ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE
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PUERTO BAHÍA MULTIPURPOSE PORT
COLOMBIA

Figure 1: General picture of the project
Sources: Sociedad Portuaria Puerto Bahía, "Informe de Progreso" (presented to the United Nations Global Compact 2014), 5.

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EXECUTIVE SUMMARY

Puerto Bahía is a large-scale multifunctional port with capacity to handle dry and liquid products in bulk. Located at the southern part of Mamonal in Cartagena Bay, between the Dique Canal and Bahía Honda swamp on the island of Barú, the port is the most advanced in Colombia and the region for handling, storing, and exporting oil. In its current operation phase the project has the capacity to store 3 million barrels of oil and to handle an export flow of 6.8 million metric tons per year. US $585 million was invested in the construction of the port, which is allowed to operate for 25 years under the administration of Sociedad Portuaria Puerto Bahía (SPPB), part of the holding company Pacific Infrastructure.

Puerto Bahía has been committed to sustainability during its construction and operation periods. Specifically, it has made several efforts to improve the quality of life of the surrounding community and the natural world. The project performed a broad set of actions including infrastructure development, technical training, and support of cultural and entrepreneurial programs. It also made several efforts to conserve and restore the surrounding water bodies of the Dique Canal and Bahía Honda swamp by creating sound reforestation programs and monitoring quality of both vegetation and animal habitats. Impacts on Quality of Life and Natural World were the project's highest achievements, followed by Leadership, Resource Allocation, and finally Climate and Risk.

Efforts to improve quality of life in the surrounding communities resulted in the construction of a cultural center and a new day care center, and the renovation of El Pelao aqueduct and the soccer field. The community's economic improvement was also seen after the implementation of training workshops in technical skills associated with port operation and a policy of employing local population first. 60% of the unskilled labor came from the direct area of influence, and at least 200 workers were employed during the construction period. Additionally, a group of the most disadvantaged women was selected to receive entrepreneurial support for starting a new manufacturing company. Two companies resulted from these programs, the cleaning products company Productos Barú and the clothing manufacturing company Confeccionando Futuro. Moreover, surrounding communities were involved in activities to monitor and restore natural conditions. For example, 107.5 ha of mangrove areas and 65 ha of wooded areas on land were replanted by Pasacaballos Mangrove Growers Association, a worker-owned company from the project's area of influence.

Water systems conservation and restoration stand out in the project's impacts on the natural world. Since the area is not connected to Cartagena's aqueduct network, water supply and consumption were addressed with special care. Freshwater scarcity is handled by collecting and

treating rainwater as well as wastewater, using portable toilets, reusing industrial water, and performing monthly surface and groundwater quality monitoring. Moreover, the project manages flooding dynamics, water infiltration, and water quality by implementing mangrove and dry forest reforestation programs in addition to planting an ecological corridor around Bahía Honda swamp. These restorative actions improve the existing hydrological systems in addition to providing new habitats for animals. As a side effect of the water system restoration, the project team was able to preserve the biodiversity conditions found before the construction of the project started.

These natural world achievements are supported by the leadership of the Puerto Bahía team. The project follows the United Nations Global Compact, is part of local associations, and demonstrated strong collaboration with both public and private agencies dealing with sustainability issues. For example, it identified Coreca, a local company that buys recycled material derived from the port's operation. This company is part of APELL, a cooperative group of the largest industrial companies of Mamonal and Cartagena as well as community leaders, created to promote joint efforts in case of an emergency. Additionally, the project supports sustainable practices by requiring its contractors and suppliers to meet the ISO 14001 quality standard as part of its sustainability management plan.

In its resource allocation practices for construction materials, Puerto Bahía considered both the sources and disposal of used material as well as internal practices for reducing waste and promoting recycling. For example, 100% of construction materials such as concrete, gravel, and sand were acquired from local companies. All the ornamental and reforestation vegetation came from the area of influence. Separate containers and designated places for dangerous waste treatment and disposal were provided for recycling and waste reduction. Additionally, the amount of excavated materials taken off site was reduced by creating topographic reconfigurations inside the project. The efforts to acquire materials from local companies and reuse excavated materials reduce each material's embodied energy. This will represent a reduction of CO_2 emissions and fossil fuel use among other benefits related to transportation.

Finally, some consideration was given to climate and risk. Puerto Bahía performs well in its measurement of emitted gases and air pollutants in the project area. The port is also very well prepared for short-term hazards both natural and manmade such as earthquakes, fires, or flooding. Puerto Bahía's employees and the affected community were informed about possible risks and receive periodic communications regarding emergency responses. However, the project's resilience could be improved by creating a long-term plan for threats such as global warming and sea level rise.

Although Puerto Bahía is considered a sustainable infrastructure project, there is still room to improve several aspects of its operation and planning, such as: reduction of energy and water consumption, increased reuse of recycled materials inside the project, creating an adaptability plan for sea level rise and global warming or addressing the heat island effect. Some other measures to consider are planning for possible deconstruction and recycling of the project's facilities, improvement or support for community mobility and access beyond roads for vehicles, and encouragement of alternative modes of transportation for the affected communities as well as employees.

Due to the project is located in such a strategic ecological region between the Dique Canal and the Bahía Honda swamp, it was imperative to address the ecological dynamics of the existing habitats in order to improve not only the project's site but the surrounding communities and the region. Commitment to the communities started through the conservation and improvement of the natural habitat, and went on to provide better living conditions that will foster economic development. Puerto Bahía's performed actions toward sustainability in addition to its role as a sustainability leader in the cooperative sector may help disperse negative impacts of the project at a regional and maybe a global scale.

Figure 2: People and Leadership award Summary of results

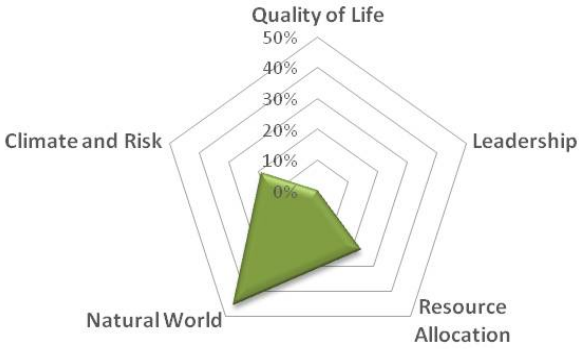

Figure 3: Climate & Environment award Summary of results

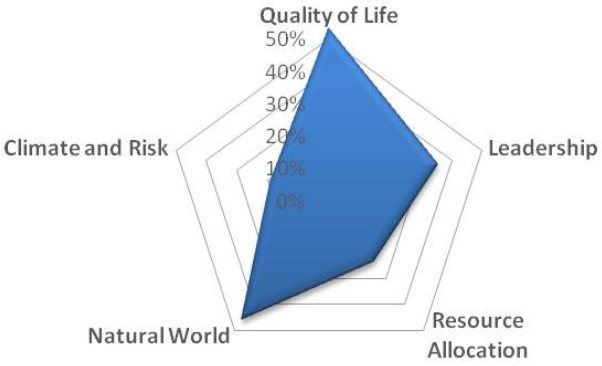

Figure 4: Infrastructure 360 award Summary of results

1. PROJECT DESCRIPTION AND LOCATION

Puerto Bahía is a large-scale multipurpose port with the capacity to handle dry and liquid products in bulk, a general loading terminal, and a specialized infrastructure for oil storage. It has been labeled "the first large-scale oil storage port in [Colombia's] Atlantic and Pacific regions."[1] Located four miles from Cartagena's port, the new project will complete the area's programmed storage services by adding the capacity to store oil and other liquids. Additionally, the project is located near the Dique Canal, which is another water route for Colombia's imports and exports, as well as some new highways built by the Colombian government. The port's management, officially named Sociedad Portuaria Puerto Bahía (SPPB), is part of the Pacific Infrastructure holding company, and will follow Pacific Infrastructure's guidelines for corporate governance, performance, and standard qualities. The project administration is divided, with the oil storage administered by Oiltanking International while the cargo terminal is administered by SPPB. The port is currently in operation. After a total of four construction phases that began in October 2012, Puerto Bahía was inaugurated in August 2015. Phases 1, 2, and 3 were related to the liquid terminal, and Phase 4 was related to the dry cargo terminal. The total investment of US $585 million was mainly provided by Pacific Exploration and Production and the International Finance Corporation (IFC); small loans from several banks were also required.

With an area of 105 hectares, Puerto Bahía is located on the southern part of Cartagena Bay, between the Dique Canal and Bahía Honda swamp on the island of Barú. It is connected to the Magdalena River, historically one of Colombia's most important shipping routes, as well as to the Caribbean. Additionally the project is located on the mouths of three minor rivers (Caño Correa, Caño Matunilla, and Caño Lequerica). The location of the project is convenient because of the natural depth of the bay (about 16 m on average), which allows for docking without dredging. The area of the project's influence is located within the Caribbean's tropical dry forest biome, predominantly characterized by grasslands, mangroves, and wetlands. The area also has rich ecosystems and biodiversity, with some exceptions such as the deteriorated mangroves in Bahía Honda. The area hosts some endangered species (both flora and fauna), with ranges of danger varying from critical to in danger or vulnerable.[2]

The port is the most advanced in Colombia and the larger region for storing oil supplies. It serves the country and the region because of its strategic location near the Panama Canal. In addition, to facilitate the storage of liquids and containers, the port has specialized facilities for imports, exports, and transshipments of bulk loads. The project is committed to the

[1] Edwin Bohorquez, "Otro puerto para el Caribe," *El Espectador*, Bogotá, 2016.
[2] Equal, "Plan de acción para la biodiversidad Sociedad Portuaria de Puerto Bahía," document presented to Puerto Bahía, Bogotá, 2015, 7.

preservation of the biodiversity and the environmental condition of its area of influence, as well as to the social and economic development of the surrounding communities.

During operation, Puerto Bahía's energy consumption is estimated to be just over 9 million kWh per year. The only locally available renewable energy source is a pilot project for powering an office space with two solar panels. This will replace energy from diesel-based electric generators.

Puerto Bahía presents a big opportunity to improve the control of greenhouse gas emissions, which are estimated to be 4.6 million tons of CO_2 equivalent per year for the project by itself.[3] According to the Environmental Management Plan and per national regulations, the following actions will be performed within the project framework: preference for the use of newer vehicles, preference for the use of local materials suppliers, periodic maintenance of vehicles and machinery, and the selection of low-emissions technology for the burning of gases required during the oil storing process. Additionally, air quality in and around the project will be monitored every six months. Although the actions listed above reduce emissions below the level required by national standards, the tanker trucks used to distribute oil throughout the country are the most significant source of the project's greenhouse gas emissions, and remain uncontrolled. This is a factor that is not entirely under the project team's control, but which they can try to influence and improve upon.

SPPB is committed to promoting economic, social, and cultural development within its area of influence. The site neighbors five urbanized areas identified by the Ministry of the Interior of Colombia as Afro-descendant communities: Pasacaballos, Araca, Santa Ana, Bocachica, and Caño del Oro. The Constitutional Court of Colombia has designated the Afro-descendant communities of Barú (part of the direct area of influence of the project) as part of the country's minority population. The project team has demonstrated significant efforts to integrate the affected communities in design decisions making as well as environmental training and monitoring. Puerto Bahía has also created a foundation (Fundación Puerto Bahía) to manage and support programs dedicated to improving the social, cultural, and economic development of the communities. Through the support of the foundation, the community has constituted new companies such as Confeccionando Futuro, Atarraya, Productos Barú, and CADESAR. Collaboration with the community occurs periodically during workshops, meetings, and trainings.

[3] Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación," document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014, 20.

2. APPLICATION OF THE ENVISION RATING SYSTEM

The Envision™ system is a set of guidelines that aid in optimizing the sustainability of an infrastructure project during the planning and preliminary design phases, as well as a means to quantify the relative sustainability of the project. In this case study, the infrastructure to be assessed is a Multipurpose Port Puerto Bahia in Cartagena, Colombia.

Envision consists of 60 credits grouped into five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Risk. Each credit pertains to a specific indicator of sustainability such as reducing energy use, preserving natural habitat, or reducing greenhouse gas emissions. Those credits are rated on a five-point scale referred to as a "level of achievement": "improved," "enhanced," "superior," "conserving," and "restorative." Evaluation criteria are provided to determine whether the qualifications for each level of achievement have been met for a particular credit. In each of the five categories there is a special credit called "Innovate or exceed credit requirements." This is an opportunity to reward exceptional performance that applies innovative methods within the subjects that Envision evaluates.

The criteria for the levels of achievement vary from credit to credit, but generally an "improved" level of achievement is awarded for performance that slightly exceeds regulatory requirements. "Enhanced" and "superior" levels indicate additional gradual improvement, while "conserving" often indicates performance that achieves a net zero or neutral impact. "Restorative" is the highest level and is typically reserved for projects that produce an overall net positive impact. The Envision system weighs the relative value of each credit and level of achievement by assigning points. Credit criteria are documented in the Envision Guidance Manual, which is available to the public on the ISI[4] and Zofnass Program[5] websites.

3. QUALITY OF LIFE CATEGORY

Envision's first category, Quality of Life, pertains to potential project impacts on surrounding communities and their well-being. More specifically, it distinguishes infrastructure projects that are in line with community goals, clearly established as parts of existing community networks, and consider long-term community benefits and aspirations. Quality of Life incorporates guidance related to community capacity building and promotes infrastructure users and local members as important stakeholders in the decision-making process. The category is divided into four subcategories: Purpose, Well-being, Community, and Vulnerable Groups.

[4] www.sustainableinfrastructure.org
[5] www.zofnass.org

Purpose

The project should aim to positively impact functional aspects of the community, such as growth, economic development, and the overall improvement of quality of life. Puerto Bahía had an overall good performance, since there is evidence of several initiatives created to improve economic and cultural conditions of the community in the long term.

Puerto Bahía is committed to listening and to making the project part of the surrounding community. The project team fulfilled the community participation requirements set by the national government in addition to internal policies of local hiring, local training, and local support. The five communities in the direct area of influence had many opportunities to explain their concerns and make requests. The outcome of this participative process includes two manufacturing startups, a support program for fishermen, a new cultural facility, the rehabilitation of a water tank, a nursery garden, and various training workshops including for occupational therapy, early childhood, port management and operation, English, and software training, among others.

In order to promote local employment, there is an internal policy to hire at least 60% of their unskilled labor from the local area. This internal policy applies directly to the operation team of Puerto Bahía, including subcontracted companies. During the construction period 79% of the people hired came from the region, with 24% from the direct area of influence. Additionally, the community is involved in several environmental management monitoring processes.

The affected population is considered an Afro-descendant community, designated by the Colombian government as a minority group. The support, training, and development from Puerto Bahía's team have had a major impact on this minority group. Additionally, one of the project's most developed social programs, the one dedicated to the manufacturing startups, is specifically focused on women with the lowest income. The focus on the minorities and the most vulnerable population will positively affect the economic development of the direct area of influence of Puerto Bahía.

Although Puerto Bahía has made several efforts to improve the surrounding communities' economic, cultural, and health conditions, the duration of their support is not clear. Thus there is a lost opportunity to restore the community's natural environment and to assure the effectiveness of the implemented projects.

Well-being

Well-being looks at improving individual comfort related to noise and illumination, health conditions and mobility. Puerto Bahía has implemented plans and protocols related to the health, safety, and comfort to its workers. Additionally, it has systematically monitored and addressed employee´s health risks that occurred during construction, operation, or integration of new technology implemented by Puerto Bahía for storing oil.

The occupational health plan is a comprehensive procedure that defines actions regarding worker health monitoring as well as environmental monitoring in order to reduce risks and increase comfort. For example, although the project's area already had noise levels above the national regulation, Puerto Bahía demonstrated commitment to controlling and monitoring its noise emission and propagation. The documentation provided demonstrated periodic measurements and studies before construction and during operation. There is also detailed information regarding noise restrictions for project equipment. During construction there were internal policies for working hours, noise propagation strategies, and restriction of the use of horns and sirens or other required equipment in order to reduce unnecessary noise. The major noise producers during the operation phase were identified and safety measurements were taken in order to control negative impacts on workers. 88.89% of the areas of the port have noise levels below the national regulation; the remaining 11.11% has been assessed and controlled. This noise control procedure proves the project's commitment to increase the comfort of the community and the workers.

