserved.

Schedule

The program of plant enrichment and isolation of areas to facilitate the natural succession, conservation and protection of the mangrove areas, will be done 6 months after the construction of PUERTO BAHÍA COLOMBIA DE URABÁ begins, and its duration should be defined with the CORPOURABÁ corporation. The aforementioned is due to the fact that the execution and monitoring of this program will be considered for this authority.

Costs

For the implementation of this program has a budget of up to $ USD 1,176,855, which is equivalent to 60% of the investment of 1%.

Responsible

[81] SÁNCHEZ PÁEZ HELIODORO, RICARDO ÁLVAREZ LEÓN, OMAR ARIEL GUEVARA MANCERA, ALEJANDRO ZAMORA GUZMÁN, HILAYALIT RODRÍGUEZ CRUZ and HERNANDO EUGENIO BRAVO PAZMIÑO. Diagnosis and preliminary zoning of mangroves in the Pacific of Colombia. Santa Fe de Bogotá D.C., 1997, 343 p.

[82] Ibíd., p.6

The execution of this program will be carried out by the company PUERTO BAHÍA COLOMBIA DE URABÁ S.A or the entity or company that, at the time of execution, the project owner arranges, after a mutual agreement with CORPOURABÁ.

- Program of support for the management and management of the river basin of the Leon River

General purpose

To allocate 10% of the investment of 1% for the support of the Management and Management of the River Basin of the Leon River (POMCA) as stipulated in Resolution 200-03-20-99-1341-2014[83].

Specific objectives

Contribute to the environmental entity (CORPOURABÁ) economically for the planning of the water resource so that they can make decisions about the preservation of the water resource.

Support in the formulation of the Management Plan and Management of the River basin of the Leon River so that it can be framed within the National Policy for the Integrated Management of Water Resources (National Water Plan).

Improve the environmental conditions of the basin through activities of planning and sustainable development.

Justification

The Leon river basin fulfills great functions from the environmental and socioeconomic point of view, even though it has been affected by different factors of an anthropic nature, bringing as a consequence the decrease of its ecological characteristics and the environmental deterioration of the basin, affecting the quality of natural resources, mainly water quality, a situation that motivates the need for planning for the sustainable use and management of renewable natural resources, in order to maintain or reestablish an adequate balance between the economic use of such resources and the conservation of the physical-biotic structure of the basin and particularly of its water resource.

Special coverage

COLOMBIA. CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABA - CORPOURABÁ. Resolution 200-03-20-99-1341-2014. (September 18, 2014). By which the basin of the Leon river is declared in order. Apartadó., 2014. p.6.

[83] COLOMBIA. CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABA - CORPOURABÁ. Resolution 200-03-20-99-1341-2014. (September 18, 2014). By which the basin of the lion river is declared in order. Apartadó., 2014. p.6

Table No. 11.61 Municipalities that cover the Leon River basin

Municipality	Area (ha)	Area (%)
Turbo	33.906,80	15%
Apartadó	36.768,95	16%
Carepa	38.635,93	17%
Mutatá	46.336,65	20%
Chigorodó	72.178,74	32%
Total area of the basin	227.827,07	100%

Source: Made by Aqua & Terra Consultores Asociados S.A.S., 2015

Specific environmental activities

To achieve these objectives, it is planned to carry out the following activities, which are contemplated in Decree 1729 of 2002 and the Technical Guide for the formulation of Management Plans and Management of Hydrographic Basins - POMCAS of the Ministry of Environment and Sustainable Development[84] (Table No. 11.62).

[84] To achieve these objectives, it is planned to carry out the following activities, which are contemplated in Decree 1729 of 2002 and the Technical Guide for the formulation of Management Plans and Management of Hydrographic Basins - POMCAS of the Ministry of Environment and Sustainable Development 104

Table No. 11.62 Proposed activities to achieve the objectives of this program

REFERENCE	ACTIVITY
Preparation	According to the Methodological Guide of the Ministry of environment and sustainable development[85], this phase has as purpose to build the foundations of the Plan of Management and Management of the Basin from a first perception interaction where everything that the actors know or know of the basin is collected.
Diagnosis	Current status of the watershed and its main characteristics, biophysical, sociocultural, technical-economic and ecological.
Prospective	In this phase, future technical-economic scenarios are designed based on the results of the diagnosis for the coordinated and sustainable use of the system components present in the basin (soil, water, flora, fauna).
Formulation	It covers proposing hypotheses, setting objectives, establishing the structure and organization for execution, adopting evaluation mechanisms and preparing the budget for the execution, monitoring and evaluation of the POMCA.
Execution	It is the development of the activities proposed in the formulation, with the human, technical and financial requirements necessary to achieve the proposed goals. This item will be the responsibility of CORPOURABÁ and the municipalities of Turbo, Apartadó, Carepa, Mutatá and Chigorodó.
Monitoring and evaluation	In this phase, the monitoring and evaluation mechanisms and instruments are established, as well as the environmental and management indicators that allow evaluating compliance with the plan. This item will be the responsibility of CORPOURABÁ and the municipalities of Turbo, Apartadó, Carepa, Mutatá and Chigorodó.

Source: Aqua y Terra Consultores Asociados S.A.S., 2015

Schedule

The support for the formulation of the POMCA of the Leon River will be made six (6) months after the start of the construction of PUERTO BAHÍA COLOMBIA DE URABÁ, and its duration should be defined with the CORPOURABÁ corporation. This is due to the fact that the formulation of this plan is intended to be done in coordination and support with the competent entities in charge of water resource planning.

Costs

For the implementation of this program, it has a budget of up to $ USD 196,142, which is equivalent to 10% of the investment of 1%.

Responsible

[85] Ibid., p.104

The development of this program will be in charge of CORPOURABÁ with the economic support that the company PUERTO BAHÍA COLOMBIA DE URABÁ S.A assigns for the execution of this.

- Program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon River basin

General Objective

To allocate 10% of the investment of 1% for the program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon river basin.

Specific objectives

Recover, conserve and protect forest cover through reforestation with native species, promoting the generation of protective water ecosystems.

Conserve and regulate the water resource within the Leon River basin.

Improve the quality of life and well-being of the settlements surrounding the bodies of water within the Leon River basin.

Justification

Deforestation greatly affects watersheds, generating serious environmental consequences downstream, such as increased runoff, erosion, instability of the land and erratic flow behavior. The Leon River basin is no stranger to this scenario.

In this regard, the program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon River basin seeks to advance concrete processes of rehabilitation and connectivity of the damaged coverings in the water margins and in the water sources of the Leon River in order to positively impact the geomorphological stability, the regulation of its flow, the quality of its waters and the ecological structure of the basin.

Special coverage

The Leon River is born to the north of the town of Mutatá in the south-western foothills of the Abibe Mountain Range, its course has a predominant orientation to the northwest and flows into the Bahía Colombiain in the Gulf of Urabá, has an extension of 227,827

hectares, of which 75,424 hectares correspond to forests and semi-natural areas, equivalent to 33% of the total area of the basin[86].

Specific environmental activities

This program will be carried out through the implementation of reforestation in the margins of the bodies of water, in the areas where spring heads are identified, in degraded areas or in areas where it is necessary to increase the forest cover to restore the connectivity of the ecosystems. In general terms, the activities carried out are the following:

Determination of sites to reforest, these areas will be defined jointly with the community and CORPOURABÁ

Selection of the species to plant, is given by the objective of reforestation, biophysical requirements of the species and availability of plant material.

Adequacy, preparation and sowing, is given according to the defined site to carry out the reforestation.

Maintenance of the reforestation will be the responsibility of the company PUERTO BAHÍA COLOMBIA DE URABÁ S.A or the entity or company that at the time of its execution the project owner arranges

Schedule

The program of recovery and conservation of strategic areas for connectivity and water regulation of the Leon River basin will be made 6 months after the construction of PUERTO BAHÍA COLOMBIA DE URABÁ begins, and its duration should be defined with the CORPOURABÁ corporation. The above is due to the fact that this program is intended to be carried out in coordination and support of this authority.

Costs

For the implementation of this program, it has a budget of up to $ USD 196,142, which is equivalent to 10% of the investment of 1%.

Responsible

The execution of this program will be carried out by the company PUERTO BAHÍA COLOMBIA DE URABÁ S.A or the entity or company that, at the time of execution, the project owner arranges, after a mutual agreement with CORPOURABÁ.

[86] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA., Óp. cit. p. 40.

1.2.2 Compensation plan for biodiversity loss

- *Introduction*

The compensation plan for biodiversity loss consists of actions that aim to compensate for the impacts or negative effects that cannot be prevented, corrected or mitigated and that lead to loss of biodiversity in onshore natural ecosystems and secondary vegetation; in such a way that the effective conservation of an ecologically equivalent area is ensured where a permanent conservation strategy or its ecological restoration can be generated, so that when comparing with the baseline the net loss of biodiversity is guaranteed. Within the management plans established in the present study (Chapter 11.1.1), management measures that allow the prevention, correction or mitigation of the impacts identified on the fauna are considered, for this reason the environmental management program of the wildlife and habitat protection; According to the above, a Compensation Plan for Loss of Biodiversity is not required for the faunal community.

In order to comply with the provisions of decree 1791 of 1996[87], where it is required that when a forest use of natural forest is made, the compensation of at least the same amount of harvested trees must be carried out and in order to guarantee a good environmental management in the project area, the SOCIEDAD PORTUARIA PUERTO BAHÍA COLOMBIA DE URABÁ SA, formerly PUERTO BAHÍA COLOMBIA DE URABÁ SA, presents the Compensation Plan for Loss of Biodiversity focused on forest exploitation. This was determined according to the provisions of the manual for the allocation of compensation for loss of biodiversity, from the Ministry of environment and sustainable development[88].

- *Location*

The construction of works for the operation of the PUERTO BAHÍA COLOMBIA DE URABÁ project requires the forestry exploitation of the arboreal individuals located in the area of direct affectation of the project; which is formed by a corridor of 2,474.7 m long and 60 m wide, for an area of 148,484 m2 that goes from the Nueva Colonia township, to the land where the onshore terminal of the port will be built.

The property (350,079 m^2) plus the withdrawal strip of the Leon rivers and the Nueva Colonia canal (63,358.58 m^2) have an area of 413,437.68 m^2; and a strip 437.6 m long and 20 m wide (9.832.7 m^2), where the viaduct will be constructed that will lead from the onshore terminal to the pier; this strip is within the Protective Forest Reserve of the wetlands of Leon and Suriquí River declared by agreement No. 100-02-02-01-0010-2011

[87] COLOMBIA. MINISTRY OF ENVIRONMENT. Decree 1791 (04, October, 1996). By means of which the regime of forest exploitation is established. Bogotá: The Ministry, 1996.25 p.

[88] COLOMBIA, MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. MANUAL FOR THE ALLOCATION OF COMPENSATIONS FOR LOSS OF BIODIVERSITY. Bogotá, D.C., August 2012. 49 p.

by CORPOURABÁ[89] and which includes the mangrove vegetation of this area, as shown in Table No. 11.63 and Figure No. 11.53. This strip was subtracted from the Protective Forest Reserve through agreement No. 100-02-02-01-0004-2011 by CORPOURABÁ[90].

The volume under which forest use was estimated for the construction of Puerto Bahía Colombia in Urabá was made taking into account the entire area of influence of the project; however, considering that the land where the land terminal will be built borders the riverbank of the Leon River and the artificial canal of Nueva Colonia, a retirement area defined by decree 1076 of 2015 must be respected.[91], which corresponds to a strip of 30 meters, thus conserving the riparian forest of this area. However, the only area that will be intervened and that has been included in the forest inventory, is the one associated to the fluvial pier, which will be located on the right margin of the north end of the artificial canal of Nueva Colonia, approved this in resolution number 0032 of 2012[92], whereby the environmental license of the Project was obtained.

Table No. 11.63 Areas of forest utilization

Coverage unit	Ecosystem	Area (m^2)	Area (ha)
Onshore vegetation	Gallery or riparian forest of the tropical humid Zonobiome of Magdalena-Caribe	148.500,00	14,85
	Dense, flooded dense forest of the Magdalena-Caribe tropical humid Zonobiome		
	Palm grooves of the tropical humid Zonobiome of the Magdalena-Caribe		
Land where the land terminal will be built	Clean pastures of the tropical humid Zonobiome of the Magdalena-Caribe	413,400	41,34
Forest Reserve of Leon and Suriquí river wetlands			
Mangrove vegetation within the Forest Reserve	Dense high mangrove of the Caribbean Halo biome	5.400	0,54
	High secondary mangrove vegetation of the Caribbean Halo biome	4.400	0,44
Total area of forest utilization		**571.700,00**	**57,17**

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

[89] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABA. Agreement No 100-02-02-01-0010-2011 (June 16, 2011). By means of which the category of protected area of the Protective Forest Reserve of the Wetlands is certified between the rivers León and Suriquí in the municipality of Turbo, created in the agreement of the directive council No 100-02-02-01-011-2009 with the category of protected area Regional Natural Park (Decree 2372 of 2010). Apartadó, 7p.

[90] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABA. Agreement No 100-02-02-01-0004-2011 (March 17, 2011). By means of which an area of the Protective Forest Reserve of the wetlands between the León and Suriquí rivers is partially and temporarily subtracted and a season is partially lifted. Apartadó, 6p.

[91] COLOMBIA. MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. Decree 1076 (May 26, 2015). By means of which the single regulatory decree of the environmental sector and sustainable development is issued. Bogotá D.C.: The Ministry, 2015. 654 p.

[92] COLOMBIA. NATIONAL AUTHORITY OF ENVIRONMENTAL LICENSES - ANLA. Resolution 0032 (January 25, 2012). By means of which an environmental license is granted. Bogotá D.C.: 135p.

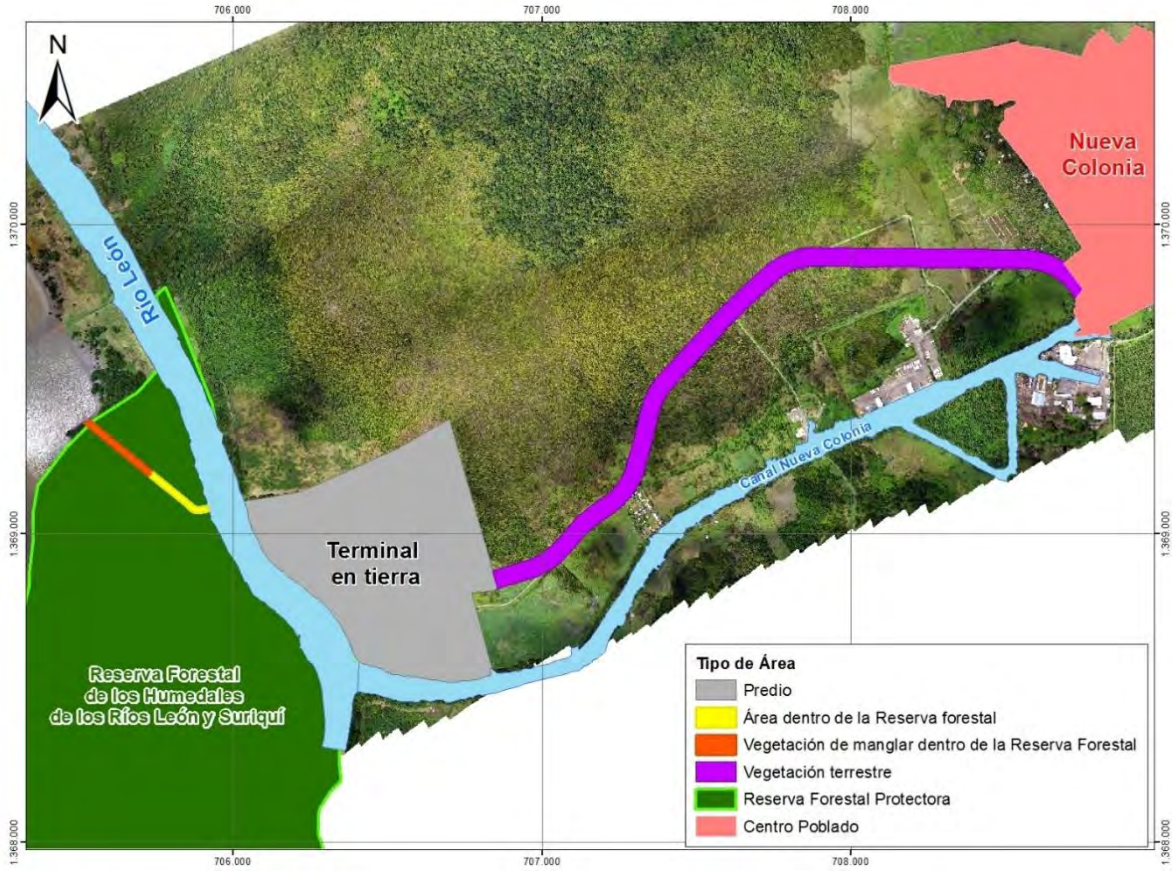


Figure No. 11.53 Area of direct impact of the project
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

1.2.3 Environmental baseline of the area directly affected by the project

The floristic characterization of the species identified in the field within the area of direct intervention of the project was carried out (Photograph No. 11.5), where the spatial distribution of the species was determined, allowing to know the degree to which they are grouped or dispersed and the amount of existing individuals per unit of land cover interpreted for the area of influence of the project, scale 1: 10,000 (Annex 7.5 Forest inventory at 100%).

Photograph No. 11.5 Overview of the area of influence of the project
Source: Taken by Puerto Bahía Colombia de Urabá S.A, 2009

The species that characterize the mangrove cover are Avicennia germinans (Black mangrove), Rhizophora mangle (Red mangrove) and Laguncularia racemosa (White mangrove); these species are protected by a prohibiton resolution number 076395 B of August 4, 1995 issued by CORPOURABÁ[93] and which was lifted by agreement No. 100-02-02-01-0004-2011 by CORPOURABÁ[94].

The registered floristic wealth for the area of direct affectation of the project is of 12 orders, 23 families, 38 species in 1,154 individuals; of the total of families one (6%) belongs to the class of the Monocotyledons and 25 families (94%) to the class of the Magnoliopsids.

Table No. 11.64 shows the floristic composition within the direct intervention area of the project.

Table No. 11.64 Floristic composition in the area of intervention of the project

Division	Class	Order	Family	Specie	Common Name
Angiospermae	Monocotyledoneae	Arecales	Arecaceae	*Elaeis Oleifera*	American Oil Palm
				Raphia taedigera	Yolillo palm

[93] COLOMBIA. CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ. Resolution 076395B (August, 4, 2014). By means of which the amounts of the rates for the use of public and private forests are fixed. Section, 2014. 5 p.

[94] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ - CORPOURABÁ. Agreement No 100-02-02-01-0004-2011 (March 17, 2011). By means of which an area of the Protective Forest Reserve of the wetlands between the León and Suriquí rivers is partially and temporarily subtracted and a season is partially lifted. Pulled apart,6 p.

				Cocos nucifera	Coconut Palm
Magnoliophyta	Magnoliopsida	Sapindales	Anacardiaceae	*Anacardium excelsum*	wild cashew
				Spondias purpurea	red mombin
				Spondias mombin	yellow mombin
				Mangifera indica	Mango
			Sapindaceae	*Melicocca bijuga*	Spanish lime
			Rutaceae	*Citrus sp*	Orange tree
		Lamiales	Avicenniaceae	*Avicennia germinans*	Black mangrove
			Lamiaceas	*Gmelina arborea*	beechwood
				Tectona grandis	Teak
			Bignoniaceae	*Tabebuia rosea*	pink poui
				Crescentia Cujete L	Calabash Tree
		Malvales	Bombacaceae	*Ceiba pentandra*	Kapok
				Bombacopsis quinata	Ceiba Tolua
				Pachira aquatica	Malabar chestnut
			Malvaceae	*Ochroma pyramidale*	Balsa tree
				Sterculia apetala	Panama tree
			Sterculiaceae	*Guazuma ulmifolia*	West Indian elm
		Rosales	Cecropiaceae	*Cecropia telenitida*	trumpet tree
			Moraceae	*Ficus sp*	fig tree
				Ficus glabrata	Higueron
		Myrtales	Combretaceae	*Laguncularia racemosa*	White mangrove
				Terminalia Catappa L	Almond tree
			Myrtaceae	*Psidium guajava*	Guava
			Melastomataceae	*Miconia sp*	Niguito
		Fabales	Fabaceae	*Brownea ariza*	Ariza
				Erythrina indica picta	Canta gallo
				Pithecellobium dulce	Chiminango
				Apuleia leiocarpa	Combita
			Caesalpiniaceae	*Prioria copaifera*	Cativo
			Mimosaceae	*Inga codonantha*	Guamo
		Laurales	Lauraceae	*Beilschmiedi sp*	Laurel
		Rhizophorales	Rhizophoraceae	*Rhizophora mangle*	Red Mangrove
		Gentianales	Rubiaceae	*Genipa americana*	Majagua
		Magnoliales	Annonaceae	*Annona muricata*	Guanabana
		Malpighiales	Dichapetalaceae	*Tapura colombiana*	Nasedero

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

The most representative families within the area of direct impact of the project are the Fabaceae, Avicenniaceae, Bombacaceae, Arecaceae, Rhizophoraceae, Moraceae, Bignoniaceae, Cecropiaceae and Mimosaceae, as can be seen in Figure No. 11.54. The rest of the families have an abundance lower than

2%.