Moreover, Puerto Bahía demonstrated additional concern regarding the risks of operating the new technology. Eight floating-roof tanks were constructed that reduce the risk of working at great heights and exposure to welding during construction as well as the emission of particulates during operation. Systematic health monitoring of the workers was demonstrated as well as air quality control.

An important aspect to keep in mind in promoting community well-being is mobility in the area. Puerto Bahía is located near two urbanized areas, Pasacaballos and Ararca, and better mobility programs including alternative modes of transportation could be implemented. Such programs would significantly improve the quality of life of the community working in Puerto Bahía as well as make a better urban connection between the port and its surroundings. Additional efforts could also be undertaken to increase accessibility, safety, and wayfinding for the community. In order to promote safety in the work area, a plan for workplace hazard identification and emergency routes has been established as well as better signaling outside the project. One of the examples of this intervention is the road connecting Puerto Bahía and the Barú community.

Some of this new signage will reduce traffic in the area and will help to better identify some natural or cultural features of significance to the community.

Community

The cultural assets of the adjacent community, including its visual character and cultural heritage, should be considered in carrying out a sustainable project. Puerto Bahía demonstrated a good performance in considering heritage, local character, and the overall physical context of the surrounding communities. Archaeological and local landscape assets were identified and action plans were deployed in order protect them and mitigate the negative impacts. The community was highly involved both in the identification and the mitigation actions. The community was also thoroughly consulted when developing new public spaces and public buildings dedicated to improved livability in the area.

Regarding historical heritage, a comprehensive archeological analysis was done in order to identify and preserve historic objects found in the site. Such elements have importance not only to the local community but also to Colombian people. These findings become part of the national cultural heritage of Colombia and can be used by the general public.

The project's commitment to the existing site conditions and their importance to the community is also present in the conservation of natural ecosystems, which are part of the local community character. Under the umbrella of preserving local character, mangroves, fish communities, large avian species, and iguanas are considered the main target of conservation efforts due to their ecological value as well as their significance to the community. For the affected people of Puerto Bahía, mangroves are part of their everyday experience; fish communities and iguanas are part of their economy and daily meals and bird species are a symbol of the biodiversity of the area. Additionally the project has internal policies to improve the site's landscape, transforming 85,890 m^2 by planting new trees, shrubs, and grass.

Livability in the community was also improved by the project's actions. New public spaces like a new pedestrian bridge and a new sports field were built. Existing local roads were paved and provided with new sidewalks, also a park associated with the cultural house was renovated. Public buildings such as a family aid and orientation center, a new cultural center, a new digital technology center, a new clothing warehouse, and a new fish-farming facility were constructed. All these actions increased the quality of life and engendered community engagement.

Nevertheless, there are still opportunities for improvement by increasing efforts to monitor the conservation of the local character in the long term, as well as improving the project's archaeological strategy by shifting from a conservation attitude to a restorative one.

Additionally, the project can also influence the design of new public spaces with more durable materials and better integration of pedestrians.

Vulnerable Groups

When assessing the impacts a given project can have on the quality of life of the population, it is extremely important to pay special attention to vulnerable groups – such as women and children – in order to increase community pride and development. Puerto Bahía has demonstrated a commitment to improving the economic, productive, and cultural conditions of the affected Afro-descendant communities, with major efforts to support special productive programs for women living in poverty.

The five communities affected by the port are considered Afro-descendants by the National Government of Colombia. These communities are characterized by the poverty that affects the majority of the community, including women. Puerto Bahía supported various empowerment projects such as Jugando con Valores, Confeccionando Futuro, Productos Barú, a fishermen's empowerment program, early childhood development programs, and labor and technical training. Jugando con Valores is targeted to the young population of Barú and is focused on empowering the community to create leaders and follow the power structure. Confeccionando Futuro and Productos Barú are two manufacturing startups created by a group of 30 women. These companies were created after receiving technical and management training provided by Fundación Puerto Bahía. Puerto Bahía also supported the fishermen's program that provided support and training for improving the production of local fishermen. These production projects opened the possibility of improving quality of life by empowering women and their families.

In addition to the productive programs, several training initiatives regarding child care, labor abilities, electronics, English, port activities, and tourism administration were provided to 220 community members.

Although efforts to empower vulnerable are significant, there remain big opportunities to assess mobility conditions for women and afro-descendants groups. The community should be involved in participation programs dedicated to upward mobility where people can express their needs and difficulties. With such information at hand, additional stakeholders like public and private agencies could be called on to create partnerships to support projects designed to promote upward mobility for women and vulnerable groups.

4. LEADERSHIP CATEGORY

The Leadership category evaluates project team initiatives that establish communication and collaboration strategies early on, with the ultimate objective of achieving sustainable performance. Envision rewards stakeholder engagement as well as encompassing a holistic, long-term view of the project's life cycle. Leadership is distributed into three subcategories: Collaboration, Management, and Planning.

Collaboration

In order to ensure a collaborative approach, committed leadership with sustainability is required in order to identify stakeholders and fully capture synergies, savings, and opportunities for innovation. To achieve these goals it is required teamwork and partnerships with involved parties at all levels. Leadership should encourage collaboration with external stakeholders, including the affected community, as well as collaboration among the project's team. This type of collaboration requires new management strategies in order to solve new challenges.

Puerto Bahía has made significant efforts to share the project's commitment to sustainability. The company presented the project to the UN Global Compact and was accepted as an active GC (Global Compact) company. The compact evaluates care taken on human rights, designation of working standards, establishment of an Environmental Management Plan, and commitment to eliminating corruption. Puerto Bahía had a positive evaluation from the UN compact.

The project has a management system in which the Direction of Sustainability responds directly to the Board of Directors. The project also created an independent foundation called Fundación Puerto Bahía dedicated exclusively to managing actions affecting the community and their environmental impact.

As part of the project's Environmental Management Plan, Puerto Bahía has involved the community by fostering participation in the design and operation of the project. The community is also directly involved in monitoring environmental indicators. Although the communication with the community is strong, the project team could improve its communication with other external stakeholders beyond preventing or responding to emergencies. Puerto Bahía has established strong connections and collaboration with different entities, also as a member of APELL, a group of large industrial companies of the region created

to consolidate efforts in case of an emergency. The project team also collaborates with the Alcaldía de Cartagena, Gobernación de Bolívar, Corporación Autónoma Regional, and Concejo Distrital para la Gestión del Riesgo de Desastres. These collaborations have created a strong partnership in case of emergencies need to be confronted. However, these linkages could also be used as platforms for better environmental practices, improvement of large-scale ecosystems, and more.

Puerto Bahía could also increase efforts to foster teamwork inside the project's management. It is advisable to create teamwork strategies able to optimize alternative supply sources. A well-structured team collaboration could optimize the project's operation by eliminating duplicated functions or unnecessary redundancies.

Management

The long-term sustainability of the project requires a new way of management that pursues possibilities for collaboration with local companies, integration with local infrastructure, and long-term optimization of processes. Integration opportunities with surrounding areas and the region have been identified and improved in the project. Puerto Bahía demonstrated a commitment to integrating and improving local infrastructure and to systematic monitoring and maintenance activities related to the Environmental Management Plan. The project still has to improve its actions to identify and pursue opportunities to manage use of by-products or waste generated by the nearby community.

Puerto Bahía will renovate an existing road and improve a section of planned road in order to better connect the project and the local areas with the region. Both road improvements positively impact communities in the project's area of direct influence. The existing road is part of the network that provides access to Pasacaballos, Ararca, Santa Ana, Barú, and Playa Blanca. The project will improve this connection by widening the road, upgrading it from dirt to pavement, constructing a drainage system, building landslide protection systems, as well as the improvement of road signals. The planned road called Transversal de Barú will connect the region with the industrial zone and the port area of Cartagena. Moreover, this network reaches the regional corridors of the Cartagena bypass road and the industrial zones of Barranquilla and Santa Marta. The network is also linked to the national corridors connecting the Atlantic coast with the main production centers of western and central Colombia. Puerto Bahía advocated for improving the structure of the road so that heavy-load vehicles could use it for long periods without damaging the road. Improvements to the road were coordinated by Puerto Bahía's team and will positively affect the economic and urban development of the region.

Puerto Bahía has also performed well in structuring a systematic monitoring plan and action program. Broad understanding of the benefits of prevention and periodic monitoring were demonstrated by an Environmental Management Plan with clear objectives, responsibilities, schedules, and costs. Monitoring measures were performed before and during the construction period, which demonstrated the commitment of the project to prevention, conservation, and restoration of its natural and social environment.

However, there is still room for improvement in identifying additional integration of the project with other community-wide infrastructure systems and with other actors that could use the project's waste and by-products. These actors have the potential to provide useful products to Puerto Bahía.

Planning

Planning decisions and actions could increase the sustainability performance of the project. The Planning subcategory takes into account diverse aspects such as long-term monitoring and maintenance, possible conflicting regulations, and future growth trends in the area. Puerto Bahía has performed above standard considerations in planning aspects by defining systematic mechanisms and strategies in a Comprehensive Management Plan in which current and future regulatory conflicts are identified. In addition, Puerto Bahía created an Environmental Management Plan defining specific monitoring processes for mitigation actions during the operation and construction phases of the project. To incorporate future growth trends in the area, the project's team built facilities to last longer than their operation contract. However, the team missed the opportunity to provide guidelines for a dismantling process or in case of a change of use in the future.

The project's Environmental Management Plan defines actions required to reduce negative impacts to the environment and the nearby community. Each program has a detailed plan in which all details about the cost, schedule, and goals of the project are identified as well as the benefited population and strategies of community participation. Monitoring indicators are defined to address actions regarding air, water, biodiversity, forestry, or wetlands quality.

The project team identified conflicting information on permitted tank height between the international law NPFA 30 and Colombian law. As a result it was decided to use international regulations, which were proven to be more restrictive and safe than the local ones. Establishing mechanisms to identify regulatory conflict and to find adequate solutions to flaws in the project's design demonstrates the effectiveness of Puerto Bahía's planning mechanisms.

According to the life span of the project, the Planning Document of Cartagena asserts that the project's site is suitable for industrial and port purposes, and therefore the project's infrastructure is expected to be in place for the long term. Additionally, project structures were built to last longer than Puerto Bahía is currently allowed to operate -20-year contract. However, within the project design criteria there was no consideration of possible future changes in the flexibility, durability, and resilience of physical structures nor selection of materials easily adaptable to changing configurations, retrofits, or repairs.

The location and design are aligned with long-term project requirements. However, there is room for major improvements such as a more in-depth and systematic search of conflicting regulations that may affect sustainability. This will promote a shift from conflict identification and resolution in individual projects to broader relief and structural change. Additionally, more consideration could be given to flexibility for change, expansion, or improvement in project design. Although the project team provided evidence of the maintaining project's use in the long term, there is no consideration of future changes in technology or new emerging needs that could have been taken into consideration during the design stage. There is also no consideration regarding the selection of materials easily adaptable for changing configurations, retrofits, or repairs.

5. RESOURCE ALLOCATION CATEGORY

The Resource Allocation category deals with material, energy, and water requirements during the construction and operation phases of infrastructure projects. The quantity and source of these elements as well as their impact on overall sustainability are investigated throughout this section of the Envision rating system. Envision guides teams to choose less toxic materials and promotes renewable energy resources. Resource Allocation is divided into three subcategories: Materials, Energy, and Water.

Materials

Origin, quality, quantity, and life cycle of materials should be considered in the sustainable performance of infrastructure projects. This should include the assessment of net embodied energy during the entire lifespan of the project accounting for extraction, processing, manufacturing, and transport of materials and components. Reducing the embodied energy in transporting, extracting, or producing new materials as well as in the disassembly or transformation for recycling old materials is a major contributor to reducing energy consumption and contamination. Puerto Bahía demonstrated commitment to recycling, reuse, and acquiring construction materials from local sources. It is also committed to supporting

other companies that procure sustainable materials, as several companies with ISO 14001 were selected to provide construction materials. These actions improve the performance of the port in terms of reducing the embodied energy of materials used.

The project's detailed Environmental Management Plan describes recycling and reuse parameters for managing waste materials during the construction and operation periods. In order to facilitate reuse and reduce contamination risks, waste is stored in different-colored containers separated by categories. According to project documentation, three companies picked up 1000 kg of paper and cardboard, 436 kg of plastic, and 90 kg of metal between January and May of 2015. Additionally, more than 50% of the excavated materials have been properly stored and reused inside the project site.

Concern about the final use of materials and their destination is accompanied by addressing the origin of construction materials. According to the Environmental Management Plan, 100% of the concrete should come from companies located a maximum distance of 12 km from the project. Additionally, the Plan specifies that the project should always look first for local companies when acquiring a new service or product. As a result, three local companies provided concrete, sand, and gravel. Lastly, a local company created to support the project provided plants and trees for reforestation of the project and its area of influence.

Commitment to sustainability is also considered when selecting supply companies. According to recruitment process documentation, ISO 14001 certification is preferred for companies providing the following materials: stone materials, waste transportation and management, water and energy supply, civil construction, electrical and mechanic installation and assembly, maintenance services, food services, community work, monitoring services, and topographic services. Companies are monitored and required to follow Puerto Bahía's internal policies of good management practices. Additionally, suppliers are provided with technological support from Puerto Bahías project team about environmental management.

The project has room to improve its sustainable performance by performing a life cycle assessment of future materials used in the project and by planning and designing specifications and acquisitions of new materials with reuse and recycling in mind. Lastly, Puerto Bahía may significantly increase the use of its own recycled waste, decrease the percentage of excavated materials taken out of the site, and enhance its effort to support and identify companies engaging in sustainable practices beyond the local regulations and ISO 14001.

Energy

Using renewable energy in addition to strategies for reducing energy consumption are crucial for minimizing fossil fuel use. Achieving this goal involves design, planning, and monitoring actions.

Puerto Bahía has increased efforts to reduce the project's energy consumption. It commissioned Tetratech, a third-party company, to create a report evaluating how efficiently the project uses energy. The report identified 13 mechanisms to reduce energy consumption, including design recommendations, specific maintenance activities, and specific equipment usage. The report also includes gross consumption estimation during the total construction period (2,850,000 kWh) and operation (9,030,000 kWh/year). After evaluating energy consumption and possible reduction mechanisms, Tetratech recommended conducting a one-year plan with new reduction goals based on monthly monitoring. Although Tetratech's report demonstrates commitment to energy reduction, there was no evidence that the report's recommendations were implemented. Specifically, there was no information regarding reducing energy consumption by more than 20% as the report recommended. Therefore, there is opportunity to improve efforts by following the reduction mechanisms recommended.

In addition, Puerto Bahía implemented two renewable energy projects: a container office space powered by two solar panels, and a wind power extractor system providing energy to the port surveillance system. The solar panel project is a pilot project for powering other containers used as office space. The solar panels generate enough electricity to reduce fuel consumption by 5 gallons/day. Combined with the photovoltaic system, the wind power extractor system provides 130 W of the 195 W used by the surveillance system. While the two implemented projects help reduce fossil fuel use, they generate only a fraction of the total energy used by the project. According to Tetratech, a possible way to reduce nonrenewable dependence would be to connect to Colombia's national energy network, which is largely supported by hydropower. However, the optimal solution would be to install renewable solutions on site.

Water

Finding a water consumption balance is crucial because of uncertainty about future water availability. Protecting freshwater sources by reducing potable water consumption and optimizing water usage are viable strategies to address water scarcity in the future. Puerto Bahía has increased efforts to monitor water consumption and measure underground water quality while implementing water recycling systems. Starting in January 2015, the project team started measuring water consumption, reporting 196 liters of drinking water from January to May.