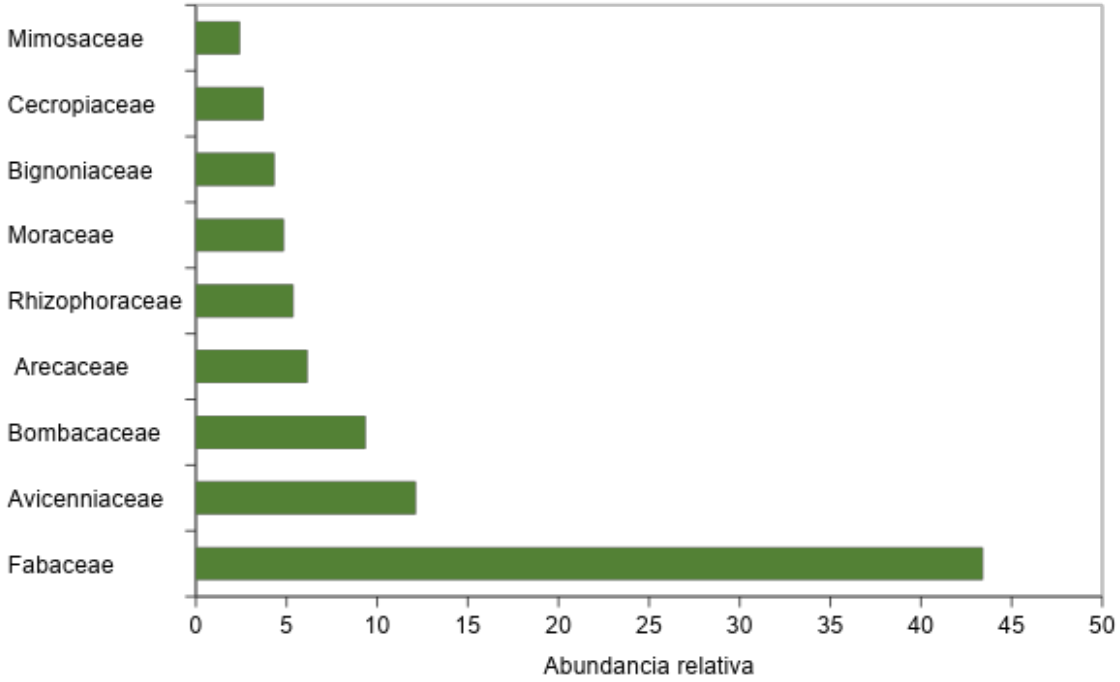


Figure No. 11.54 Relative abundance of the most representative families in the study area
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Table No. 11.65 shows the commercial volume of wood to be harvested for each type of coverage, during each activity to be carried out in the construction and operation of the project. There it is observed that the coverage with the highest volume of wood to be extracted is the gallery or riparian forest with 301.86 m3, because this coverage is located within the site where the terminal will be built on the project's land.

Table No. 11.65 Commercial volume of wood that will be harvested in each of the land cover by activity developed in the project

COVERINGS	Symbol	ACTIVITIES			Total Commercial volume (m³)
		Viaduct and Dock	Terminal on Earth	Vía	
		Transport, manufacture and driving of the piles	Dismantle, clean, stripping and filled with land	Land clearing, cleaning and stripping	

Discontinuous urban fabric	112			7,83	7,83
Banana and banana	2213			6,3	6,3
Clean pastures	231	0,77	92,17	75,82	168,76
Woodland pastures	232			21,2	21,2
Dense high mangrove	311122	31,47			31,47
Palmar	311123		1,86	45,67	47,53
Gallery or riparian forest	314	26,3	275,56		301,86
Plantation of hardwoods	3152			2,01	2,01
Dense flooded herbage not wooded	321121		12,21	227,23	239,44
Arracachal	321123		0,18		0,18
High secondary vegetation	3231	4,99			4,99
Total Commercial volume (m³)					831,57

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Table No. 11.66 shows the number of trees that were found by type of coverage within the area of direct impact of the project. There it is observed that the coverage with the greatest number of individuals corresponds to the gallery or riparian forest, where the most abundant species are Pithecellobium dulce (Chiminango) with 210 individuals and Apuleia leiocarpa (Combita) with 43 individuals, followed by coverage of clean pastures, where 287 trees were identified, being the species Pithecellobium dulce (Chiminango) with 135 individuals and Apuleia leiocarpa (Combita) with 29 individuals, the most abundant species in this coverage.

Table No. 11.66 Affected area and number of trees to be exploited by type of coverage within the area of direct impact of the project

Land hedges							No trees
Corine Land Cover Methodology							
Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Symbol**	
Artificialized Territories	Urbanized areas	Discontinuous urban tissue				112	31
Agricultural Territories	Permanent crops	Herbaceous permanent crops	Plantain and banana			2213	16
	Pastures	Clean pastures				231	287

		Woodland pastures				232	24
Forests and Semi natural Areas	Forests	Dense forest	High dense forest	Dense high flood forest	Dense high mangrove	311122	167
					Palmar	311123	19
		Gallery or riparian forest				314	365
		Forest plantation	Plantation of hardwoods			3152	3
	Areas with herbaceous or shrubby vegetation	herbage	Dense herbage	Dense flooded herbage	Dense flooded herbage not wooded	321121	209
			dense herbage	Dense flooded herbage	Arracachal	321123	1
		Secondary or transition vegetation	High secondary vegetation			3231	32

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Once the area of direct impact of the project was characterized, those impacts with environmental significance were identified which were not mitigated and which require a reasonable period for the environment to recover (Table No. 11.67).

Below are the identified impacts:

- Alteration of onshore habitats: This impact refers to modifications or alterations that may occur in the onshore environment, related to anthropic activities or natural causes that may affect the floristic and faunal communities, such as the modification of refuge areas for herpes, birds and mammals, changes in the availability of the substrate for the development of the flora. It also refers to changes in coverage, availability of food and perches, among other factors that influence the natural dynamics of flora, herpes, birds and mammals

- Variation of vegetation cover: Corresponds to the loss or removal of forest vegetation cover and associated floristic species, product of human activities directly or indirectly, or by natural phenomena.

Table No. 11.67 Impacts with environmental significance

IMPACT	ENVIRONMENTAL SIGNIFICANCE OF THE IMPACT	ACTIVITY	ENVIRONMENTAL ELEMENT AFFECTED
Alteration of onshore habitats	Severe	Dismantle, clean, stripping and filled with the land - Viaduct, Pier and Jetty	Flora and fauna
	Severe	Dismantling, cleaning, discarding and filling the land - Ground Terminal	Flora and fauna
	Moderate	Dismantling, cleaning, stripping and land fill - Via	Flora and fauna
Variation of vegetation cover	Severe	Dismantle, clean, stripping and filled with the land - Viaduct, Pier and Jetty	Flora and fauna
	Severe	Dismantling, cleaning, discarding and filling the land - Ground Terminal	Flora and fauna
	Moderate	Dismantling, cleaning, stripping and land fill - Via	Flora and fauna

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

In the chapter of environmental evaluation (chapter 8) is detailed the identification of the environmental components susceptible to receive changes or impacts in the activities to be developed in the scenario with project.

1.2.4 Description of the ecologically equivalent areas proposed for compensation

It is recommended that the place where compensation is made preferably be directed to conserve areas that are ecologically equivalent to those affected, in places that represent the best opportunity for effective conservation, that is, places within the Portfolio of Priority Areas for Conservation, generated by the Ministry of Environment and Sustainable Development and by the Environmental Authorities or National System of Protected Areas, where biodiversity is viable by area, condition and landscape context, where it is possible to generate a new category of management or conservation strategy for the useful life of the project[95].

The ecologically equivalent areas should be located within the area of influence of the project or, failing that, within the hydrographic sub-areas[96] where the project is located [97].

Regarding the above considerations, and the characteristics of the project, it is proposed that the compensation be made within the Forest Reserve of the Wetlands of Leon and

[95] Ibid.

[96] National Water Study (IDEAM, 2010) and Hydrographic Network of Colombia (IDEAM, 2009). Scale 1: 500,000 [map]. Bogotá.

[97] COLOMBIA, MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. Óp. cit., p 49.

Suriquí Rivers and in the areas of the Leon River delta on the Caribbean Sea (Figure No 11.55); in order to advocate for the conservation and survival of those individuals that are sown.

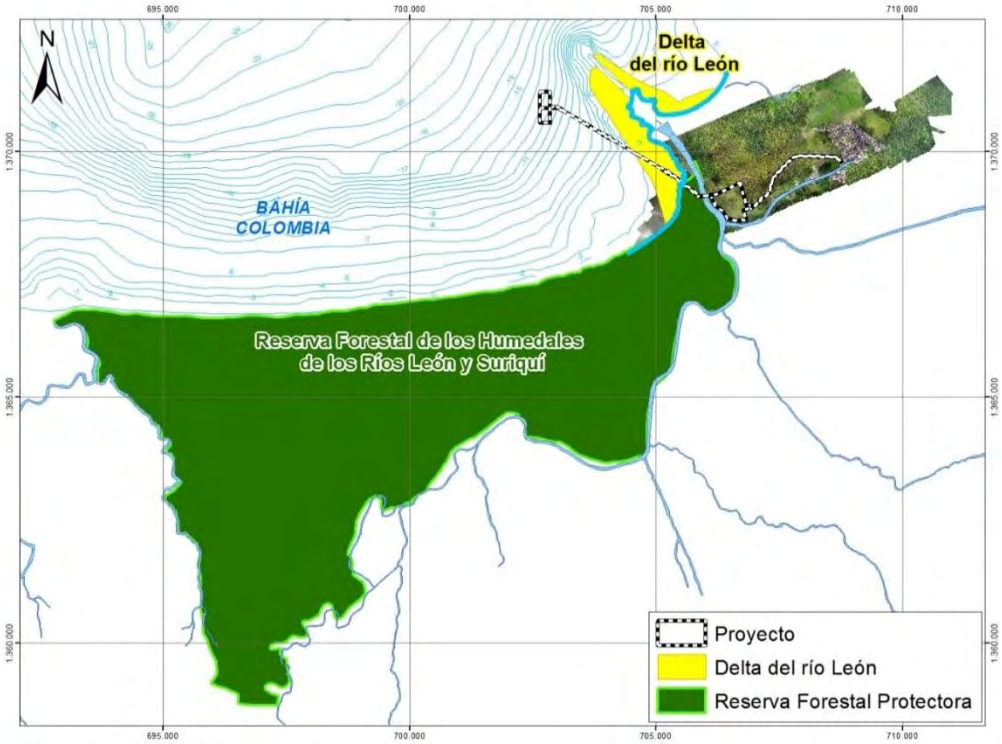


Figure No. 11.55 Proposed area for compensation of vegetation cover
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Protective Forest Reserve of the wetlands between the Leon and Suriquí rivers

Through Agreement number 019 of December 17, 2009, the Corporation for the Sustainable Development of Urabá - CORPOURABÁ declared the Protected Reserve Zone of the wetlands between the Leon and Suriquí rivers, located in the Gulf of Urabá, to the northwest of the Department of Antioquia, comprising the middle area of the coastal municipality of Turbo.