However, the project's region faces difficulties over potable water availability and supply water coverage. According to Puerto Bahía's water availability assessment, Cartagena's water supply comes from the Dique Canal, a source contaminated by industrial and residential wastewater discharge. The water availability report also identifies that the aqueduct system does not cover the project's site. The project's current water supply comes from treated canal water that is trucked in from Cartagena. In an attempt to address these issues, Puerto Bahía enacted several water reduction policies including: use of portable toilets, reuse of industrial water, discharge of rainwater into the bay, and treatment of wastewater. Water is treated by two plants, one for domestic wastewater and another for industrial wastewater. Treated water is discharged back into the bay or in some cases is trucked to facilities specializing in treating industrial wastewater.

The project's team also conducted an underground water quality and availability assessment. Geototal, a company contracted to construct 10 wells for measuring water quality and cleaning contaminated water, reported measurements from 2014 and 2015 demonstrating the project's long-term commitment to improving the quality of freshwater. Commitment to monitoring underground water included increasing efforts to monitor freshwater consumption on a monthly basis.

Puerto Bahía conducted a resource consumption efficiency report that describes design strategies, maintenance, training, and equipment specification used to reduce freshwater consumption. Periodic monitoring was part of the recommendations, with several actions described to reduce possible leaks or failures of the system that could impact water use.

The efficiency report also identifies water reuse opportunities specifically for wastewater treated inside the project. Rainwater will be contained in perimeter canals and directed to water treatment tanks before being discharged into Cartagena Bay. The report identified an opportunity for using such water for irrigation and toilet lavatories. However, water reuse systems have not been implemented and the opportunity to create a comprehensive water recycling strategy remains unused.

6. NATURAL WORLD CATEGORY

The Natural World category focuses on how infrastructure projects may impact natural systems and promotes opportunities for positive synergistic effects. Envision encourages strategies for conservation and distinguishes projects with a focus on enhancing surrounding natural systems. Natural World is subdivided into three subcategories: Siting, Land and Water, and Biodiversity.

Siting

Finding an appropriate location for an infrastructure project can benefit important ecological areas – such as water bodies, wetlands, and diverse habitats – and areas with geologic or hydrologic value. The correct location in certain cases should avoid these areas or find mechanisms to minimize possible negative impacts. Strategic locations for performing restorative effects on the environment could be areas considered as brownfields. Puerto Bahía is located in a significantly important aquatic ecosystem that was previously used by the shrimping industry. One of the first actions undertaken by the project team was to conduct an archaeological study and an environmental impact study addressing the existing conditions of the natural environment and recommendations to protect and restore them when possible. Such studies included existing surface and groundwater systems, terrain configuration, soil composition, biodiversity identification, structural geology, and hydrological geology. The project team's recommendations were followed for the last five years, demonstrating commitment to reducing negative environmental impacts.

Vulnerable geological conditions were identified in the Environmental Impact Study performed in 2011 before the construction of the project started. According to the study, Puerto Bahía is located in an area of low seismic risk and over an aquitard that is part of the Dique Canal aquifer. The Dique Canal delta and Ciénaga Honda swamp, the main aquatic ecosystems of the project, were also considered as strategic ecoregions by the archaeological project and the Protection and Conservation Program for Mangroves and Endangered Species. According to the documentation provided, the Dique Canal is a 115 km canal connected to the Magdalena River, which is part of a wetland network of approximately 60,000 ha. Ciénaga Honda or Bahía Honda is a swamp surrounded by 17 ha of mangrove ecosystems ranging from 8 to 100 meters in width. The report included recommendations such as reforestation, access restriction, domestic animal restriction, and fishing regulations in order to protect and start renovation processes for regional ecosystems. The project team responded with monitoring from 2012 until 2015 and conducted a reforestation program designed to improve aquatic ecosystem functions. Puerto Bahía also took measures to avoid oil and contaminated water leakage and protect groundwater quality during construction and operation. In an additional effort, submerged structures within the port were constructed with steel in order to allow underwater sediment flow as much as possible.

Reforestation activities designed to restore aquatic ecosystems included planting 106 ha of mangroves by Aculpas, the company commissioned to perform the reforestation activities. Although reforested areas were located outside the project's site, they were all related to existing basins or shore lines of water bodies within the area of influence. The reforestation

program was a three-year process of planting, pruning, periodic soil maintenance, and survival verification and was intended to create an ecological corridor around Ciénaga Honda swamp. 18 ha of dry forest was planted south of Ciénaga Honda, and 8.6 ha of vegetation was planted inside the port.

Altogether, reforestation activities plus periodic fauna and flora monitoring will protect and improve strategic prime habitats within the region.

Land and Water

Infrastructure projects should consider hydrological systems at a scale beyond a site or a direct area of influence. Quality of surface and groundwater in larger systems should be protected by avoiding contamination or improving their ecological functions. Puerto Bahía has considered the Dique Canal and Ciénaga Honda water systems at a scale larger than the project by avoiding soil and groundwater contamination and increased erosion. The project has created a reforestation plan to prevent water contamination, treat wastewater and stormwater, and finally to improve hydrologic ecological functions

For contamination prevention Puerto Bahía has a sound and detailed Environmental Management Plan that defines a channeling system surrounding the port's facilities to direct stormwater to a treatment pool. All excavated material should be surrounded by ditches and covered with polyethylene in order to avoid run-over of additional sediments. Additionally, Puerto Bahía defined a pest control policy that includes using adhesive tramps, the construction of physical barriers, and implementation of biological methods such as parasitoids, predators, and pathogens in preference to chemical pesticides during the construction and operation periods. Whenever the biological barriers are not sufficient, chemical pesticides are used for control. According to the documentation provided, pesticides used should be among those allowed by Annex III of the Rotterdam Convention and Annex A and B of the Montreal Protocol.

Moreover, the project performed several actions to treat surface and groundwater contamination during construction and operation periods. For domestic water management the project has provided an aqueduct that conducts water to a treatment plant. For industrial water or water contaminated with oil, the project has provided an oil separator tank where oil will be separated from water at a rate of 300 gallons per minute. For rainwater treatment, the project created a drainage channel system that conducts water to a sedimentation tank. For groundwater, the project commissioned the construction of 10 wells for identifying contaminated water and for cleaning it whenever found.

Additionally, Puerto Bahía planted 8.6 ha of grass and some ornamental vegetation in addition

to 18 ha of native trees typical of the dry forest and dry tropical forest. Reforestation activities will improve hydrological system quality by avoiding erosion and contributing to a natural water-cleaning process.

However, there is room for improving overall quality of the surrounding hydrological system by increasing the percentage of permeable surfaces inside the project, reducing pesticide use, and increasing efforts to clean the Dique Canal and Ciénaga Honda swamp, which were identified as highly polluted.

Biodiversity

Infrastructure projects such as Puerto Bahía can minimize negative impacts on natural species and their surrounding habitats. By promoting ecological corridors, animal movement, and reducing habitat fragmentation, the project may improve the natural biodiversity of the site.

Puerto Bahía identified habitat conditions of species present in the Dique Canal and Ciénaga Honda, and also identified threats and formulated a strategy to help conserve and restore each habitat. Puerto Bahía followed some of the suggested restoration activities, including creating an ecological corridor between Ciénaga Honda's shoreline and the Dique Canal in order to maintain ecological connection to the coast. The corridor has an approximate area of 7 ha and a width between 11 m and 15 m. Following internal policies of using native species, the corridor was planted with dry forest vegetation such as astrupillo (*Prosopis juliflora*), olivo (*Capparis odoratissima*), dividivi (*Caesalpinia*), and aromo (*Acacia farnesiana*). The planted ecological corridor will help restore the Dique Canal wetland network, which is a 115 km canal connected to the Magdalena River (of approximately 60,000 ha), and Ciénaga Honda or Bahía Honda, a swamp surrounded by approximately 17 ha of mangroves of 8 to 100 meters in width.

Ciénaga Honda swamp is the most studied area within the project. Monitoring and evaluation reports were written in 2001, 2012, 2014, and 2015. Each report identified flora and fauna of aquatic habitats associated with the mangroves, including insects, reptiles, birds, mammals, phytoplankton, zooplankton, fish, and other invertebrates. Ecosystemic services such as supply, regulation, support, and cultural services were also identified. Finally, conclusions and recommendations were formulated for conserving and protecting existing habitats. For example, the reports highlighted the ecosystemic importance of mangrove species *Laguncularia racemosa* (mangle blanco), *Rhizophora mangle* (mangle rojo), and *Avicennia germinans* (mangle salado) because of their function as shelter and food source for wildlife including insects, ants, termites, spiders, bees, fishes, invertebrates such as Mytilidae spp and mangrove oysters, fiddler crabs, and bird species.

Invasive species were also identified. In the case of Cartagena Bay the lionfish was identified as dangerous because it has no known predator in the area; therefore management strategies were implemented such as increasing fishing and communicating with the local communities about its negative effects.

Puerto Bahía maintains most of the water services that existed before the project such as hydrologic connection, water quality, habitat, and sediment transport. However, there is still room for improvement in finding better processes for increasing the percentage of undisturbed soil and finding better mechanisms to improve water quality in the Dique Canal and Ciénaga Honda, which are very important hydrologic assets to the site and the region. Puerto Bahía could join efforts with private and public stakeholders such as nearby industries and Cartagena's Mayor's Office to reduce contaminated water discharge and to increase forested areas around the Dique Canal and Ciénaga Honda hydrologic systems.

7. CLIMATE AND RISK CATEGORY

Envision aims to promote infrastructure developments that are sensitive to long-term climate disturbances. Climate and Risk focuses on avoiding direct and indirect contributions to greenhouse gas emissions, as well as promotes mitigation and adaptation actions to ensure short and long term resilience to hazards. Climate and Risk is further divided into two subcategories: Emissions and Resilience.

Emissions

Reducing pollutant emissions such as greenhouse gases and other dangerous emissions may reduce long-term risks at the scale of the project and at a global scale; it may increase the project's lifespan. Puerto Bahía has made continuous efforts to monitor pollutant emissions during the construction and operation periods, but there is still room for formulating emission reduction strategies, especially regarding greenhouse gases and pollutant particles. During the construction period Puerto Bahía measured a total of 21,953 metric tons of CO_2 emissions, of which 21,452 were produced by construction equipment and 501 by electricity consumption. During the operation period the project team did an emissions projection of 4,611,444.94 metric tons of CO_2 per year. The assessment identified that the major CO_2 emissions source during construction period was the use of diesel fuel in vehicles and machinery. The major CO_2 emissions during operation are estimated to come from tanker trucks required for oil transportation.

Puerto Bahía performed an air quality assessment for the construction period following the air

quality standards of local regulations. According to the study, only particulate pollutant emissions per day were above the maximum level established by local legislation, while CO_2, NO_2, and SO_2 emissions were way below the allowed maximums. The project has implemented particulate emissions control actions such as periodic vehicle monitoring and covering of excavated or construction materials with high-density plastics. Unfortunately, particulate emission preventive actions have not been successful enough and additional mechanisms need to be implemented.

Several recommendations regarding greenhouse gas emissions reduction were formulated by the commissioned companies performing the environmental studies, such as replacing fossil fuels with natural gas or with renewable energy sources. However, there is no evidence of these recommendations being put into effect. There was also no evidence regarding emissions reduction of any kind during the construction or operation periods or assessment of CO_2 emissions embodied in the materials used. Puerto Bahía should consider improving air quality during the operation period by performing an air quality assessment considering parameters beyond the local regulation, such as the South Coast Air Quality Management or the California Ambient Air Quality Standards. The project should also carry out the recommendations formulated by the efficiency report and consider embodied carbon emissions of materials used including extraction, refinement, and manufacture and distance transported.

Resilience

Sustainable infrastructure projects are able to adapt to changing long-term conditions such as unexpected weather change patterns, sea level rise, or climate alterations. Capacity to adapt to such changes is defined as resilience. Resilience includes addressing risks and threats by proposing plans to reduce the project's vulnerability. Puerto Bahía has made increasing efforts to identify natural and manmade threats associated with the project's operation. The project has identified community risks and operational and environmental vulnerability. Risks and threats were ranked according to their probability of occurrence and their estimated impact. However, there is still room to address long-term adaptability to climate change and sea level rise, both very crucial factors for the project since it is located on the coast in a very warm climate.

Identification of threats was well documented. The project team prepared a risk analysis, an emergency contingency plan, and a communication strategy involving community participation. The main risks identified on the area of influence of the project are: possible vehicle collisions, fireball explosions, oil spills, nafta spills, jet fire explosions, contaminated vapor emissions, flash fires, pedestrians run over, and health impact. Communities located in the area of influence received training about the threats associated with the operation of the port and how to react

in case of an emergency.

Additionally, the project has performed restoration activities that will minimize short-term hazards such as water contamination, vegetation loss on the shoreline and mangrove areas, and overfishing. The construction of the waste and stormwater treatment systems will improve the water quality of the Ciénaga Honda swamp and the Dique Canal; the reforestation strategy of planting a total of 34.8 ha of shoreline vegetation and 74.8 ha of dry forest vegetation will reduce flooding risk; and finally the fishing community has been trained and provided with support for better fishing practices that will protect the affected fish ecosystem.

Threats were ranked according to their level of threat, and response actions were recommended for each of them. The restoration activities performed by the project followed the requirements of the environmental license provided by the local environmental authority.

Although the project team performed restoration work on water bodies, wetlands, and mangroves, there is no clear strategy for how to continue the restoration process over the long term; there is still room to address negative effects of global warming and sea level rise that may cause serious flooding to the project. There are several international standards and regulations that Puerto Bahía could follow in order to increase the project's adaptability over time.

APPENDIX:

APPENDIX A: PROJECT PICTURES AND DRAWINGS

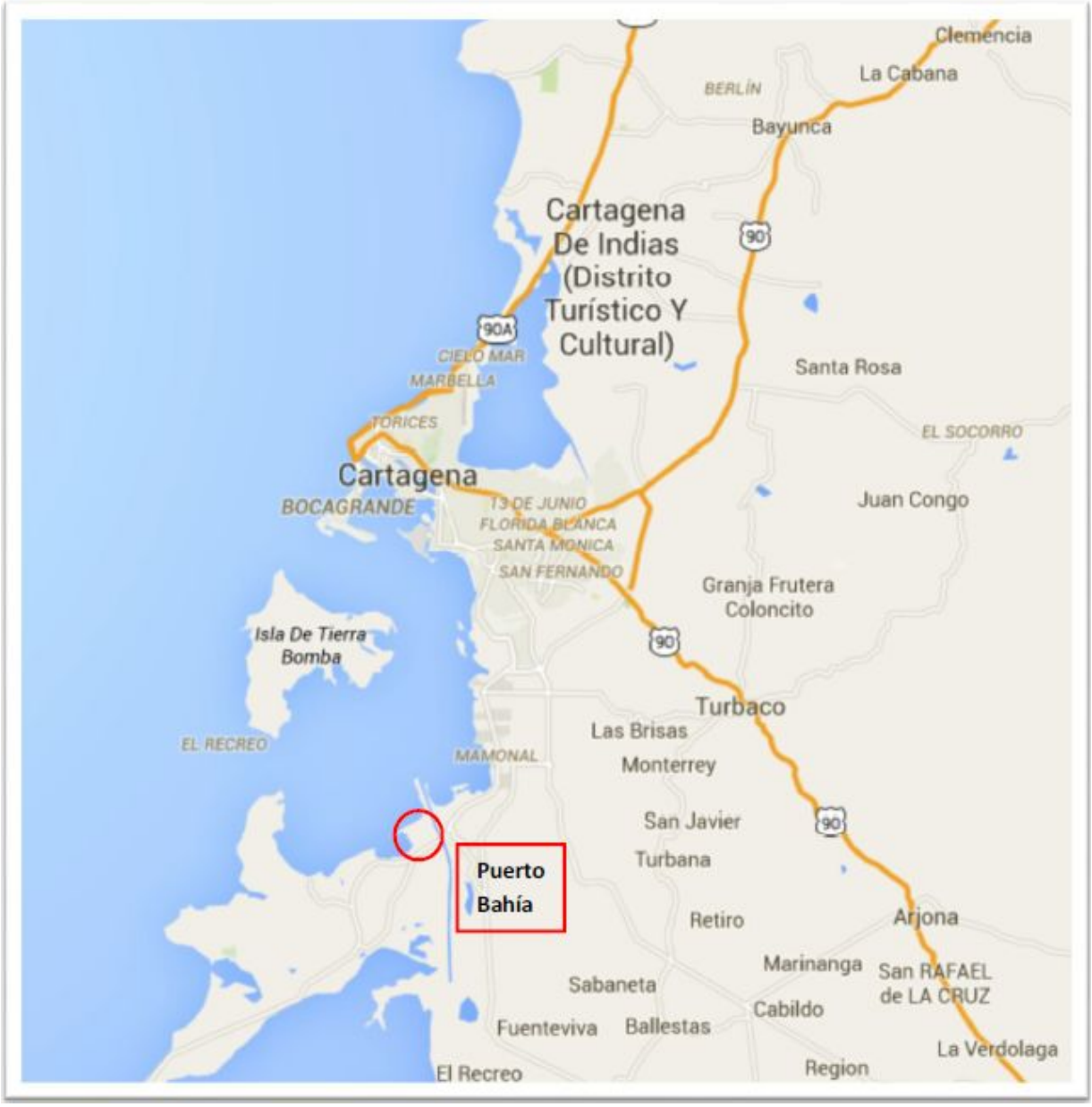

Figure 5: Location map.
Sources: Geototal. "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar"." (Document presented to Puerto Bahía, Bogotá: 2015). 6