In general, the area is made up of wetlands or swamps, where the vegetation known as panganales, arracachales in association with species of common occurrence in the area such as the saltcellar, yarumo, cativo among others and mangrove vegetation located in the mouths, stands out of the Suriquí and Leon rivers over the waters of Bahía Colombia.

At the confluence of the floodplains of Leon and Suriquí rivers, communicated by pipes of different specifications, a mixed forest structure with species such as the Prioria copaifera "Cativo", Pachira aquatica "Salero", Cynometra sp. "Hard mangrove", Carapa guianensis "Güino", Inga sp., "Guamo" and Pterocarpus officinalis "Bambudo", among other species

as well as several species of palm, forming a facet of mixed flooded forest, given that despite the presence of the cativo, it is not possible to catalog it as a typical catival of the region and with the high timber productivity of the same, but of great biological value and of singular importance for the regional fauna, because this mixed forest is practically the last refuge of communication , on the eastern side, between the wooded areas of the region[98].

According to the map of land cover, CORINE Land Cover methodology adapted for Colombia. Scale 1: 100,000, the area included as a wetland of the Leon-Suriquí Rivers, dense, low-flood forest is identified, which makes the area an area with serious limitations for the establishment of any type of traditional agrarian production system.

In relation to the life zones according to the Holdridge classification, the Leon-Suriquí rivers wetland belongs to the formation called Tropical Humid Forest, with the following climatic characteristics: average temperature higher than 24 degrees Celsius and an annual average rainfall between 2,000 and 4,000 millimeters. The relative humidity varies from 90% in the rainy season to 85% in the dry season.

Currently the Leon-Suriquí rivers wetland presents a high vulnerability, due to the pressure originated from the process of colonization in the region, which has involved the occupation or allocation of wastelands, which in turn translates into activities that seek to dry large areas to convert land use towards livestock activities and to a lesser degree (medium-low vulnerability) alterations due to aperiodic burning, hunting and extraction of firewood[99].

- Leon River Delta

The processes that occur at the mouth of the Leon River are very complex since in this zone oceanic, fluvial, wind and anthropic agents are interacting, as a result of interaction added to the abundant sediment load that the Leon River delivers to the sea in its outlet, an intense sedimentary process is generated that has resulted in the formation of a delta, which gradually increases its dimensions and moves towards the sea, the dredging activities that are carried out periodically in the area have allowed to maintain the navigation through this body of water, but it has not been possible to stop its advance towards the sea.

With the current sedimentary dynamics at the mouth of the Leon River, the landscape, the coastal environment and the bathymetric configuration of the sea have been affected, causing difficulties in navigation operations.

[98] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ- CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA. Management Plan for the Protective Forest Reserve of the Wetlands between León and Suriquí Rivers, Municipality of Turbo, Department of Antioquia. PUBLIC CALL No. 047 OF 2007. MEDELLÍN, MARCH 31, 2008

[99] Ibid

The emerged deltaic plain represents the emerged part of the Leon River delta (see Photo No. 11.6), is cut by an artificial channel that connects the Leon River with the Caribbean Sea in Bahía Colombia, is made up of materials of marine - alluvial origin, these areas are poorly drained marshes and are formed in some sectors by mangrove vegetation in this juvenile.

Photograph No. 11.6 Plain deltaic right bank of the Canal towards the sea
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Aiming to delimit them and specify the areas where it is necessary to carry out reforestation or revegetation activities, within the Protective Forest Reserve, it was identified with the help of the satellite images of the Google Earth geographical geovisor, foci of deforestation and loss of forest connectivity (Figure No. 11.56).

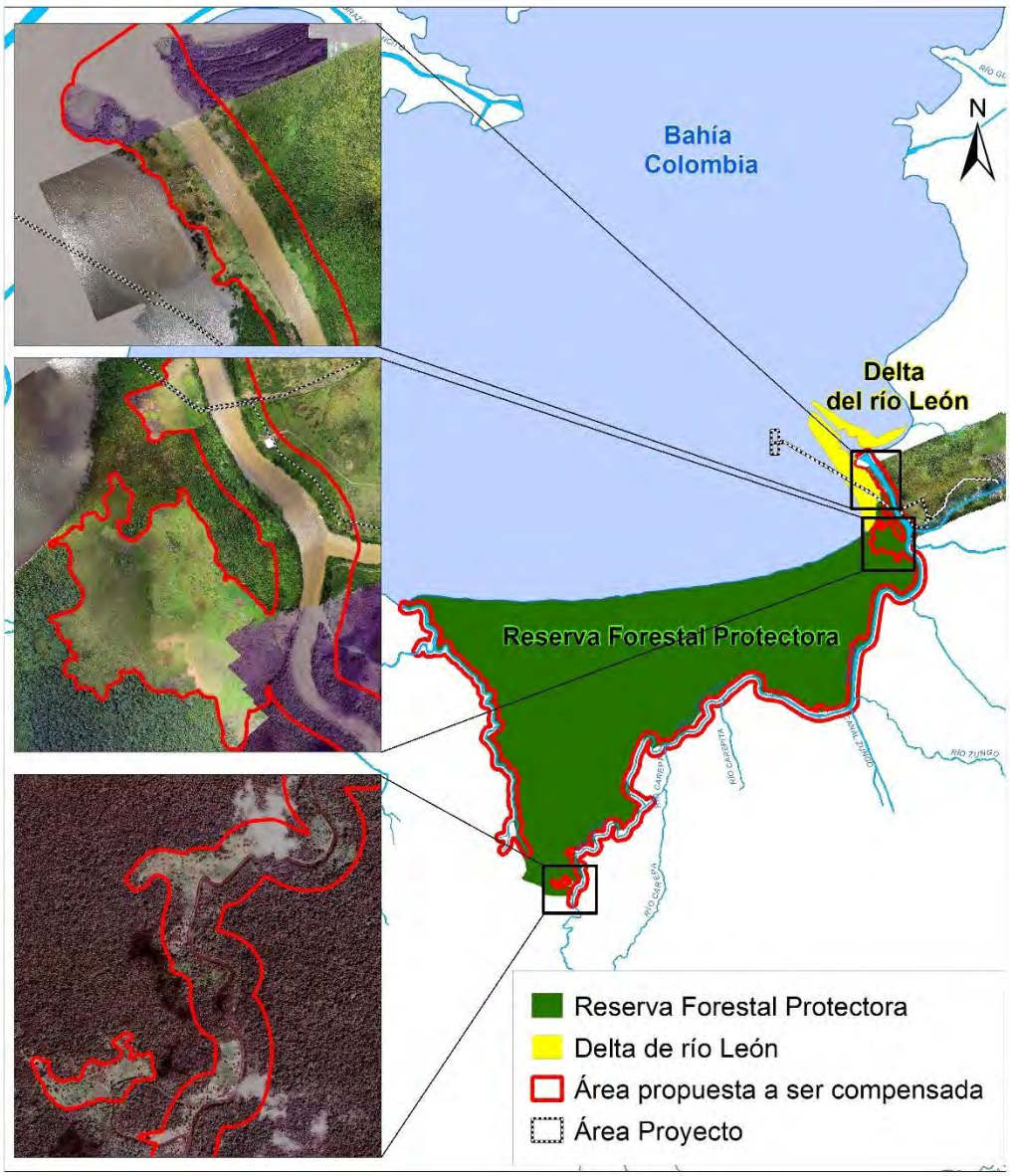


Figure No. 11.56 Area where compensation is proposed
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

According to the above, it is proposed that the compensation be made on the banks of Leon and Suriquí rivers, in a 100-meter wide strip; identifying those areas where colonization processes have involved the occupation of vacant lots and the felling of trees for the sowing of pastures for livestock use; likewise on the delta of the Leon River, with the objective of giving continuity to the mangrove vegetation that occurs within the

Protective Forest Reserve; In this area of the delta areas suitable for the adequate growth of mangrove species were identified.

The areas where mangrove compensation is proposed should be visited to corroborate the information obtained, with the participation of CORPOURABÁ officials and some leaders of the community councils. In these areas, environmental conditions related to: the regular presence of fresh water sources, soil and water salinity, soil drainage and aeration, and sources of environmental contamination should be considered. A qualification in quantitative terms of these aspects for each one of the areas will allow to select in an accurate way the areas susceptible to recovery and the specific tasks to be carried out to guarantee the good result of the activities that are implemented. In accordance with what has been mentioned, the following guidelines will be considered:

- It is necessary to have a source of fresh water of temporary or permanent nature, which may come from rivers or estuaries, from a phreatic level close to the surface or from rainfall.
- The salinity of the soil and water must be less than 30 ppm, although in the dry season it can reach 50 ppm; sites with salt concentration above 70 ppm cannot be selected, since these are derived in the decline of vigor and development of mangrove forests and in substantial increases in mortality of individuals
- For a better development of the vegetal cover it is advisable that the substrate presents adequate availability of nutrients, selective permeability and the capacity of accumulation of essential elements; These conditions generally occur in places with marked influence of rivers or estuaries. On the contrary, the substrates composed of sand are generally poor, forming an inert structural material, scarce of clay micelles, which causes loss of essential nutrients and accumulation of insoluble and toxic compounds, limiting the good development of mangroves[100].
- It is advisable to lower the levels of domiciliary and industrial pollution, due to their negative influence on the natural regeneration process of the mangrove vegetation[101].

The compensation plan is detailed below and is submitted to CORPOURABÁ, as the competent environmental authority, to integrate these programs or resources into its Triennial and Regional Management Plans, oriented towards the conservation and restoration of the Forest Reserve the Wetlands of Leon and Suriquí Rivers and the Leon River delta.

[100] Ibid., 38 p.

[101] Ibid., 38 p.

1.2.5 Detailed proposal of compensation actions

For the construction of PUERTO BAHÍA COLOMBIA DE URABÁ, the vegetation cover located in the direct intervention area of the project must be removed (access road, land terminal, viaduct, jetty and pier), which largely corresponds to the training of natural pastures (65%), characteristic of flood plain areas. Where arboreal species are found characteristic of very humid tropical forests.

For the very Humid Tropical Forest the area intervened will be compensated according to the calculation of the area to be compensated through the compensation factors for biodiversity loss established in the manual for the allocation of compensation for loss of biodiversity, from the Ministry of environment and development sustainable[102].

- *Total Compensation Factor*

The calculation of the total compensation area was made based on the four individual compensation factors established in the manual[103]:

1) Representativeness of the ecosystem in the national system of protected areas, this factor varies from 1 to 3.

2) Its rarity, this factor varies from 1 to 2.

3) Its remanence, this factor varies from 1 to 3.

4) Annual transformation rate, this factor varies from 1 to 2.

The sum of these four compensation factors results in the total compensation factor for each of the affected coverage units [104].

To determine the total area to compensate for the loss of biodiversity in each of the natural ecosystems, Equation No. 11.21 was used:

$$Ac = Ai \times \sum Fc$$

Equation No. 11.21 Equation for the calculation of the area to be compensated for loss of biodiversity

Where:

Ac: Area to be compensated for Loss of Biodiversity
Ai: Area to impact the natural ecosystem due to the development of the project
Fc: Total compensation factor

[102] COLOMBIA, MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. Óp. cit., p 49.

[103] Ibid.

[104] Ibid.

As for the secondary vegetation that may be affected by the development of the project, Equation No. 11.22 was used.

$$Acvs = Ai \times (\Sigma Fc / 2)$$

Equation No. 11.22 Equation for the calculation of the area to be compensated for loss of biodiversity in secondary vegetation

Where:

Acvs: Area to compensate for Loss of Biodiversity in secondary vegetation

Ai: Area to impact secondary vegetation

Fc: Total compensation factor

The minimum value of the Total Compensation Factor for natural ecosystems is 4 and the maximum value is 10.

- *About special ecosystems*

When the projects, works or activities, intend to intervene, wetlands of the RAMSAR International Importance list or mangroves, the environmental authority will impose the maximum compensation factor (10), taking into account the determinations on the matter that have been adopted through the different administrative acts in relation to conservation and the sustainable use of said ecosystems[105].

- *Calculation of the compensation area of the project*

According to the above, the area to be compensated was calculated, based on the natural ecosystems identified in the area of influence of the project. Within the mangrove, the high density mangrove ecosystems of the Caribbean Halo biome and high secondary mangrove vegetation of the Caribbean Halo biome were grouped, classified within the special ecosystems according to what is established in the manual for the allocation of compensations for loss of biodiversity, of the Ministry of environment and sustainable development[106], therefore, its total compensation factor (Fc) corresponds to 10.

As for the ecosystem of clean grasses of the humid tropical Zonobiome of the Magdalena-Caribe, located in the land where the onshore terminal of the project will be built, it was related as secondary vegetation only for the calculation of the compensation area, considering that these pastures are of natural origin belonging to the floodplains, which are in a successional state.

[105] Ibid.

[106] Ibid.

Table 11.68 shows the compensation factors for the calculation of the area to be compensated by the natural ecosystem intervened; in total, 255.40 hectares will be compensated.

Table No. 11.68 Compensation for affected natural ecosystem

Code	Ecosystem	Affected area (ha)	Fce	Fcr	Fcb	FCTP	Fc	Ac (ha)
Mda_HC	Dense high mangrove of the Caribbean Halo biome	0,54					10	5,40
Vsa_HC	High secondary mangrove vegetation of the Caribbean Halo biome							
Bgr_ZHTMC	Gallery or riparian forest of the tropical humid Zonobiome of Magdalena-Caribe	5,68	1,25	1,5	2	1	5,75	32,65
Hdina_ZHTMC	Dense, flooded dense forest of the Magdalena-Caribe tropical humid Zonobiome	10,80	2,5	1,3	1	1	5,75	62,11
Palm_ZHTMC	Palmar of the tropical humid Zonobiome of the Magdalena-Caribe	0,76	1,25	1,5	2	1	5,75	4,36
Pl_ZHTMC	Clean pastures of the tropical humid Zonobiome of the Magdalena-Caribe	33,53	1	1	1	1,5	4,5	150,89
TOTAL AREA TO COMPENSATE		**51,31**						**255,40**

Fce: Compensation factor for Representativeness of ecosystems - priority districts / biogeographic in the National System of Protected Areas - Types of prioritization, Fcr: Compensation factor for Rareness of ecosystems-biomes / biogeographic districts, Fcb: Compensation factor for Remanence of ecosystems-biomes / Biogeographic districts, FCTP: Compensation factor for Annual Transformation Rate of biome ecosystems / biogeographic districts. Fc: Total compensation factor, Ac: Area to be compensated for Loss of Biodiversity.

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- *Objective*

- General Objective

Compensate 255.40 hectares of very humid tropical forest, in highly intervened areas in the Protective Forest Reserve of the Wetlands of Leon and Suriquí Rivers, due to the change of aptitude for land use generated by the construction of the project PUERTO BAHÍA COLOMBIA DE URABÁ.

- Specific objectives

1. Carry out, through revegetation or reforestation of forest species, an increase in the vegetation cover of the ecosystems intervened during the construction of the PUERTO BAHÍA COLOMBIA DE URABÁ project.

2. Guarantee the sustainability of the process through the development of maintenance activities and monitoring of the compensated areas.

- *Methodology for the selection of species*

For the selection of species, the characterization of the arboreal flora that is presented in the Management Plan of the Protective Forest Reserve of the Wetlands between Leon and Suriquí Rivers was used[107] and the floristic characterization that are detailed in chapter 5.2 of this study. For this reason, the species recommended for the compensation program are presented in Table No. 11.69.

Table No. 11.69 Registration of recommended tree species to make compensation for forest harvesting

Scientific name	Common name
Prioria copaifera	Cativo
Anacardium excelsum	wild cashew
Lecythis sp.	Olleto
Swartzia sp.	Cucharo
Spondias sp.	Ciruelo macho
Pachira acuática	Salero
Cecropia sp.	Yarumo
Trema micrantha	Zurrumbo
Hampea sp.	Melao
Carapa guianensis	Güino
Sterculia apetala	Camajón
Tabebuia rosea	Roble
Vitex sp.	Truntago
Pterocarpus officinalis	Barbudo
Inga codonantha	Guamo
Ficus glabrata	Higuerón
Luehea seemanii	Guásimo colorado
Raphia taedigera	Pangana
Peltogyne sp.	Hard Mangrove
Avicennia germinans	Black Mangrove
Laguncularia racemosa	White Mangrove
Rhizophora mangle	Red Mangrove

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

The table above shows the species that have been selected to carry out the compensation plan, these have a great biological value and of singular importance for the ecological connectivity within the protective forest reserve of the wetlands between Leon and Suriquí rivers [108].

[107] CORPORATION FOR THE SUSTAINABLE DEVELOPMENT OF URABÁ- CORPOURABÁ, ADMINISTRATIVE DEPARTMENT OF ENVIRONMENT-DAMA. Management Plan for the Protective Forest Reserve of the Wetlands between the León and Suriquí Rivers, Municipality of Turbo, Department of Antioquia. PUBLIC CALL No. 047 OF 2007. MEDELLÍN, MARCH 31, 2008

[108] Ibid.

- *Reforestation in the mangrove areas*

Because the species that make up the mangrove should be treated differently silvicultural to other species to reforest, we present below the methodology for the compensation of mangrove areas.

- Planting density

For the species of Peltogyne sp., Avicennia germinans, Laguncularia racemosa, Rhizophora mangle; they will have a planting distance of 7 m by 3 m (Figure No. 11.57) for an average sowing density of 476 seedlings per hectare; the area to be compensated for the use of mangrove vegetation is 5.40 hectares, for this reason it is estimated that the total of individuals to be compensated will be approximately 2,570 mangrove trees.

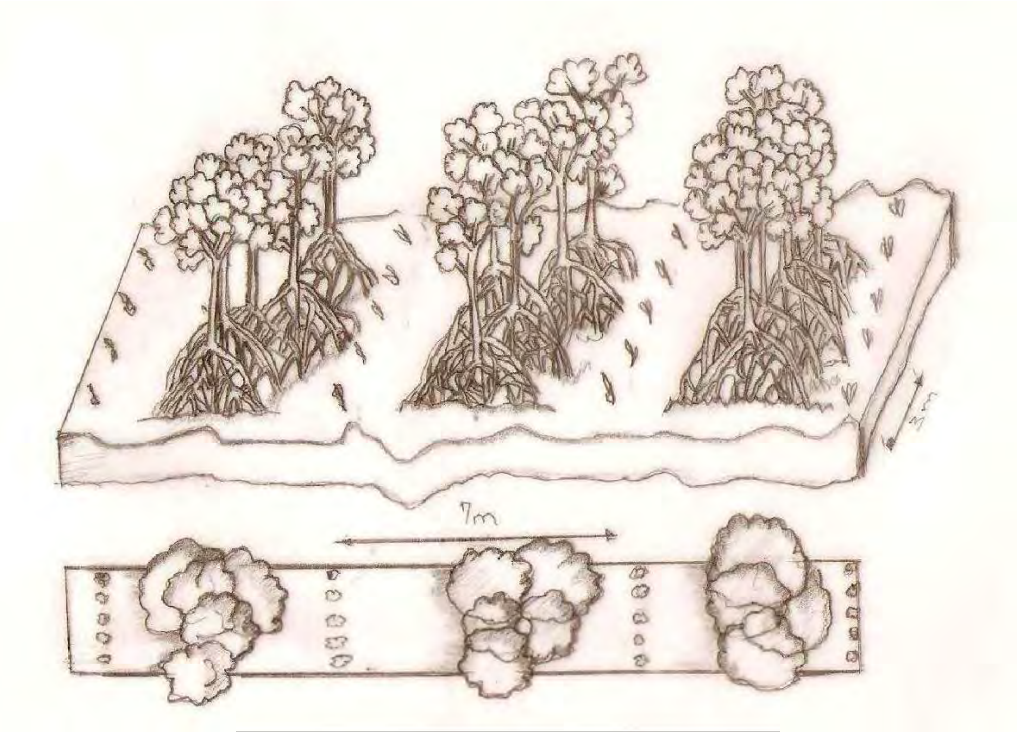


Figure No. 11.57 Design of the planting density of the mangrove
Source: RODRÍGUEZ CRUZ HILAYALIT (1998)[109]

- Previous actions by develop

It must define the activities that can be implemented for the rehabilitation of mangrove areas, such as training a group of people in restoration and revegetation of areas to be

[109] RODRÍGUEZ CRUZ HILAYALIT. Restauración de las áreas de manglar en el Caribe continental de Colombia. Informe No. 20. MMA – ACOFORE – OIMT. Proyecto PD. 171/91 Rev. 2 (F) Fase II (Etapa I). Bogotá, 1998. 38 p.

recovered, direct sowing, maintenance of plantings, monitoring of plantings, among others, for which theoretical-practical workshops will be developed.