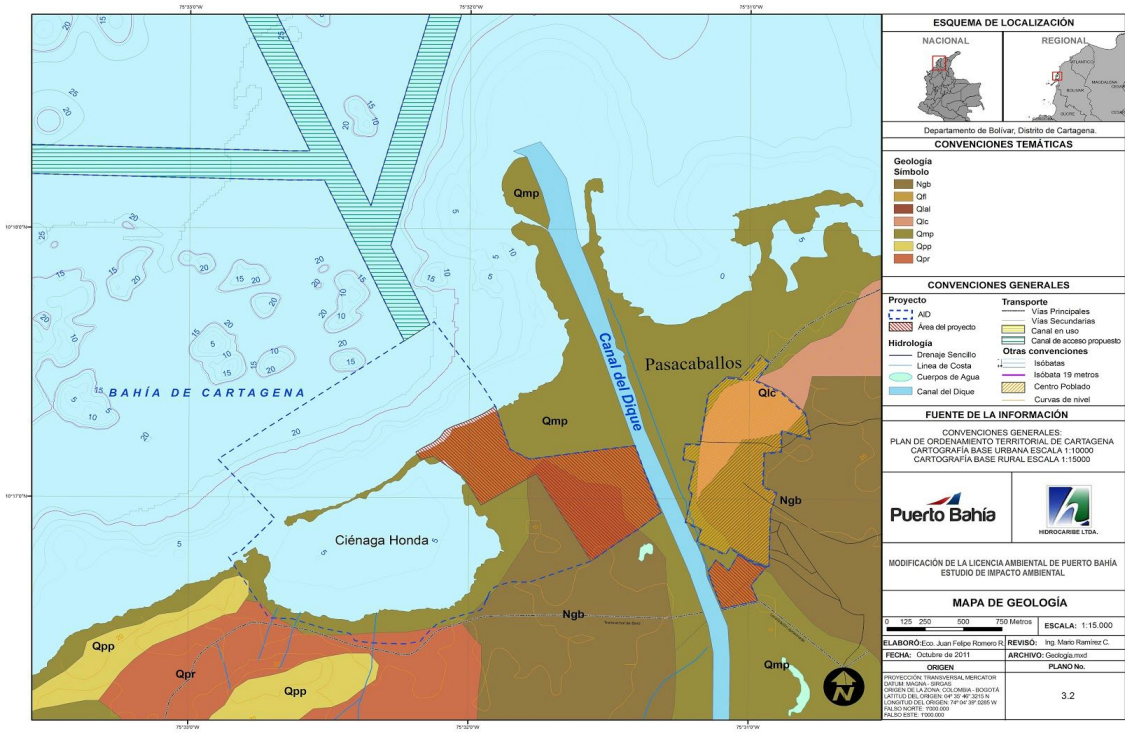

Figure 6: Location map.
Sources: Hidrocaribe, "*Capítulo 3. Caracterización Medio Abiótico*". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 7.

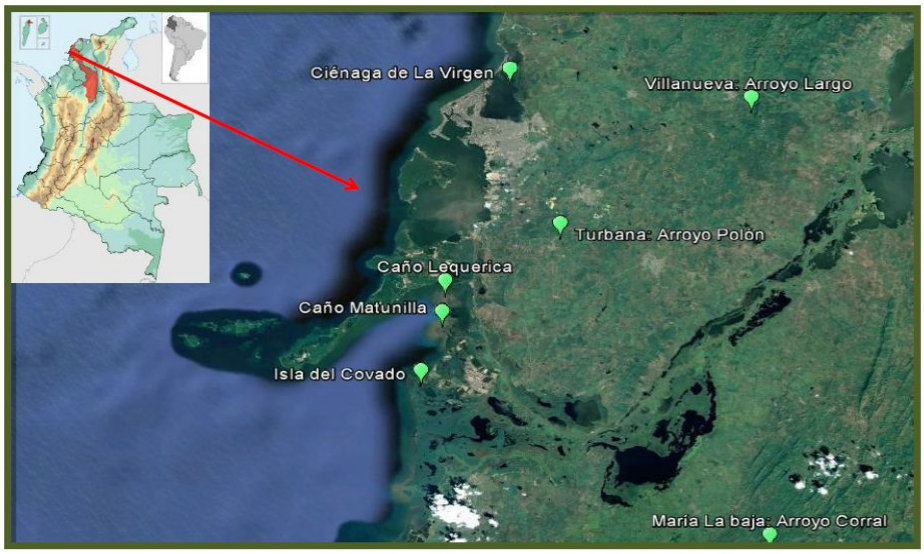

Figure 7: Reforested Areas Location
Sources: Gestión y Control Ambiental S.A.S, "*Informe de Monitoreo de Parcelas Permanentes en Ecosistemas de Manglar y Bosque Seco en Zonas Enriquecidas Forestalmente por la Sociedad Portuaria Puerto Bahía*". (Document presented to Puerto Bahía, Cartagena: 2012). 8.

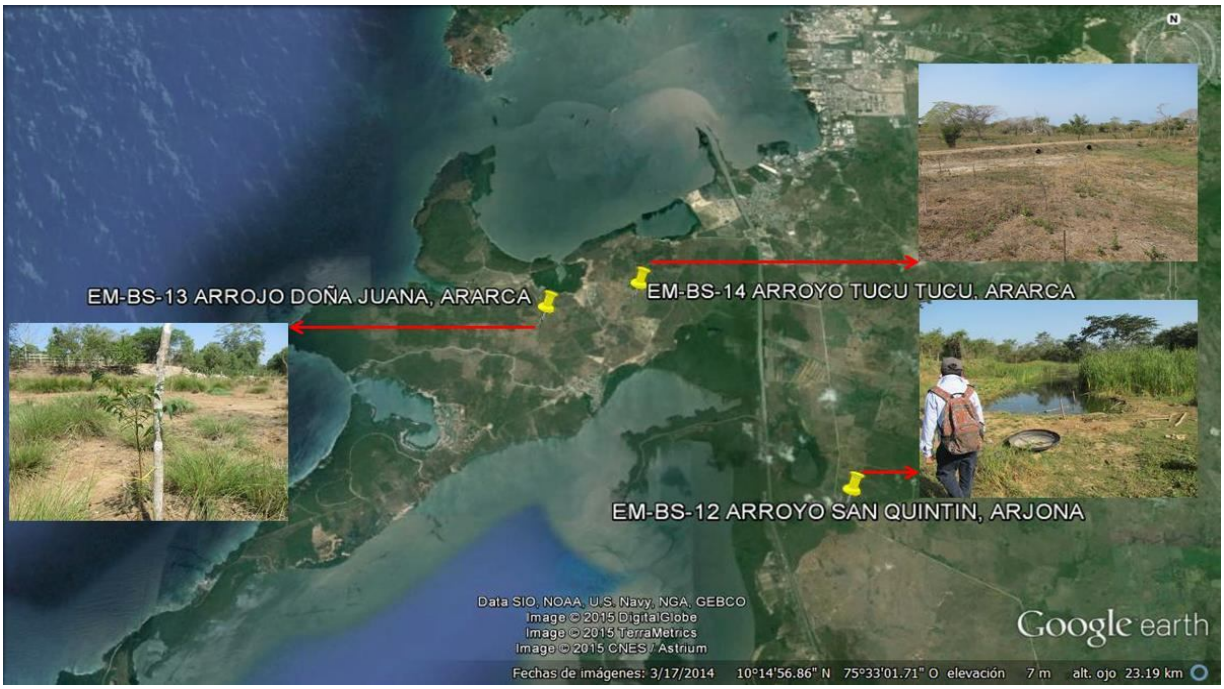

Figure 8: Reforestation Program Locations
Sources: Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 8.

Figure 9: Entrepreneurial program "Confeccionando Futuro"
Sources: Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date).2

Figure 10: Entrepreneurial program “Confeccionando Futuro”
Sources: Fundación Puerto Bahía. “Confeccionando Futuro”, (Internal Document Puerto Bahía, Unknown location and Date).4

Figure 11: Community Participation
Sources: Geoestudios Ingeniería LTDA, "Proyecto Implementación del Plan de Atención de Emergencias y Respuesta para la SPPB y complemento del Plan de Contingencia de Puerto Bahía". (Internal Document Puerto Bahía, Unknown Location and Date). 8.

Figure 12: Community Participation
Sources: Geoestudios Ingeniería LTDA, "Proyecto Implementación del Plan de Atención de Emergencias y Respuesta para la SPPB y complemento del Plan de Contingencia de Puerto Bahía". (Internal Document Puerto Bahía, Unknown Location and Date). 7.

Figure 13: Reforestation Program Locations
Sources: Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 11.

Figure 14: Reforestation Program Locations
Sources: Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 13.

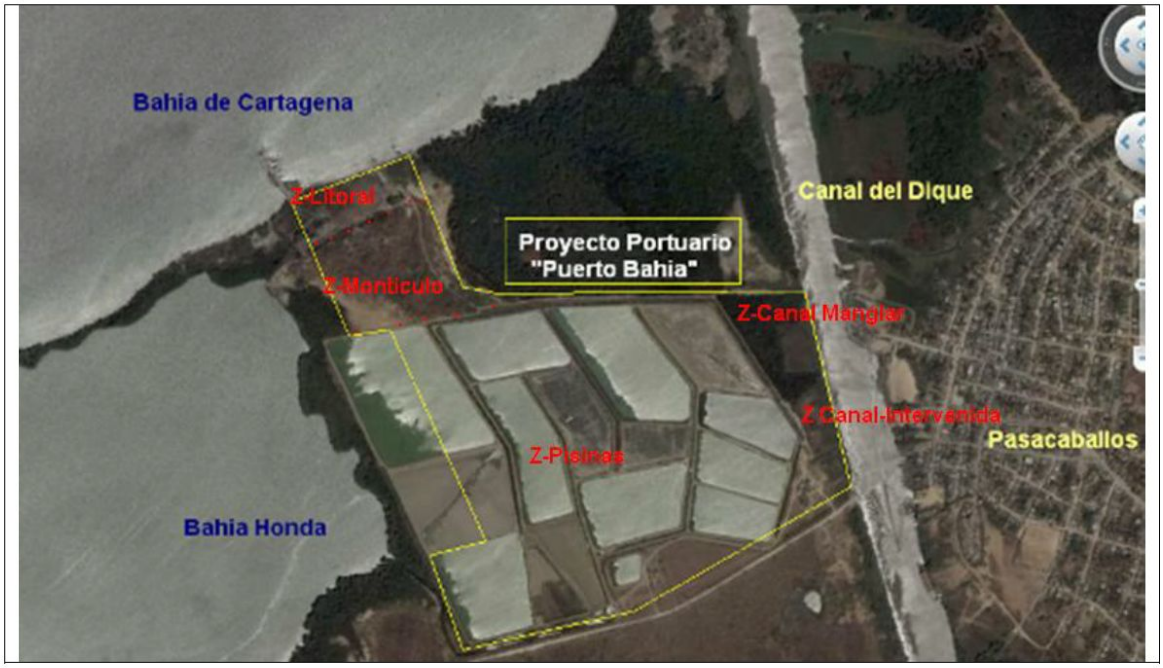

Figure 15: Site's Condition Previous to Construction
Sources: Puerto Bahía, "*Informe de Evaluación Arqueológica Proyecto Puerto Bahía*". (Document presented to Puerto Bahía, Bogotá: 2009).2

Figure 16: Solar Panel Pilot Project
Sources: Pert, "*Informe Seguimiento a la Gestión en HSEQ*". (Internal Document Puerto Bahía, Unknown Location and Date). 23.

Figure 17: Wind Extractor Energy Producer
Sources: Pert, "*Informe Seguimiento a la Gestión en HSEQ*". (Internal Document Puerto Bahía, Unknown Location and Date). 23.

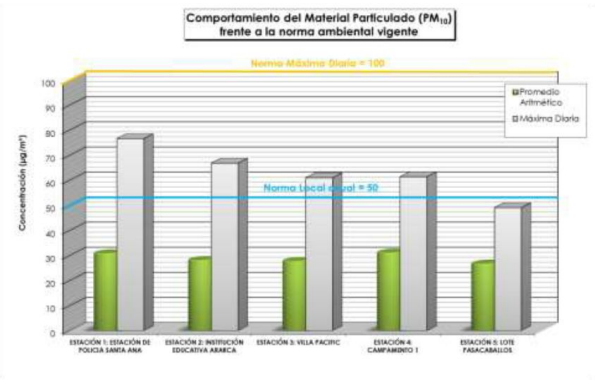

Figure 18: Suspended Particles Table
Sources: MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "*Monitoreo de Calidad del Aire de la Sociedad Portuaria Puerto Bahía Etapa de Construcción"*. (Document presented to Puerto Bahía, Bogotá: 2015). 83.

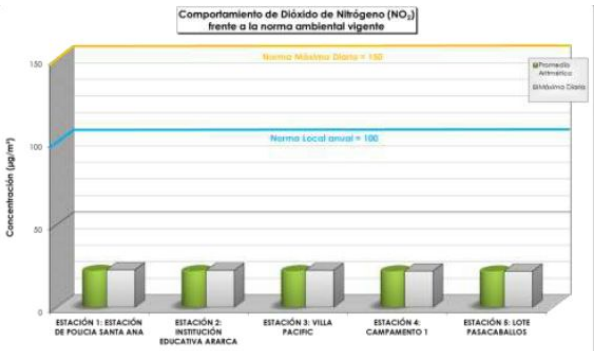

Figure 19: NO_2 Emissions Table
Sources: MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "*Monitoreo de Calidad del Aire de la Sociedad Portuaria Puerto Bahía Etapa de Construcción"*. (Document presented to Puerto Bahía, Bogotá: 2015). 93.

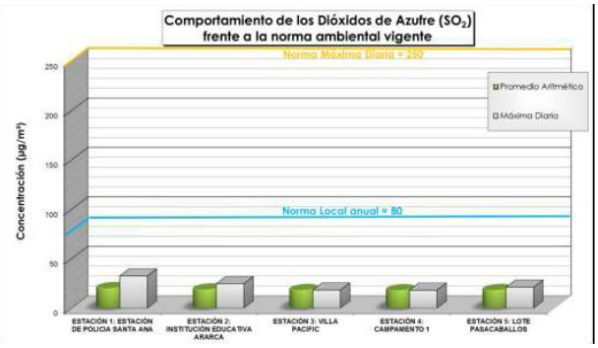

Figure 20: SO_2 Emissions Table
Sources: MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "*Monitoreo de Calidad del Aire de la Sociedad Portuaria Puerto Bahía Etapa de Construcción"*. (Document presented to Puerto Bahía, Bogotá: 2015). 99.