- Activities to develop

There are three (3) activities below that, in general terms, have been considered for the recovery or establishment of mangrove coverage in deteriorated or newly formed areas:

Restoration, in reference to the mangrove, has to do with the removal of the tensors that have intervened in the ecosystem, the restoration aims to induce normal conditions for the subsequent recovery of the plant cover and consequently other affected natural elements. According to Guevara,[110] basically two levels of intervention are presented: in the first are the deteriorated areas and in the process of degradation, where a large part of the dead trees are evident and only some individuals remain standing, a situation caused by stressful conditions of a water imbalance in the area ; and in the second instance, deteriorated areas in an advanced state of degradation, with hypersaline soils and with all the dead trees, which have collapsed as a result of the natural loss of water flows and, therefore, of their dynamics. For the restoration of these areas it is proposed the recovery of areas altered by dredging, rehabilitation of water flows, collection and management of propagules and seeds, establishment of community mangrove nurseries, establishment of mangrove plantations, maintenance and monitoring of plantations.

Revegetation, is the activity related to the regeneration or restoration of the vegetation cover that was in the area. Usually this activity is carried out in disturbed areas where mangrove trees have been lost, generally by felling, and in which the vegetation cover has been replaced by invasive species such as the tiger bush (Acrostichum aureum) and where the basic environmental conditions of salinity and water flow that are usually surrounded by mangrove areas in good conditions. For the revegetation of these areas, the collection and management of propagules and seeds, the establishment of community mangrove nurseries, the establishment of mangrove plantations, the maintenance and monitoring of plantations are proposed.

Vegetation, this activity consists in the planting of seedlings in selected areas, where the native vegetation cover has been removed mainly due to the expansion of the agricultural frontier for the sowing of pastures. For the vegetation of these areas, the collection and management of propagules and seeds, the establishment of community mangrove nurseries, the establishment of mangrove plantations, the maintenance and monitoring of plantations are proposed.

[110] GUEVARA MANCERA OMAR ARIEL. Manual para la restauración de los bosques de manglar en áreas degradadas del Pacífico Colombiano. MMA – ACOFORE – OIMT. Proyecto PD. 171/91 Rev. 2 (F) Fase II (Etapa I). Bogotá, Colombia. 1998. 16 p.

- Selection and collection of propagules or saplings

At the moment of making the propagules or saplings, the origin of these should be taken into account, which must have a minimum size of 20 cm, the propagules must be straight, the tip of which will emerge must have the root of brown color; the form must be straight and the terminal bud developed; you should reject the curved and spotted hypocotyls, they must have a hard or rigid consistency, they must have olive green coloration and they must present good development of all their parts. At the time of harvesting, the propagules must have easy detachment of the seed, absent from pests, fungi or insects and physical damage caused by insects or pests.

For the species of Avicennia germinans (Black mangrove), Laguncularia racemosa (White mangrove), Rhizophora mangle (Red mangrove), there is a greater availability of propagules in the rainy season which is determined between the months of August to November[111].

- Work of adaptation of the land

✓ Delimitation and demarcation of the area.
✓ Preparation of the site or cleaning of the land.
✓ Layout and demarcation of the sowing.
✓ Hole Making (In sectors with presence of consistent mud).
✓ Subscriber.
✓ Sowing.
✓ Reseeding.

- *Reforestation with species other than mangrove*

The reforestation process for species other than mangrove species is detailed below:

- Planting system and density of planting

The forest material will be planted using the quarry system or "chicken leg" using a separation between 3-meter seedlings. In this system, the trees are placed in parallel rows forming equilateral triangles between them as seen in Figure No. 11.58, with this planting distance the density is approximately 1283 trees per hectare. The area to be compensated is 250 hectares, which means that approximately 320,750 trees will be planted as a compensation measure.

[111] RODRÍGUEZ, Alberto. RUÍZ Jaime and GARZÓN Jaime. Structural and functional characteristics of the Avicennia germinans mangrove in Chengue Bay (Colombian Caribbean). ISSN 0122-9761. Santa Marta, Colombia, 2004. 22p.

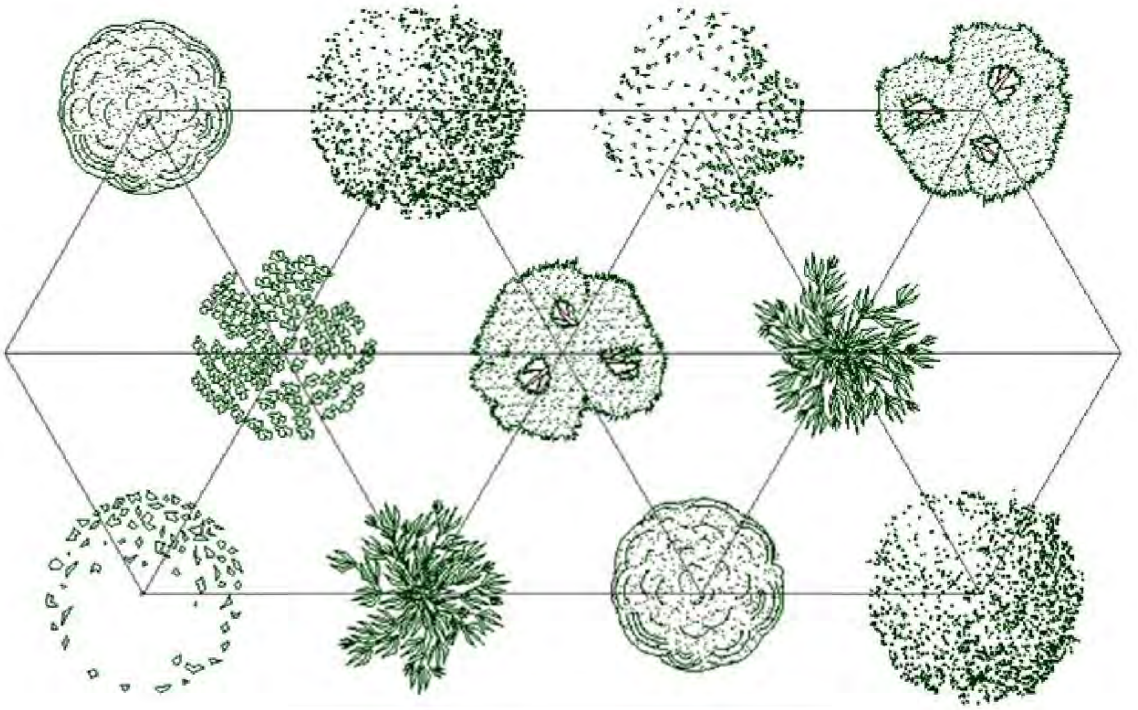


Figure No. 11.58 Design of the general scheme of the sowing system in quincunx or hen's foot.
Source: Universidad del Tolima (2013)[112]

- Activities to develop

Plating, It consists of the total cleaning of the site where the hole will be opened for the planting of the seedlings. The diameter is one (1) meter per plate.

Layout, it consists of the delimitation of the areas where the seedling will be planted

Hole Making, consists in the opening of the holes, this activity must be done days before establishing the reforestation with the aim of aerating the site a little, according to the size of the plant to be planted the opening of the hole is made. However, the standard size of 50 cm * 50 cm * 50 cm can be taken into account, in order to allow the young plant a good space for its root development.

Sowing, this work should begin at the beginning of the rainy season to achieve a good establishment and capture of the material. The sowing procedure is as follows:

Once the soil is planted, the plant material is placed vertically without damaging the ground bread, leaving the seedling at ground level, in order to avoid seedling mortality by drowning. Subsequently, the hole is filled with the same soil that was extracted at the time

[112] TOLIMA UNIVERSITY. Forest use and compensation plan for the construction of the veterinary clinic of the Faculty of Veterinary Medicine and Zootechnics in the Miramar estate, Ibagué municipality, department of Tolima. Ibagué, 2013. 57 p.

of making the hole, finally a small pressure is exerted with the hoe around the plant to give firmness, remove air and avoid possible stagnations.

- Selection of the plant material to be used

The plant material that will be taken to the field must have a good phytosanitary status at the time of sowing and have its apical meristem caulinar "cogollo" in perfect conditions. These seedlings should have a height that ranges between 0.30 and 0.40 meters from the neck of the stem (discounting the height of the bag), should be visibly vigorous, olive green, not present insect damage or pests and have a straight shape and a rigid consistency.

- Time of planting and irrigation

During the first 6 months the planted trees must maintain acceptable humidity levels, that is why the planting should be done at the beginning of the rainy season which is established between the months of August to November.

- *Required Staff*

For the management and control activities that derive from the implementation of the environmental management measure, the following personnel are required (Table No. 11.70):

Table No. 11.70 Staff required for compensation measures

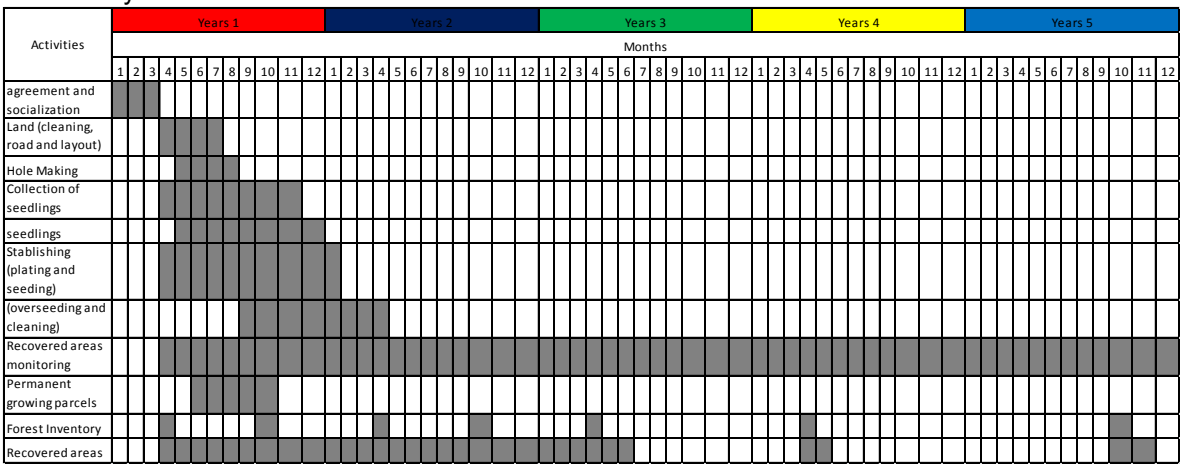
Personal	Responsibility
1 Forestry Engineer	Responsible for control and monitoring
2 Forest Technologists	Responsible for the operational part
1 Biologist	Responsible for wildlife monitoring
10 Field assistants	

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- *Project duration*

It is estimated that the realization of the compensation plan for biodiversity loss for 255.40 hectares, in the Forest Reserve of Leon and Suriquí Rivers Wetlands and in the areas of the Leon River delta on the Caribbean Sea, will take some time Approximately 5 years following the schedule set forth in Table No. 11.71. Finally, upon completing the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas.

Table No. 11.71 Schedule of activities for the realization of the compensation plan for loss of biodiversity



Fuente: Aqua & Terra Consultores Asociados S.A.S., 2015

- *Cost ratio of the compensation plan for loss of biodiversity*

Table 11.72 lists the activities and the cost of each of them for the implementation of the compensation plan for the loss of biodiversity of 255.4 hectares in the Forest Reserve of the Wetlands of Leon and Suriquí Rivers and in the areas of the Leon River delta over the Caribbean Sea.

Table No. 11.72 Price analysis for the activities of the compensation plan for loss of biodiversity

CONCEPT	PRICE PER HECTARE Other species	PRICE PER HECTARE Mangrove
Agreement and socialization	$ 250.000,00	$ 250.000,00
Land adequacy (roads, cleaning and layout)	$ 500.000,00	$ 500.000,00
Digging holes	$ 250.000,00	
Seedling Collection (Mangrove)		$ 500.000,00
Seedling Transportation		$ 250.000,00
Establishment (sowing)	$ 900.000,00	$ 450.000,00
Maintenance (reseeding and plating)	$ 200.000,00	$ 200.000,00
Monitoring of recovered areas	$ 300.000,00	$ 300.000,00
Technical equipment costs	$ 700.000,00	$ 700.000,00
Technical transport	$ 500.000,00	$ 500.000,00
Administrative costs	$ 300.000,00	$ 300.000,00
Maintenance of recovered areas	$ 365.000,00	$ 370.000,00
TOTAL PER HECTARE	**$ 4.265.000,00**	**$ 4.320.000,00**

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

Table 11.73 shows the total values for each coverage unit to be compensated for biodiversity loss.

In conclusion, the compensation has a total value of approximately $1,089,588,783 (one thousand and eighty-nine milLeon five hundred and eighty-eight thousand seven hundred and eighty-three Colombian pesos).

Table No. 11.73 Total value of compensation for loss of biodiversity

Ecosystem	Area to compensate (ha)	Total Price
Dense high mangrove of the Caribbean Halo biome	5,40	$ 23.328.000,00
High secondary mangrove vegetation of the Caribbean Halo biome		
Gallery or riparian forest of the tropical humid Zonobiome of Magdalena-Caribe	32,65	$ 139.232.217,30
Dense, flooded dense forest of the Magdalena-Caribe tropical humid Zonobiome	62,11	$ 264.907.803,69
Palmar of the tropical humid Zonobiome of the Magdalena-Caribe	4,36	$ 18.596.237,01
Clean pastures of the tropical humid Zonobiome of the Magdalena-Caribe	150,89	$ 643.524.525,00
TOTAL	**255,40**	**$ 1.089.588.783**

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

1.2.6 Evaluation of potential risks of implementation of the compensation plan

For the evaluation of the probable risks in the implementation of the proposed compensation plan, several methodologies have been used[113] [114] for the evaluation of the probable risks in the implementation of the proposed compensation plan, several methodologies have been used

- *Methodology*

The proposed methodology consists in carrying out a preliminary risk analysis, which consists of:

- Detect those elements with a high possibility of originating negative events in the implementation of the compensation plan.
- Analyze the elements identified in detail.
- Propose measures for the reduction of associated risks.

For the development of the risk analysis, the following definitions, concepts and qualifications will be taken into account:

Process: specific to the area or process where the working conditions are being identified.

Activity: they can be routine which constitute normal, and non-routine procedures that are those periodic and occasional procedures.

[113] STORCH DE GRACIA, J.M., Manual of industrial safety in chemical and oil plants. Vol. 2. Madrid: McGraw-Hill, 1998. 1023 p.

[114] NATIONAL UNIT OF DISASTER RISK MANAGEMENT-UNGRD. Methodological guide for the preparation of Departmental Plans for Risk Management. Colombia. 2012. 77p.

Threat: is a physical or chemical condition with the potential to cause undesirable consequences or serious damage to personnel responsible for executing the compensation plan, property or the environment, and is expressed in the likelihood of a potentially dangerous phenomenon within a period of time to a certain area. Threats will be classified as technological (Endogenous), natural and anthropic (Exogenous).

Risk factor: is the existence of elements, phenomena, environments and human actions that contain a potential capacity to produce injuries or material damage and whose probability of occurrence depends on the elimination or control of the aggressive element. These are classified as: physical, chemical, mechanical, locative, electrical, ergonomic, psychosocial, work at heights, transit, social, biological, among others.

Danger: source or situation with potential for harm in terms of injury, illness, damage to property, damage to the work environment, personnel, population or a combination of these.

Risk: combination of the probability and the consequence (s) of the occurrence of a specific dangerous event**.**

Source: identifies the process, objects, instruments and physical and psychological conditions of the people that generate the risk factor.

Hours of exposure per day: this is the real or average time during which the personnel in charge of executing the compensation plan are in contact with the risk factor in their working hours.

Control measures: measures to eliminate or mitigate the risk factors that have been put in place at the source of origin, in the means of transmission, in people or in the method.

Probability: it is a function of the frequency of exposure, the intensity of exposure and the special sensitivity of some of the sources to the risk factor among others (Table No. 11.74).

Table No. 11.74 Assessment of the probability of occurrence of the threatening event

Probability of occurrence	Probability rating
The exhibition will always happen	High
The exhibition will occur on some occasions	Medium
The exhibition will happen rarely	Low

Source: Storch, 1998, Adapted by: Aqua & Terra Consultores Asociados S.A.S., 2015

Consequences / vulnerability: they are estimated according to the potential of severity of the human injuries, to the losses of equipment, materials and the effects on the development of economic activities of the compensation areas (Table No. 11.75).

Table No. 11.75 Assessment of the consequence - vulnerability

Consequence – vulnerability	Qualification consequence
Negative effects on the environment, execution of compensation plan, serious injuries to staff and possibly fatal, considerable economic effects	Extremely harmful
Some negative effects on the environment and the execution of the compensation plan, serious and non-fatal effects on the health and well-being of personnel, fairly moderate economic effects	Harmful
No effect on the environment and the execution of compensation plan, superficial injuries to personnel, minimal economic effects	Slightly harmful

Source: Storch, 1998, Adapted by: Aqua & Terra Consultores Asociados S.A.S., 2015

Risk estimation: it is agreed with the combination made between probability and consequences / vulnerability, in the following way (Table No. 11.76).

Table No. 11.76 Risk estimation

Evaluation		CONSEQUENCES/VULNERABILITY		
		Slightly harmful	Harmful	Extremely harmful
Probability	Low	Trivial risk	Tolerable risk	Moderate risk
	Medium	Tolerable risk	Moderate risk	Important risk
	High	Moderate risk	Important risk	Unacceptable risk

Source: Storch, 1998, Adapted by: Aqua & Terra Consultores Asociados S.A.S., 2015

Recommendations: recommendations are established according to the degree of risk identified:

Risk	Recommendations
Trivial	No specific action is required if there are risks
Tolerable	There is no need to improve control measures but solutions or improvements should be considered and periodic checks should be made to ensure that it is still tolerable.
Moderate	Efforts should be made to reduce the risk and consequently mitigation and control measures should be designed. As it is associated with very serious injuries, the probability will be reviewed and it must be of a higher priority than the moderate one with fewer consequences.
Important	In the presence of such a risk, no work should be done. This is a risk in which you

	must establish safety standards or checklists to ensure that the risk is under control before starting any task. If the task or the work has already begun, the control or reduction of the risk must be done as soon as possible.
Unacceptable	If it is not possible to control this risk, any operation should be suspended or its initiation prohibited.

Source: Storch, 1998, Adapted by: Aqua & Terra Consultores Asociados S.A.S., 2015

To identify the risks, a procedure is carried out in the areas proposed to compensate (Protective Forest Reserve, Leon River delta):

1. Identification of pre-existing conditions that may lead to serious situations.
2. Identification of the types of risks (fires, explosions, spills, etc.)
3. Determination of possible causes that may cause accidents.
4. Identification of the type of infrastructure related to the risks.
5. Determination of the possible effect on people, environment and material goods.
6. Location of possible damages.
7. Preventive recommendations.

The results of the risk analysis will be presented in a matrix, after assessing the risks, the hierarchy will be executed to establish the corresponding recommendations to be applied in the execution of the compensation plan.

- *Identification and analysis of possible threats in the proposed areas to be compensated*

Next, the possible threats (exogenous and endogenous) that may be found in the Protective Forest Reserve and the Leon River delta for the execution of the compensation plan are considered.

- *Identification of exogenous threats in the proposed areas to compensate*

Below are the exogenous threats that may appear in the development of activities for the implementation of the compensation plan.