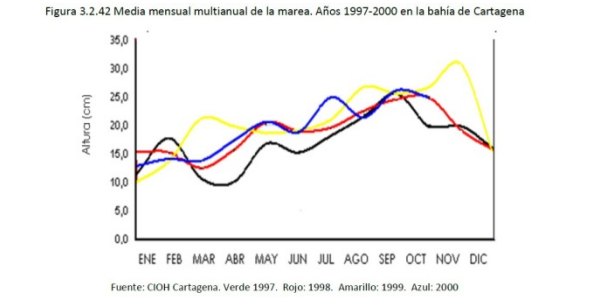

Figure 21: Sea Tide Levels 1997 - 2000
Sources: Hidrocaribe, "*Capítulo 3. Caracterización Medio Abiótico*". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 85.

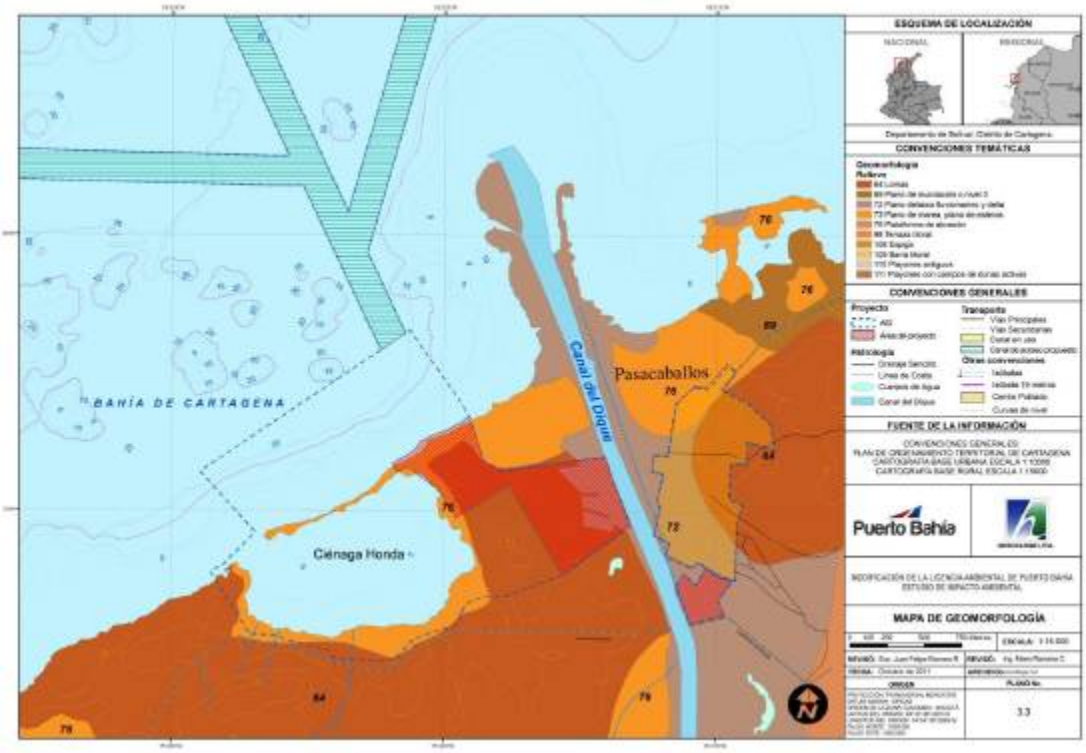

Figure 22: Geomorphologic map of the project
Sources: Hidrocaribe, "*Capítulo 3. Caracterización Medio Abiótico*". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 17..

APPENDIX B: ENVISION POINTS TABLE

ENVISION POINTS TABLE

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
QUALITY OF LIFE	PURPOSE	QL1.1 Improve community quality of life	2	5	10	20	25
		QL1.2 Stimulate sustainable growth and development	1	2	5	13	16
		QL1.3 Develop local skills and capabilities	1	2	5	12	15
	WELLBEING	QL2.1 Enhance public health and safety	2	—	—	16	
		QL2.2 Minimize noise and vibration	1	—	—	8	11
		QL2.3 Minimize light pollution	1	2	4	8	11
		QL2.4 Improve community mobility and access	1	4	7	14	
		QL2.5 Encourage alternative modes of transportation	1	3	6	12	15
		QL2.6 Improve site accessibility, safety and wayfinding	—	3	6	12	15
	COMMUNITY	QL3.1 Preserve historic and cultural resources	1	—	7	13	16
		QL3.2 Preserve views and local character	1	3	6	11	14
		QL3.3 Enhance public space	1	3	6	11	13
	VULNERABLE GROUPS	QL4.1 Identify and address the needs of women and diverse communities *	1	2	3	4	
		QL4.2 Stimulate and promote women's economic empowerment	1	2	3	4	
		QL4.3 Improve access and mobility of women and diverse communities *	1	2	3	4	5
					Maximum QL Points:	194**	
LEADERSHIP	COLLABORATION	LD1.1 Provide effective leadership and commitment	2	4	9	17	
		LD1.2 Establish a sustainability management system	1	4	7	14	
		LD1.3 Foster collaboration and teamwork	1	4	8	15	
		LD1.4 Provide for stakeholder involvement	1	5	9	14	
	MANAGEMENT	LD2.1 Pursue by-product synergy opportunities	1	3	6	12	15
		LD2.2 Improve infrastructure integration	1	3	7	13	16
	PLANNING	LD3.1 Plan for long-term monitoring and maintenance	1	3	—	10	
		LD3.2 Address conflicting regulations and policies	1	2	4	8	
		LD3.3 Extend useful life	1	3	6	12	
					Maximum LD Points:	121*	
RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce net embodied energy	2	6	12	18	
		RA1.2 Support sustainable procurement practices	2	3	6	9	
		RA1.3 Use recycled materials	2	5	11	14	
		RA1.4 Use regional materials	3	6	9	10	
		RA1.5 Divert waste from landfills	3	6	8	11	
		RA1.6 Reduce excavated materials taken off site	2	4	5	6	
		RA1.7 Provide for deconstruction and recycling	1	4	8	12	
	ENERGY	RA2.1 Reduce energy consumption	3	7	12	18	
		RA2.2 Use renewable energy	4	6	13	16	20
		RA2.3 Commission and monitor energy systems	—	3	—	11	
	WATER	RA3.1 Protect fresh water availability	2	4	9	17	21
		RA3.2 Reduce potable water consumption	4	9	13	17	21
		RA3.3 Monitor water systems	1	3	6	11	
					Maximum RA Points:	182*	

ENVISION POINTS TABLE

			IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
NATURAL WORLD	SITING	NW1.1 Preserve prime habitat	—	—	9	14	18
		NW1.2 Protect wetlands and surface water	1	4	9	14	18
		NW1.3 Preserve prime farmland	—	—	6	12	15
		NW1.4 Avoid adverse geology	1	2	3	5	
		NW1.5 Preserve floodplain functions	2	5	8	14	
		NW1.6 Avoid unsuitable development on steep slopes	1	—	4	6	
		NW1.7 Preserve greenfields	3	6	10	15	23
	LAND & WATER	NW2.1 Manage stormwater	—	4	9	17	21
		NW2.2 Reduce pesticide and fertilizer impacts	1	2	5	9	
		NW2.3 Prevent surface and groundwater contamination	1	4	9	14	18
	BIODIVERSITY	NW3.1 Preserve species biodiversity	2	—	—	13	16
		NW3.2 Control invasive species	—	—	5	9	11
		NW3.3 Restore disturbed soils	—	—	—	8	10
		NW3.4 Maintain wetland and surface water functions	3	6	9	15	19
					Maximum NW Points:	203*	
CLIMATE & RISK	EMISSIONS	CR1.1 Reduce greenhouse gas emissions	4	7	13	18	25
		CR1.2 Reduce air pollutant emissions	2	6	—	12	15
	RESILIENCE	CR2.1 Assess climate threat	—	—	—	15	
		CR2.2 Avoid traps and vulnerabilities	2	6	12	16	20
		CR2.3 Prepare for long-term adaptability	—	—	—	16	20
		CR2.4 Prepare for short-term hazards	3	—	10	17	21
		CR2.5 Manage heat islands effects	1	2	4	6	
					Maximum CR Points:	122*	
					Maximum TOTAL Points:	822*	

* Indigenous or afro-descendant peoples
** Not every credit has a restorative level. Therefore totals include the maximum possible points for each credit whether conserving or restorative.

Figure 23: Envision credits with scores by achievement level. This table includes experimental "Vulnerable Groups" credits developed in collaboration with the Inter-American Development Bank.
Sources: Envision™ and the Zofnass Program for Sustainable Infrastructure.