Table No. 11.77 Identification of probable exogenous threats

Classification of the threat	Type of threat	Threats
Exogenous	Natural	Earthquakes: the area of the Leon River delta and the forest reserve are in a tectonically active zone (Figure No. 11.34).
		Flooding: the area where compensation is proposed is limited to the Leon and Suriquí rivers. Additionally, it is a

		topographically very low area, badly drained and is affected by daily tidal fluctuations in the case of the delta zone.
		Climatic and hydrodynamic: the area is characterized by three marked climatic periods (summer, winter and transition), so depending on the climatic period, low-rainfall situations can be generated, causing heat shock to staff or times of high rainfall, making activities for the execution of the compensation plan.
		Bite or bite of animals (snakes, bees, among others): Considering that compensatory measures are raised on a reserve and that this has little or average anthropic intervention it is very possible to find organisms that look for more conserved areas to develop their activities. These organisms can be poisonous snakes, large mammals, insects, among others.
		Contact with stinging plants: this threat refers to the possible contact of the personnel in charge of executing the management plan with stinging plants that may be present in the area.
	Anthropic	Coordination with CORPOURABÁ: this threat refers to possible difficulties in organizing the accompaniment of officials in the proposed compensation activities.
		External forces (actions of third parties): This threat is related to the presence of armed groups outside the law, which implies that terrorist acts may be presented that threaten security, the normal development of the execution of the compensation plan and the human life.

Sources: Aqua & Terra Consultores Asociados S.A.S., 2015

The threats of natural type were identified according to the contingency plan and the characteristics identified in the present study, since the proposed areas to be compensated are located in the neighborhoods with similar characteristics. Some limitations for the detailed description of exogenous threats are due to the fact that the areas proposed to compensate are not well characterized since it was not the object of the present study.

- Probability of occurrence of exogenous threats

Next, the probability of occurrence of exogenous threats in the sites proposed to implement the compensation plan is evaluated (Table No. 11.78).

Table No. 11.78 Probability of occurrence of exogenous threats

Classification of the threat	Kind of Threat	Threats	Probability	
			Leon River Delta	Protective Forest Reserve
EXOGENOUS	NATURAL	Earthquakes	Low	Low
		Floods	Medium	Medium
		Extreme weather events	High	High
		Bite or bite of animals	Medium	Medium
		Contact with stinging plants	Medium	Medium
	ANTHROPIC	Coordination with CORPOURABÁ	Low	Low
		EXTERNAL FORCES (actions of third parties, presence of armed groups outside the law)	Low	Medium

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Evaluation and analysis of the consequence / vulnerability of exogenous threats

After the classification of the probability of occurrence, the following assessment of the consequences / vulnerabilities of the exogenous threatening events was obtained in both proposed areas for compensation.

Table No. 11.79 Evaluation of the consequence - vulnerability

Classification of the threat	Kind of Threat	Threats	Consequence – vulnerability	
			Leon River Delta	Protective Forest Reserve
EXOGENOUS	NATURAL	Earthquakes	Harmful	Harmful
		Floods	Harmful	Harmful
		Extreme weather events	Slightly harmful	Slightly harmful
		Bite and/or sting of poisonous animals	Extremely harmful	Extremely harmful
		Contact with stinging plants	Slightly harmful	Slightly harmful
	ANTHROPIC	Coordination with CORPOURABÁ	Slightly harmful	Slightly harmful
		EXTERNAL FORCES (actions of third parties, presence of armed groups outside the law)	Harmful	Harmful

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Risk estimation for exogenous threats

Later, when relating the probability with the consequence, the level of risk of the identified exogenous threatening events was obtained (Table No. 11.80).

Table No. 11.80 Estimation of the risk for exogenous threats in the areas proposed to compensate

Classification of the threat	Kind of threat	threat	Risk estimation	
			Leon River Delta	Protected Forest Reserve
EXOGENOUS	NATURAL	Earthquake	Tolerable risk	Tolerable risk
		Floods	Moderate risk	Moderate risk
		Extreme weather events	Moderate risk	Moderate risk
		Bite and/or Sting of poisonous animal	Important risk	Important risk
		Contact with stinging plants	Tolerable risk	Tolerable risk
	ANTHROPIC	Coordination with CORPOURABÁ	Trivial risk	Trivial risk
		EXTERNAL FORCES (actions of third parties, presence of armed groups outside the law)	Tolerable risk	Moderate risk

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- *Identification of Endogenous threats in the proposed areas to compensate*

Below are the exogenous threats that may appear in the development of activities for the implementation of the compensation plan.

Table No. 11.81 Identification of probable endogenous threats

Classification of the threat	Kind of Threat	Threats
ENDOGENOUS	Mechanic	Work accidents: this threat refers to possible incidents with materials and equipment that are required for the execution of the compensation plan (de-harrowing, machete, shovel, Hole Makings, among others).
		Fall of heights: this threat refers to the work of heights that is required for the collection of seeds and the fall of branches that may occur on the staff.

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Probability of occurrence of endogenous threats

Next, the probability of occurrence of exogenous threats in the sites proposed to implement the compensation plan is evaluated (Table No. 11.82).

Table No. 11.82 Probability of occurrence of endogenous threats

Classification of the threat	Type of threat	Threats	Probability	
			Leon River Delta	Protective Forest Reserve
ENDOGENOUS	Mechanical	Work accidents	Low	Low
		Fall from heights	Low	Low

Fuente: Aqua & Terra Consultores Asociados S.A.S., 2015

- Evaluation and analysis of the consequence / vulnerability of endogenous threats

After the classification of the probability of occurrence, the following assessment of the consequences / vulnerabilities of the threatening endogenous events was obtained in both proposed areas to make the compensation.

Table No. 11.83 Consequence - vulnerability evaluation

Classification of the threat	Type of threat	Threats	Consequence - vulnerability	
			Leon River Delta	Protective Forest Reserve
ENDOGENOUS	Mechanical	Work Accidents	harmful	harmful
		Fall from heights	Extremely harmful	Extremely harmful

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- Risk estimation for endogenous threats

After relating the probability with the consequence, the level of risk of the exogenous threatening events was identified. (Table No. 11.84).

Table No. 11.84 Estimation of the risk for endogenous threats in the areas proposed to compensate

Classification of the threat	Type of threat	Threats	Risk estimation	
			Leon River Delta	Protective Forest Reserve
ENDOGENOUS	Mechanical	Work accidents	Tolerable risk	Tolerable risk
		Fall from heights	Moderate risk	Moderate risk

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

- *Proposal to minimize potential risks*

Once the risk analysis is made with the possible exogenous and endogenous threats in the areas to be compensated, those risks between moderate and important will be considered, in order to generate possible actions and minimize the risk, should these threats materialize.

Threat	Actions
Floods	* Be alert to the Early Warning System - SAT and local reports.
Extreme weather events	* In case of high temperatures keep the staff hydrated and have rest times for physical recovery and avoid heat stroke. * In case of a lot of rainfall, suspend activities and wait for the weather to be normal.
Bite of animals	*the staff must be equipped with appropriate footwear and clothing *The path must be checked before stepping or grabbing * Be cautious in areas with rocks, fallen logs *Choose suitable places to rest *React calmly to the encounter of a dangerous animal *In no case will the animal be manipulated or sacrificed *Adopt special preventive measures in places where the presence of dangerous species is identified. *Have a first aid kit and ant venom serum at hand, as well as trained personnel for the handling of these.
External forces (actions of third parties, presence of armed groups outside the law)	* Be aware to communications from the security forces and actions that arise * All activities that are running at the moment will be suspended
Fall from heights	* Staff must have the appropriate safety equipment * Staff must have a basic height certificate

Source: Aqua & Terra Consultores Asociados S.A.S., 2015

1.2.7 Implementation and administration mechanisms

The mechanisms for implementing this compensation plan are presented in the detailed proposal for compensation actions (11.2.5).

On the other hand, an administrative order responsible for executing the compensation plan for loss of biodiversity is presented below:

Figure No. 11.59 Administrative scheme proposed for the implementation of the compensation plan for loss of biodiversity
Source: Aqua & Terra Consultores Asociados S.A.S., 2015

1.2.8 Monitoring program for recovered areas

In the monitoring program, three basic aspects will be considered: the monitoring of seedlings planted, the monitoring of physical factors and the monitoring of the plant cover established in the recovery zone. Based on the analysis of this information, compliance with the objective of the environmental management measure can be defined.

The measurement of the extension increase of the vegetation cover in the recovered and compensated areas, is made from satellite images every year for five years, at the end of the fifth year the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas.

During this phase, landscape ecology indexes will be measured, as will multitemporal analysis of vegetation cover. Likewise, control and monitoring of the recovered areas will be carried out in the following manner:

- Control of biotic agents

During the execution of the establishment of the compensated areas and during the first five years, preventive and corrective measures will be taken to control harmful biotic and fungal agents, such as ant trio, crickets, nematodes, bacteria and fungi among others.

For the control and surveillance of the compensated areas, the PUERTO BAHÍA COLOMBIA DE URABÁ SA Company, with the support of CORPOURABÁ, will have personnel to cover the reforested areas, every six months for five years, this staff must verify the plantation status, determine the mortality rate and conceptualize the need for control of ant and biotic agents, need for irrigation and overseeding.

- Installation of permanent growth parcel(PPC)

For the evaluation of the structural attributes of the compensated forest, permanent monitoring parcels will be installed to measure the growth of the planted trees and evaluate the recovered ecosystems. The methodology proposed by Pinelo will be used, where parcels of 0.25 ha (50 m long x 50 m wide) will be installed, georeferenced and, as far as possible, delimited from the marking of the trees corresponding to the vertices with oil paint.

Every 6 months, during the first 3 years It will be measured; then every year until completing the fifth year (year 5), the phytosanitary status of each tree will be measured as well as the diameter and the total height, this in order to determine growth rates and structural analysis of the forest, also these results will be the basis to take corrective measures in case of finding deficiencies with respect to the monitored areas.

- Forest inventory

Among others, the following factors will be taken into account:

Georeferencing of each of the trees planted in the 255.4 hectares compensated.

Environmental tensors that may affect the recovery of the compensated forest will be identified.

A photographic record will be kept prior to the beginning of the works.

The mortality of the planted trees will be recorded.

- Maintenance

The maintenance will be carried out every six months, the first 3 years, then every year for two more years. Finally, upon completion of the fifth year, the compensated areas will be delivered to the competent environmental authority for their due protection and conservation under the structure of protected areas. Silvering and overseeding should be

done again to compensate for mortality. Phytosanitary control and irrigation must be done whenever required, as a result of the rigorous monitoring of reforestation.