APPENDIX C: GRAPHS

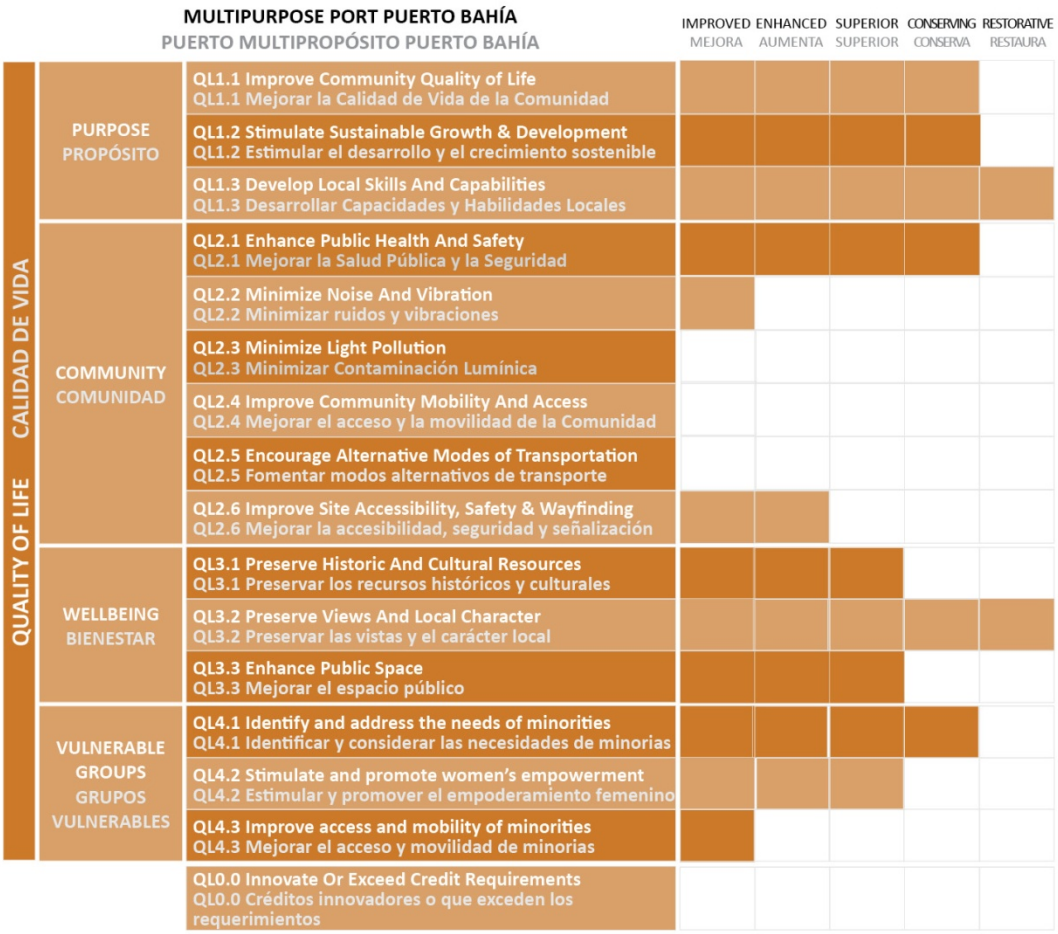

Figure 24: Quality of Life category_ Summary of results

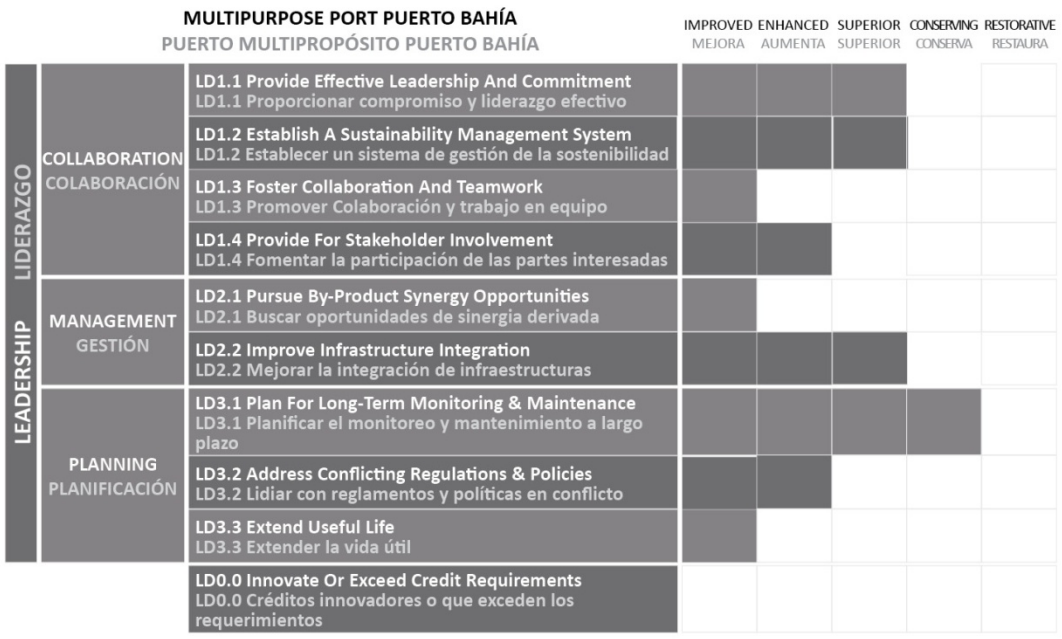

Figure 25: Leadership category_ Summary of results

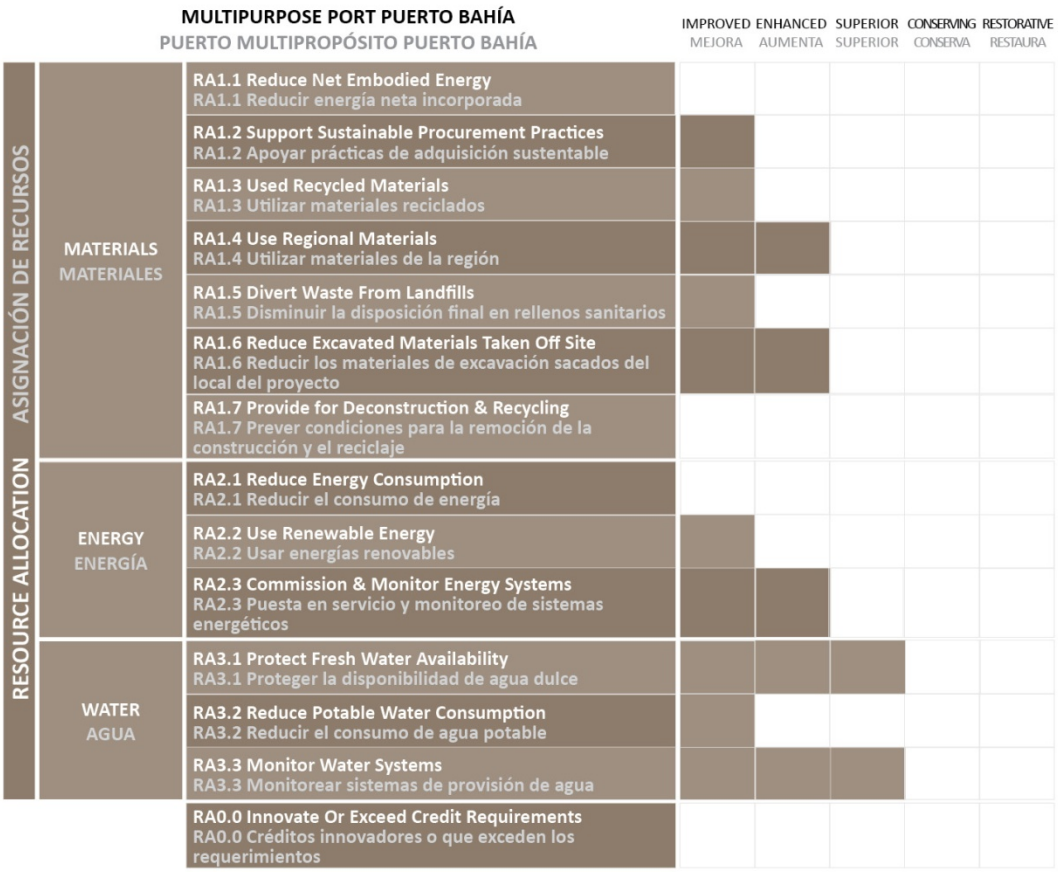

Figure 26: Resource Allocation category_ Summary of results

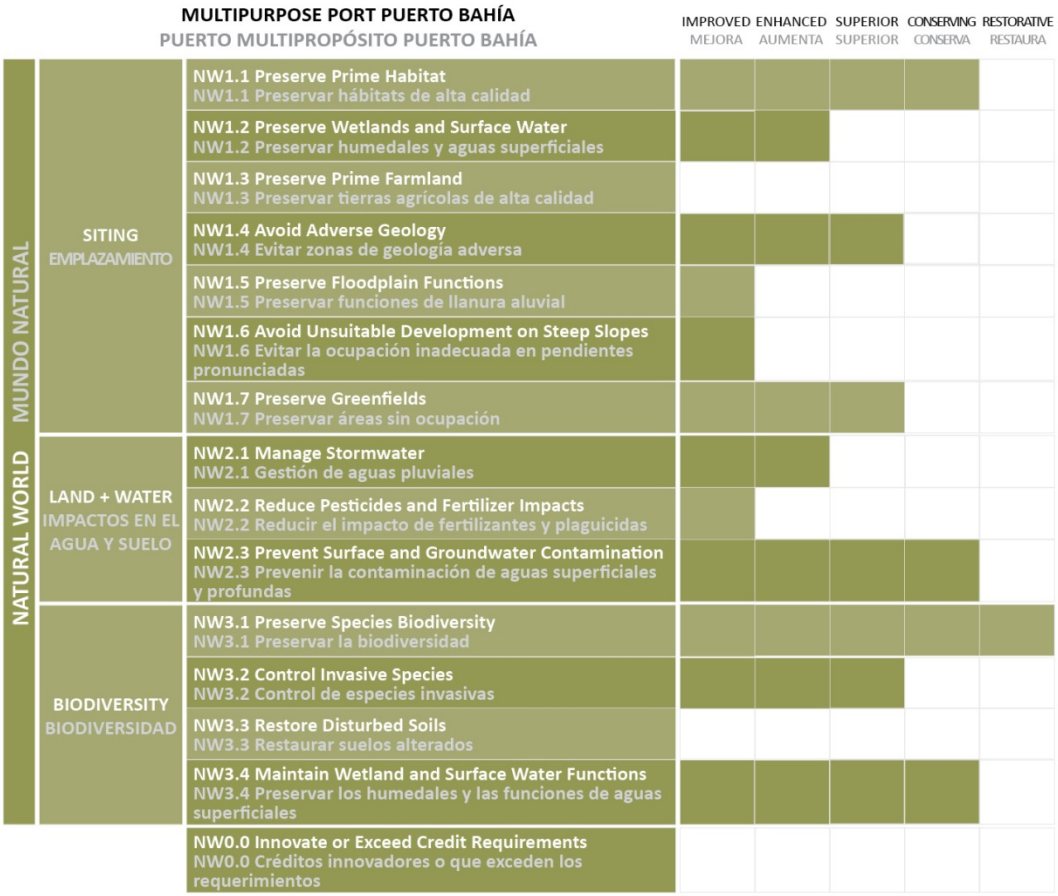

Figure 27: Natural World category_ Summary of results

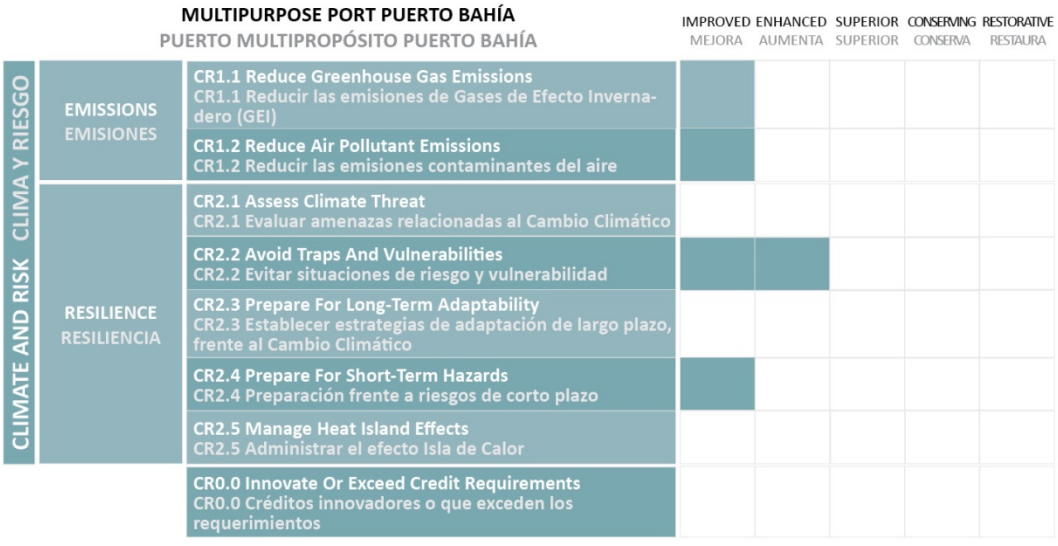

Figure 28: Climate & Risk category_ Summary of results

			MULTIPUTPOSE PORT PUERTO BAHÍA, COLOMBIA	PT.	Performance
1	QUALITY OF LIFE	PURPOSE	QL1.1 Improve Community Quality of Life	20	Conserving
2			QL1.2 Stimulate Sustainable Growth & Development	13	Conserving
3			QL1.3 Develop Local Skills And Capabilities	15	Restorative
4		COMMUNITY	QL2.1 Enhance Public Health And Safety	16	Conserving
5			QL2.2 Minimize Noise And Vibration	1	Improved
6			QL2.3 Minimize Light Pollution	0	No Score
7			QL2.4 Improve Community Mobility And Access	0	No Score
8			QL2.5 Encourage Alternative Modes of Transportation	0	No Score
9			QL2.6 Improve Site Accessibility, Safety & Wayfinding	3	Enhanced
10		WELLBEING	QL3.1 Preserve Historic And Cultural Resources	7	Superior
11			QL3.2 Preserve Views And Local Character	14	Restorative
12			QL3.3 Enhance Public Space	6	Superior
		VULNERABLE GROUPS	QL 4.1 Identify and address the needs of women and diverse communities (indigenous or afro-descendant peoples)	4	Conserving
			QL4.2 Stimulate and promote women's economic empowerment	3	Superior
			QL4.3 Improve access and mobility of women and diverse communities (indigenous or afro-descendant peoples)	1	Improved
			QL0.0 Innovate Or Exceed Credit Requirements	0	0
			QL	103	

			MULTIPUTPOSE PORT PUERTO BAHÍA, COLOMBIA	PT.	Performance
13	LEADERSHIP	COLLABORATION	LD1.1 Provide Effective Leadership And Commitment	9	Superior
14			LD1.2 Establish A Sustainability Management System	7	Superior
15			LD1.3 Foster Collaboration And Teamwork	1	Improved
16			LD1.4 Provide For Stakeholder Involvement	5	Enchanced
17		MNGMT.	LD2.1 Pursue By-Product Synergy Opportunities	1	Improved
18			LD2.2 Improve Infrastructure Integration	7	Superior
19		PLANNING	LD3.1 Plan For Long-Term Monitoring & Maintenance	10	Conserving
20			LD3.2 Address Conflicting Regulations & Policies	2	Enhanced
21			LD3.3 Extend Useful Life	1	Improved
			LD0.0 Innovate Or Exceed Credit Requirements	0	N/A
			LD	43	

			MULTIPUTPOSE PORT PUERTO BAHÍA, COLOMBIA	PT.	Performance
22	RESOURCE ALLOCATION	MATERIALS	RA1.1 Reduce Net Embodied Energy	0	No Score
23			RA1.2 Support Sustainable Procurement Practices	2	Improved
24			RA1.3 Used Recycled Materials	2	Improved
25			RA1.4 Use Regional Materials	6	Enhanced
26			RA1.5 Divert Waste From Landfills	3	Improved
27			RA1.6 Reduce Excavated Materials Taken Off Site	4	Enchanced
28			RA1.7 Provide for Deconstruction & Recycling	0	No Score
29		ENERGY	RA2.1 Reduce Energy Consumption	0	No Score
30			RA2.2 Reduce Pesticide and Fertilizer Impacts	4	Improved
31			RA2.3 Commission & Monitor Energy Systems	3	Enhanced
32		WATER	RA3.1 Protect Fresh Water Availability	9	Superior
33			RA3.2 Reduce Potable Water Consumption	4	Improved
34			RA3.3 Monitor Water Systems	6	Superior
			RA0.0 Innovate Or Exceed Credit Requirements	0	N/A
			RA	**43**	

			MULTIPUTPOSE PORT PUERTO BAHÍA, COLOMBIA	PT.	Performance
35	NATURAL WORLD	SITING	NW1.1 Preserve Prime Habitat	14	Conserving
36			NW1.2 Preserve Wetlands and Surface Water	4	Enhanced
37			NW1.3 Preserve Prime Farmland	0	No Score
38			NW1.4 Avoid Adverse Geology	3	Superior
39			NW1.5 Preserve Floodplain Functions	2	Improved
40			NW1.6 Avoid Unsuitable Development on Steep Slopes	1	Improved
41			NW1.7 Preserve Greenfields	10	Superior
42		L & W	NW2.1 Manage Stormwater	4	Enhanced
43			NW2.2 Reduce Pesticides and Fertilizer Impacts	1	Improved
44			NW2.3 Prevent Surface and Groundwater Contamination	14	Conserving
45		BIODIVERSITY	NW3.1 Preserve Species Biodiversity	16	Restorative
46			NW3.2 Control Invasive Species	5	Superior
47			NW3.3 Restore Disturbed Soils	0	No Score
48			NW3.4 Maintain Wetland and Surface Water Functions	15	Conserving
			NW0.0 Innovate or Exceed Credit Requirements	0	N/A
			NW	89	

			MULTIPUTPOSE PORT PUERTO BAHÍA, COLOMBIA	PT.	Performance
49	CLIMATE	EMISSION	CR1.1 Reduce Greenhouse Gas Emissions	4	Improved
50			CR1.2 Reduce Air Pollutant Emissions	2	Improved
51		RESILENCE	CR2.1 Assess Climate Threat	0	No Score
52			CR2.2 Avoid Traps And Vulnerabilities	6	Enchanced
53			CR2.3 Prepare For Long-Term Adaptability	0	No Score
54			CR2.4 Prepare For Short-Term Hazards	3	Improved
55			CR2.5 Manage Heat Island Effects	0	No Score
			CR0.0 Innovate Or Exceed Credit Requirements	0	N/A
			CR	15	

Total points	**293**	**0**

Figure 29: Envision credits with scores by achievement level. This table includes experimental "Vulnerable Groups" credits developed in collaboration with the Inter-American Development Bank.
Sources: Envision™ and the Zofnass Program for Sustainable Infrastructure.

APPENDIX D: CREDIT DETAIL

Multipurpose Port Puerto Bahía: CREDIT SPREADSHEET WITH DETAILS

CATEGORY I, PEOPLE AND LEADERSHIP		
SUB CATEGORY: QUALITY OF LIFE		
	Score	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**
QL1.1 Improve Community Quality of Life	**20**	**Conserving**
		Puerto Bahía's port will improve the quality of life for the communities located in its direct area of influence (AID) by improving productive capacity, cultural life, and water infrastructure, while mitigating the negative environmental impacts created by the port operations. The five communities in the AID of Pasacaballos, Ararca, Caño de Oro, Bocachica, and Santa Ana, were informed about the the characteristics of the project, its overall potential impacts, and the planned actions taken to mitigate them. The communities were invited to share their concerns and to propose actions to benefit their interests. During periodic meetings that occurred from March, 2010 until July, 2013, Puerto Bahía's project team agreed to finance six projects which were requested by the community. The projects include: a set of training workshops for tourism management, occupational health, environmental management, early childhood development, port logistics, and literacy; a daycare center; the construction of a cultural center; a fisherman support program; a community-building support program; and the overhaul of the existing water provision system of "Pelao". The community meetings included the participation of the national Ministry of Interior, the National Agency for Environmental Licenses: Agencia Nacional de Licencias Ambientales (ANLA), and Puerto Bahía's project team. Although the meetings were conducted in accordance with Colombia's regulations (artículo 76 de la Ley 99 de 1993 and Artículo 330 de la Constitución Política de Colombia, Decreto 1320 de 1998), the achieved agreements went beyond the communications and baseline requirements, and resulted in a range of actions taken, including the support of entrepreneurial, cultural, and training projects. Significant community improvement resulted from the actions described above, and the projects were accepted by the community with general satisfaction.
		Source: *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Protocolización de Consulta Previa Adelantada con el Consejo Comunitario Barú de la Comunidad Negra de la Unidad Comunera del Gobierno de Barú". (Unknown: 2013). 7 - 8.* *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Consulta Previa Adelantada con los Consejos Comunitarios de Comunidades Negras de: Ararca, Santa Ana, Pasacaballos, Caño de Oro y Bocachica", September, 14th, 2012.* *Ministerio del Interior y de Justicia, "Acta de Protocolización Proceso de Consulta Previa con los Consejos Comunitarios de Ararca, Caño de Oro, Bocachica, Santa Ana, Pasacaballos y la Sociedad Portuaria Puerto Bahía.". (Cartagena: 2010). 6.* *Productos Barú, "Productos Barú Brochure". (Internal Document Puerto Bahía, Unknown location and Date). 6-10.* *Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date). 2-8.*
		RECOMMENDATIONS The term for the project's support done through the Fundación Puerto Bahía or Puerto Bahía's project team should be defined. Periodic consideration should be given to existing community conditions, and opportunities for improvement should be sought out in the communities built environment, cultural assets, and productive conditions. The team should advocate for an overall community rehabilitation and rebirth. Additionally, a systematic approach to the community should be followed in such a way that it becomes a meaningful and periodic process.
QL1.2 Stimulate	**13**	**Conserving**

Sustainable Growth & Development		Puerto Bahía has an internal policy to hire at least 60% of unskilled project laborers from the local population; a factor that will improve the economy within both its direct and indirect areas of influence. This internal policy is applicable directly to the operations teams of Puerto Bahia, which includes subcontractors. During the construction period, 79% of the hires came from the region,of which 24% were people from the AID. Puerto Bahía has expanded the economic access of the local community which has increased the capacity for greater productivity. The project will also improve community recreational and cultural activities, as well as overall living conditions; these are factors that will improve prospective economic growth. Through the Puerto Bahia Foundation (Fundación Puerto Bahía), which is dedicated to managing and developing the six communal projects agreed to between Puerto Bahía and the local community; two new manufacturing start-ups have emerged, one which produces cleaning products, and another that produces clothing confections. The foundation also has a project dedicated to supporting local fishermen by holding training workshops, offering legal support, and structuring an eco-touristic fishing project. Puerto Bahía has also committed funding to build a cultural center which will support ethno-cultural activities. Furthermore, it will design and implement the water provision system of "Pelao". These activities are aimed to improve Puerto Bahía's AID in terms of livability and overall attractiveness.
		Source: *Productos Barú, "Productos Barú Brochure". (Internal Document Puerto Bahía, Unknown location and Date). 6-10.* *Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date). 2-6.* *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Protocolización de Consulta Previa Adelantada con el Consejo Comunitario Barú de la Comunidad Negra de la Unidad Comunera del Gobierno de Barú". (Unknown: 2013). 7-8.*
		RECOMMENDATIONS: Display evidence of the realization of the projects agreed to with the community. Demonstrate more involvement in restoration of the natural environment in order to improve the economic growth and development of the community.
QL1.3 Develop Local Skills and Capabilities	**15**	**Restorative** Puerto Bahía will significantly contribute to developing local skills and capabilities by providing training and job opportunities during the construction and operations periods. It will contribute to increasing the local employment of the minority group of the direct area of influence (AID), which is Afro-descendant, and among them it will be especially supportive of the most vulnerable group of women with the lowest incomes. Through the work of the Fundación Puerto Bahía, support in managing skills in addition to technical skills, such as clothing confections, will be provided in order to create new productive companies. Fundación Puerto Bahía's work has already resulted in the creation of two manufacturing companies. Additionally, the foundation provided training to fishermen for improved performance in their working activities, and also for the general community for understanding proper environmental care and risks. According to the "Talleres participativos comunitarios" (community participation workshops) document, the residents of the AID of the project were trained on how to identify threats and communicate emergencies. Moreover, in addition to the foundation the project team has an internal policy to hire locally and to train the labor force. The policy specifies mechanisms for selection and contract agreements, in addition to the training. Approximately 200 jobs were contracted for the local population during the construction period. In addition to labor training during construction period, Puerto Bahía has programs for tourism management, port administration, software technology, electronics and telecommunications, and English. These training programs were directed to 210 people with technical degrees from Pasacaballos, Ararca, Santa Ana, Bocachica and Caño de Oro.

		Source: Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Protocolización de Consulta Previa Adelantada con el Consejo Comunitario Barú de la Comunidad Negra de la Unidad Comunera del Gobierno de Barú". (Unknown: 2013). 7-8 Productos Barú, "Productos Barú Brochure". (Internal Document Puerto Bahía, Unknown location and Date). 4-6. Fundación Puerto Bahía, Puerto Bahía, "Plan de Atención de Emergencias de las Comunidades del Área de Influencia Directa de SPPB". (Internal Document Puerto Bahía, Unknown Location and Date). Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 30. Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date). 2-8.
		RECOMMENDATIONS The team should consider increasing the number of places for training workshops in order to intensify the positive impact on the communities.
QL2.1 Enhance Public Health And Safety	**16**	**Conserving**
		The project used eight floating roof tanks each capable of storing 320,000 oil barrels. According to the project team, this is a totally new technology for Colombia. Puerto Bahía, in partnership with Emypro (the company responsible for construction of the tanks) performed training and risk assessments for both the workers that constructed, as well as those that operate the tanks. The construction system of the floating roof tanks helped to reduce health risks by assembling parts at the ground level instead of at high altitude. For that task they used welding robots and hydraulic jacks. These automated processes reduce worker risks by limiting work done at heights, as well as contact with welding equipment. In addition to the risk reductions mentioned above, workers were given periodical medical checks to further assure health and safety concerns. Puerto Bahía performed the actions required by national legislation (Law 1562 of July 11th, 2012) regarding worker health and safety. Additionally it used certain international regulations as a point of reference, such as the "Environmental, Health and Safety Guidelines" of the International Finance Corporation (IFC), especially the "SISO Politics" established within the guidelines of IFC. The team's project demonstrated a comprehensive and complete risk assessment by providing systematic documentation of the monitoring of health risks.
		Source: *Sociedad Portuaria Puerto Bahía, "Manual Gestión Integral". (Internal Document Puerto Bahía, Unknown location and Date). n.d.*
		RECOMMENDATIONS In cases where any new materials, methodologies, or non-standard technologies are employed, identify and plan accordingly to assess the exposures and risks created by such applications during operation and construction phases of the project. Monitor and document the changes done to improve or protect public health and safety when using new technologies, materials and methodologies. Monitor and report assessments of the exposures and risks to public health and safety.

QL2.2 Minimize Noise And Vibration	**1**	**Improved**
		The Puerto Bahia team studied noise levels before the construction, during the construction, and during operations. The studies reported high noise levels before construction of the project started. However, the project team performed measurements and monitoring to reduce the project's noise impact throughout all phases. The noise studies done by Mapfre ARL, a multinational insurance company, and Hidrocaribe ltda, used national regulations to designate the level of noise contamination, the specific areas where it is produced, and the measures to take in order to reduce health and safety impacts to the workers and surrounding communities. Although several efforts have been made to reduce and control noise, the operation of the project increased noise and vibration levels. The Mapfre ARL team has done the measurements during the operations period, and has established that a 11.11% of the evaluated areas of the project are above the maximum level (85db) allowed by the national laws of Colombia. For these affected areas, foam ear protection has been provided to workers. Additionally, periodic audiometric exams are recommended to monitor the hearing health of the workers. According to Hidrocaribe, during the construction period Puerto Bahía had a noise control policy that specified a work schedule from 7:00am until 9:00pm, a limit of two continuous hours of operation of equipment with high noise levels, periodic maintenance of equipment in order to avoid unnecessary noise, restricted use of auto-horns and sirens, silencers on working machinery and equipment, the use of acoustic isolation panels in constructed rooms identified as "noise producers" and also with hedge plantation, and earth movements or landscape modifications in external areas to create natural noise barriers. Additionally, before the construction period began (June, 2011), when no activities related to the project construction or operation existed, noise levels were measured in nine areas (both direct and indirect areas of influence). The study determined that during the day the noise levels were below the maximum values established by local regulation, but at night the noise levels were above the maximum established values. The national regulation "Normal de Ruido Ambiental de la Resolución 0627 de Abril de 2006" establishes a maximum value of 75 db for daytime noise levels and 70 db for nighttime noise levels.
		Source: *Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 25.* *Oiltanking, SNC Lavalin Itansuca, "Especificación Técnica Bombas de Desplazamiento Positivo" in "Ingeniería Básica - Fase I Terminal - Proyecto Puerto Bahía". (Document Presented to Sociedad Portuaria Puerto Bahía S.A.,Unknown: 2012). 7.* *Oiltanking, SNC Lavalin Itansuca, "Especificación Técnica de Motores eléctricos de Inducción MT y BT" in "Ingeniería Básica - Fase I Terminal - Proyecto Puerto Bahía". (Document Presented to Sociedad Portuaria Puerto Bahía S.A., Unknown: 2012). 15.* *Oiltanking, SNC Lavalin Itansuca, "Análisis de Riesgos y Operabilidad - HAZOP" in "Ingeniería Básica - Fase I Terminal - Proyecto Puerto Bahía". (Document Presented to Sociedad Portuaria Puerto Bahía S.A.,Unknown: 2012). 8.* *Mapfre ARL. "Evaluación Ocupacional de Evaluación de Sonometrías de Ruido" in "Informe de Higiene Industrial Evaluación Ocupacional de Sonometrías de Ruido". (Document Presented to Sociedad Portuaria Puerto Bahía S.A., Pasacaballos: 2014). 10.*
		RECOMMENDATIONS Consider additional measures to create further reductions in noise and vibration, that go beyond national regulations, in order to create quieter communities.
QL2.3 Minimize Light Pollution	**0**	**No Score**
		No information regarding light pollution minimization was found in the project documentation. There was no assessment found for the lighting needs of the project, and no incorporation of lighting designs that reduced energy requirements. For these reasons, the credit is considered to be "No score."

		Source: *n/a*
		RECOMMENDATIONS Conduct an overall assessment of project lighting needs. Once the needs have been established, design a lighting system that reduces lighting requirements, light spillage, and glare, as well as reduces or avoids upward lighting.
QL2.4 Improve Community Mobility And Access	**0**	**No Score**
		No information was provided regarding transportation impact studies conducted during construction or operations phases. People from the affected communities are expected to receive free transportation to the project site, however no information beyond this mentioning was submitted. Improvements on mobility and access in this area is not explained in the project documentation.
		Source: *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Consulta Previa Adelantada con los Consejos Comunitarios de Comunidades Negras de: Arauca, Santa Ana, Pasacaballos, Caño de Oro y Bocachica". (Unknown: 2012). 8.*
		RECOMMENDATIONS The team should conduct a transportation study of the project area and the surrounding communities in order to identify ways to improve access to the site and the community, focusing on walkability and traffic reduction. Long-term mobility and access needs should be considered, and access to public transit and the use of non-motorized transportation should be enhanced. Coordination should be done with the local community and local administration in order to identify transportation issues. The findings of the study should be well documented and implemented.
QL2.5 Encourage Alternative Modes of Transportation	**0**	**No Score**
		No information has been provided regarding projects to provide non-motorized transportation options to the project site, pedestrian access to multimodal transportation facilities, or related to the provision of bike lockers, bike paths or sidewalks.
		Source: *n/a*
		RECOMMENDATIONS The team should consider encouraging the use of alternative modes of transportation by creating sidewalks, bike paths, and the appropriate support facilities that connect Pasacaballos and Santa Ana, two of the five communities of the direct area of influence, located very close to the project. The integration of the project to existing public transportation networks should be considered. The restriction of the use of motorized vehicles should be evaluated and the parking facilities controlled.
QL2.6 Improve Site Accessibility, Safety & Wayfinding	**3**	**Enhanced**
		The signage plans and design for Puerto Bahía is clear and intuitive for users. It was done by following national regulations that assess occupational health and safety, such as the "Normas Legales sobre Salud Ocupacional en Colombia, Art 202 del 2004," and "Ley 9 (1979) - De los Colores de Seguridad." Additionally, the team used international regulations for design reference, such as USA OSHA (1910,144), ANSI (A13.1-1975), DIN 2403, and BS 1710. The signage plan includes signs for the safe operation of the project, as well as traffic signs for the road connecting the project to the nearby community of Barú. Internal signals include access and emergency exits of the project for work activities which are exposed to risks. External signs include pavement painting, vertical signs, and complementary signals required to help protect pedestrians and road users. Position and visibility is a priority, therefore there is an internal policy for using reflective signs and for performing periodic maintenance activities. However, no documentation was found regarding public drawing plans for access and egress routes for users, workers, visitors, or any other personnel. There is no plan for accessibility and protection of nearby significant sites, such as cultural areas or sensitive natural areas.

		Source: *Puerto Bahía, "Señalización Industrial". (Internal document, Puerto Bahía, Cartagena: 2014). 20-28.*
		RECOMMENDATIONS The team should design a clear drawing plan, displaying the access and egress routes of the project in cases of emergency. The sign integration plan should be improved upon with the nearby community in order to easily identify areas of natural or cultural significance. Documents and plans should be designed for showing possible impacts to public safety and security.
QL3.1 Preserve Historic and Cultural Resources	**7**	**Superior**
		Puerto Bahía did a comprehensive archaeological analysis, which included compliance with local regulations, in addition to the coordination and communication with the local population and other stakeholders, such as individuals that used to work in previously existing companies which were located at the project site, and the National Institute of Archeology and History of Colombia (ICAHN). The archeological analysis and report were done by following the local regulations. Additionally, Puerto Bahía did an archeological report, an archeological project, and a socialization report for the community, above what is required by law. The archeological report and project included biotic and abiotic descriptions of the land and water sites associated with the exploration activities. By including built and natural assets of the site, the archeological report provides a detailed description of the areas that could be considered as "heritage." Risks and threats associated with the exploration activities were identified for each site. Subsequently, in the archeological project, several objects were found, including pieces of spear heads, working tools made from sea snails, and pieces of ceramic and clay pottery. The existing archaeological heritage was identified and communicated to ICAHN in a formal report. The report includes historical changes of the shoreline, historical references of human activities in the area, descriptions and images of the objects found, and the information collected from the community; this report is now available to the general public. Although not all of the archeological heritage that was found was removed for conservation, areas with higher probabilities of containing objects were monitored by an archeologist during excavation works. A comprehensive feasibility analysis was done, however there is no evidence of increasing efforts to preserve, protect or restore the historical heritage.
		Source: *Aqua & Terra y Puerto Bahía, "Diagnóstico Arqueológico Subacuático del Área de Restricción de Puerto Bahía, Área de Ciénaga Honda, Bahía de Cartagena de Indias". (Document presented to Puerto Bahía, Medellin: 2013). 7.* *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía". (Document presented to Puerto Bahía, Bogotá: 2009).. 3, 5, 12, 24, 25, 27, 29.*
		RECOMMENDATIONS Efforts to preserve, protect and restore the existing archaeological heritage should be increased. The project team should provide more evidence of the archeological findings discovered during the excavation period. It should be considered to create, upgrade, or expand new recreational and educational facilities related to the cultural and archeological heritage of the region in addition to what was discovered, in coordination with the needs of the community and other stakeholders.
QL3.2 Preserve Views and Local Character	**14**	**Restorative**
		Puerto Bahía has a conservation and compensation plan for the biotic ecosystem intended to preserve, improve, and restore the landscape characteristics of the project's site and the community. In addition to the internal policies of the project intended to increase planted areas with trees, shrubs and grass, the project team created a forestal compensation program for planting vegetation in four water bodies of the community. These water bodies, located with the project's area of influence but not on the project's land, were regenerated with 1.1 new vegetation individuals per hectare in a total of 65Ha. The community not only came up with the idea for the project, but was responsible for its construction by creating a new association called ACULPAS (Asociación de Cultivadores de Mangle de Pasacaballos), which worked on the project in

		conjunction with community members under Puerto Bahía's support. The new association empowered the community and strengthened local character by improving the project's site by planting vegetation and regenerating the natural local environment. This new association will encourage community awareness and the importance of including community involvement and maintaining local character. A detailed report about the site's natural conditions, including fauna and flora, described the compensation actions required to reduce the impact of project operation on the site. The community was involved constructing the report as well as identifying natural assets such as the labor required to perform compensatory actions. The project's area of indirect influence include swamps, hilly landscapes to the north, beaches to the west, urbanization along a north and south axis, mangroves, and aquatic habit such as coral reefs. Wetland habitat such as mangroves and swamps dominate the project's area of direct influence. The most important landscape view is the bay of Cartagena and the "Cienaga honda" swamp. Although Puerto Bahía was constructed on a previous industrial site, the project has a conservation plan for the landscape features of the direct area of influence described above and it is intended to maintain the local character of the community. Puerto Bahia defined 4 specific conservation objectives: protect mangroves, conserve fish communities, large avian species, and Iguanas. These objectives were selected because of their ecological and social importance. Community character was also a major decision factor. Mangroves were selected because of their ecological value as well as their importance in landscape composition and aesthetic value. Fish communities were selected because of their ecological value as well as their economic importance for the local community. Large avian species were selected because of the ecological role they play and their cultural value for locals as a icon of ecological diversity for the site. Iguanas were selected mainly because of their cultural value and they are used as a source of food and income for community members. Additionally, the project has internal policies for the management of the view and landscape that includes planting visual screens, local trees and shrubs and grass. A total of 85890m2 of land will be planted at the project.
		Source: *Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 4* *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015).. 25,27,30,33,34,38,41.* *Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena, October, 2011). 142 - 145.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013), 75 - 87*
		RECOMMENDATIONS In order to maintain local character, efforts to aid attempts by the community trying to develop policies or regulations to preserve local character should be increased. Provide more data from monitoring programs designed to improve or conserve the 4 objectives.
QL3.3 Enhance	**6**	**Superior**

Public Space		Puerto Bahía enhanced community livability through the renovation and construction of public space and public buildings. According to the project's documentation, this included paving roads, building sidewalks, and building a park associated with the cultural house. In addition, Puerto Bahía build a new athletic field and a pedestrian bridge. Some of the public facilities constructed included a center for family aid, a new cultural center, a digital technology center, a confection warehouse and new fish-farming facilities. All the constructed works were done with collaboration from public and private agencies like: National Agency for Overcoming Extreme Poverty (ANSPE), Pedro Romero Social Emergency Plan, Cartagena's District, DPS, SENA, FONADE, UMATA, National Government of Colombia, Ministry of Technology of Colombia, Vive Digital Colombia, IDER and the Community Council of Ararca; form the public sector and Ecopetrol. Private sector organizations that collaborated on the project included: Argos, Fundación Mamonal, Isal Barú, Carinsa, Aguas de Cartagena, Clinton Foundation, Proeléctrica, reficar and Fundacion Universitaria Los Libertadores. In addition to building public works, diverse communal activities were coordinated to increase appropriation of the space from the community. Children, tenagers and seniors were part of programs dedicated to address their particular needs and to provide them with empowering tools. For example: "Jugando con Valores" is an athletic program which uses recreation activities such as soccer to develop leadership and teamwork abilities for local youth. Early childhood and senior programs were developed in the new center of family aid and orientation building. Aforementioned programs encourage community engagement and improve quality of life.
		Source: *Fundación Puerto Bahía, "Ficha Técnica Jugando con Valores". (Internal Document Puerto Bahía, Unknown: 2014). 6.* *Fundación Puerto Bahía, Video "Araca Arranca" (Internal Document Puerto Bahía, Unknown location and Date).*
		RECOMMENDATIONS Increase efforts to improve access to surrounding natural areas identified as important for the community. Consider creating additional public space with significant restoration efforts. Examples would be a soccer field made of sod or astro turf or bigger and safer sidewalks for new roads. Reinforce the stakeholders involvement and identify specific tasks for each of them.
QL 4.1- Identify	**4**	**Conserving**

and address the needs of women and diverse communities (indigenous or afro-descendant peoples)		The Barú peninsula has been identified to have an Afro-descendant community by the national government of Colombia, which are a community within that can significantly influence the project. All of the community programs founded and promoted by Puerto Bahía are deliberately aimed to positively impact this group by improving their quality of life in general. According to the "Acta de Protocolización Proceso de Consulta Previa" published by the Ministry of Interior of Colombia, the first community meeting where Puerto Bahia's project was presented, was held on March 26, 2010. In the document there is reference to the presence of an indigenous, Afro-descendant community, as well as women in terms of a group requiring consideration. There were six additional documented meetings where the national administration and the community gathered to agree on the prospected community projects; the list of attendees shows support for the inclusion of women, and the meeting minutes establish the commitments between the project team and the community. Among the approved projects, two were purposely designated to be managed by women and the Afro-descendant community respectively. According to the "Acta de Protocolización Proceso de Consulta Previa" published by the Ministry of Interior of Colombia, the first community meeting where Puerto Bahia's project was presented, was held on March 26, 2010. In the document there is reference to the presence of an indigenous, Afro-descendant community, as well as women in terms of a group requiring consideration. There were six additional documented meetings where the national administration and the community gathered to agree on the prospected community projects; the list of attendees shows support for the inclusion of women, and the meeting minutes establish the commitments between the project team and the community. Among the approved projects, two were purposely designated to be managed by women and the Afro-descendant community respectively. According to the "Acta de Protocolización Proceso de Consulta Previa" published by the Ministry of Interior of Colombia, the first community meeting where Puerto Bahia's project was presented, was held on March 26, 2010. In the document there is reference to the presence of an indigenous, Afro-descendant community, as well as women in terms of a group requiring consideration. There were six additional documented meetings where the national administration and the community gathered to agree on the prospected community projects; the list of attendees shows support for the inclusion of women, and the meeting minutes establish the commitments between the project team and the community. Among the approved projects, two were purposely designated to be managed by women and the Afro-descendant community respectively.
		Source: *Ministerio del Interior y de Justicia, "Acta de Protocolización Proceso de Consulta Previa con los Consejos Comunitarios de Ararca, Caño de Oro, Bocachica, Santa Ana, Pasacaballos y la Sociedad Portuaria Puerto Bahía.". (Cartagena: 2010). 8.* *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Consulta Previa Adelantada con los Consejos Comunitarios de Comunidades Negras de: Arauca, Santa Ana, Pasacaballos, Caño de Oro y Bocachica". (Unknown: 2012).* *Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Protocolización de Consulta Previa Adelantada con el Consejo Comunitario Barú de la Comunidad Negra de la Unidad Comunera del Gobierno de Barú". (Unknown: 2013). 7 - 8.* *Productos Barú, "Productos Barú Brochure". (Internal Document Puerto Bahía, Unknown location and Date). 2-10.* *Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date). 3 - 6*
		RECOMMENDATIONS Conduct studies of the hazards and risks with regards to women's health and safety. Provide additional documentation describing the lifespan of the supported projects.
QL4.2 - Stimulate	**3**	**Superior**

and promote women's economic empowerment		Economic growth of women in Barú was promoted by "Fundación Puerto Bahía" through the establishment of two startup manufacturing programs: "Confeccionando Futuro" (Confectioning Future) and "Productos Barú" (Products of Barú). These programs stimulated job growth through women-led companies. For "Confeccionando Futuro," 30 women living below the poverty line were selected from the communities of Santa Ana y Ararca to be trained in the clothing-confections business. They were given technical and administrative support in order to create a new sustainable company. For "Prodcutos Barú", 29 women from the same communities also started a manufacturing company dedicated to producing cleaning products.
		Source: *Productos Barú, "Productos Barú Brochure". (Internal Document Puerto Bahía, Unknown location and Date). 6-8.* *Fundación Puerto Bahía. "Confeccionando Futuro", (Internal Document Puerto Bahía, Unknown location and Date). 2- 6.*
		RECOMMENDATIONS Search for possible national or other certification agencies that may consider women's projects in additional inclusion criteria.
QL4.3 - Improve access and mobility of women and diverse communities (indigenous or afro-descendant peoples)	**1**	**Improved**
		Although Puerto Bahía demonstrated the inclusion of women and diverse groups in the stakeholder meetings, there are no projects related to improving the transportational access, mobility, and safety of women, nor of other vulnerable social groups. No specific assessment on the needs of women nor marginalized communities was conducted.
		Source: *Ministerio del Interior y de Justicia, "Acta de Protocolización Proceso de Consulta Previa con los Consejos Comunitarios de Ararca, Caño de Oro, Bocachica, Santa Ana, Pasacaballos y la Sociedad Portuaria Puerto Bahía.". (Cartagena: 2010). 1 - 10.* *2. Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Consulta Previa Adelantada con los Consejos Comunitarios de Comunidades Negras de: Arauca, Santa Ana, Pasacaballos, Caño de Oro y Bocachica". (Unknown: 2012). 7 - 8.* *3. Autoridad Nacional de Licencias Ambientales ANLA, "Acta de Reunión de Protocolización de Consulta Previa Adelantada con el Consejo Comunitario Barú de la Comunidad Negra de la Unidad Comunera del Gobierno de Barú". (Unknown: 2013).*
		RECOMMENDATIONS Identify and address the safety of women and other vulnerable social groups, in relation to transportation, mobility and access. Design projects for the improvement of the identified transportation, mobility, and access issues. Once the project has been implemented, document evidence of the positive impact on women and other diverse groups of the changes made.
QL0.0 Innovate Or Exceed Credit Requirements		
	103	

SUB CATEGORY:LEADERSHIP		
	Score	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**
LD1.1 Provide Effective Leadership And Commitment	**9**	**Superior** Puerto Bahía supported the United Nations Global Compact from 2013 until 2014, and submitted necessary documentation to be considered an Active GC (Global Compact) company. The Compact is "a call to companies to align strategies and operations with universal principles regarding human rights, labour, environment and anti-corruption, and take actions that advance societal goals." It is considered to be "the world's largest corporate sustainability initiative". Given the international value the UN agency has, Puerto Bahía is considered a sustainability leader for the region and the industry. Puerto Bahía has taken action on 10 different issues addressed by the Global Compact. Such actions include: care for human rights by stating internal policies for their respect, designation of working standards that regulate working relationships between members and contributors of the project and its contractors, establishment of an Environmental Management Policy for good stewardship of the natural environment, and commitment to eliminate corruption by internal politics compiled in a management manual distributed around the company and its contractors. Puerto Bahía has measured its environmental performance during construction (2014) and operation period (January - June of 2015). A document was created detailing the management policies of the company and management communication guidelines regarding internal politics of public and private information management. Such documents in addition to the affiliation to the UN Global Compact demonstrate the superior leadership commitment of the project with sustainability. It is for this reason that Puerto Bahía has proven significant commitment across the organization to improve overall sustainability performance. *Source:* *Sociedad Portuaria Puerto Bahía, "Informe de Progreso". (Presented to the United Nations Global Compact 2014, Unknown: 2014). 9-30.* *"What is UN Global Compact?" United Nations Global Compact, accessed September, 14th, 2015, "https://www.unglobalcompact.org/what-is-gc."* *RECOMMENDATIONS* Increase organization-wide understanding of the issues and problems associated with sustainability inside and outside of the project community. Continue annual measurements of sustainability performance. Improve project commitment to sustainability across the organization by improving environmental practices and other performances.
LD1.2 Establish A	**7**	**Superior**

Sustainability Management System		Puerto Bahía's management system for the Direction of Sustainability has a hierarchical structure. Its direction is given to operations management and other sections of the company by the general manager and the Board of Directors. The project completed a sustainability management plan that designates sustainability goals, metrics, actions to take, stakeholders, and costs. The plan defines community participation mechanisms in each environmental action evaluated, as many of the environmental actions originated from community needs and goals. Recommended actions regarding social and environmental components are divided into two categories: actions required by the port operation, and the actions required by the community. Community actions are coordinated from an independent foundation created by the SPPB called "Fundación Puerto Bahía" and environmental actions regarding measurements of optimal operation of the port are done by Puerto Bahía. Environmental performance, control, and monitoring of required sustainable actions is regulated by the sustainability management plan. However, it has not been clearly stated who is in charge of measuring performance and how responsibilities and action delegation occurs when sustainability issues appear.
		Source: *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 12-17.* *Sociedad Portuaria Puerto Bahía. "Organigrama SPPB", (Internal Document Puerto Bahía, Unknown location and Date). 1.*
		RECOMMENDATIONS Define with more detail the roles and responsibilities of the group under the direction of sustainability. Specify a monitoring team able to report on sustainable issues. Include prospects of changing conditions and create a plan for an optimal answer.
LD1.3 Foster Collaboration And Teamwork	**1**	**Improved** SPPB and the project team have expressed a desire to improve sustainable performance by defining a sustainable management plan where tasks and actions are distributed among diverse teams during construction and operation period. A Multidisciplinary team is in charge of several monitoring and controlling sustainable actions. However, there is no reference of a particular teamwork process or any early collaboration between different parties involved, defined at the project delivery method or contract signed between the parties. Systems design and optimization are not considered as well as risks and rewards of sharing channels in which unexpected benefits or mistakes are addressed between project teams, developers, and the construction company. Moreover there is no information demonstrating a comprehensive view of the project as an actor in optimizing community infrastructure.
		Source: *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 12 - 17.*
		RECOMMENDATIONS Foster teamwork and team collaboration among all the operation activities of the project. Additionally, create teamwork cooperation for identifying and eliminating duplicated functions or unnecessary redundancies in the project operation. Include the assessment of risk/reward between the project owner and project team.Promote integrated design and delivery methods in which all involved parties have an integrated and holistic view from the beginning of the project. This will help minimize risks and uncertainty during the lifespan of the project and guarantee a more successful performance.
LD1.4 Provide For	**5**	**Enchanced**

Stakeholder Involvement		Credit detailThe community member of Puerto Bahía most affected is the stakeholder with the most involvement in Puerto Bahías project. They collaborate in the identification of environmental and social issues, environmental monitoring processes and sometimes help resolve labor disputes. According to the Environmental Management Plan, each environmental initiative includes the identification of a person responsible for execution, a mechanism of participation, and the benefited population. Frequently the affected community is both in the benefited population as well as in the mechanisms of participation. Communication with project stakeholders are important elements of the contingency program of Puerto Bahía. Governmental agencies such as "Alcaldía de Cartagena", "Gobernación de Bolivar", "Corporación Autónoma Regional" (CAR) and "Concejo Distrital para la Gestión del Riesgo de Desastres (CDIGRD) are partners in emergency situations. Additionally, Puerto Bahía is part of the Awareness and Preparedness for Emergencies at Local Level (APELL) system of Cartagena, a system created to consolidate efforts in case of an emergency. The largest industrial companies of Mamonal and port areas as well as community leaders are part of APELL.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 3.* *Sociedad Portuaria Puerto Bahía, "Manual Gestión Integral". (Internal Document Puerto Bahía, Unknown location and Date). 49-50.* *Puerto Bahía, "Complemento del Plan de Contingencias Sociedad Portuaria Puerto Bahía". (Document presented to Puerto Bahía, Unknown: 2014). 43-44.*
		RECOMMENDATIONS Take actions to increase the range of the public participation beyond the affected community in order to receive feedback for design, construction, and operation. Advocate for active public engagement in which feedback goes beyond the exchange of information to a dialog between identified opportunities and performed actions. Consider implementing a community relations program allowing periodic public participation during operation.
LD2.1 Pursue By-Product Synergy Opportunities	**1**	**Improved**
		The project's team identified opportunities to reuse waste materials coming from excavation and other construction activities at the port by selling Puerto Bahías waste materials to local recycling companies. According to Puerto Bahía's documentation, at least three local companies bought waste materials from the project. Coreca, a recycling corporation in Cartagena received approximately 1,000 kg of paper and cardboard and 436 kg of plastic between January and May of 2015. "Comercializadora excedentes y Metales SA received around 90,000 kg of metallic material between the same period. Although some by-product synergy opportunities have been identified, it is unclear if the selection of these companies was done after a careful opportunity assessment was conducted by the project team, or if it was done after a limited screening effort. There was no documentation of internal policies or plans for identifying opportunities to use unwanted by-products.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 15.*
		RECOMMENDATIONS

		By-product synergies identify unwanted cost-effective materials located in nearby facilities by establishing partnerships with leadership from different projects in the area. This will help to reduce costs and minimize the environmental impact while reducing the amount of new materials used. Determine if the projects material needs can be fulfilled from unwanted by-products from nearby facilities. Prepare the project's operation or construction team for applying or using these new opportunities to minimize costs and reduce the amount of raw materials used.
LD2.2 Improve Infrastructure Integration	**7**	**Superior** Puerto Bahía improved infrastructure integration with the local areas as well as the region and the country. The project is connected to existing and planned road networks that were transformed to support the needs of port shipping. Such transformations and improvements will result in an overall improvement of transportation infrastructure within the community. Such improvements will encourage economic growth and development capacity. The existing local road, located in front of the project's site, connects Pasacaballos with the communities of Ararca, Santa Ana, Barú and Playa Blanca. Although the road is in poor condition, it goes through the center of Pasacaballos and connects the region with the main road infrastructure of the region. Puerto Bahía performed the following improvements along the 1400 mt that are in front of the project: changed the road section from 10 to 30 mt, upgraded the road from dirt to pavement, constructed water drainage systems, landslides protection and provision of road signs. Such improvements allow transportation of heavy loads and reduces accident risk. The planned road identified as "Transversal de Barú" will connect the region with the industrial zone and the port area of Cartagena. Moreover, this network reaches the regional corridors of the by-pass road of Cartagena and the industrial zones of Barranquilla and Santa Marta. The network is linked to the national corridors connecting the atlantic coast with the main production centers in western and central Colombia. "Transversal de Barú" material specifications were improved in order to allow heavy load vehicles to use the infrastructure. This new road will not only connect the region but also protect the existing communities from negative impacts such as cargo vehicles passing through urban areas and elevated road accidents. *Source:* *Hidrocaribe, "Capítulo 2. Descripción del Proyecto", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 40 - 46.* *RECOMMENDATIONS* Increase efforts to identify additional community related infrastructure beyond roads. Consider looking for community related natural systems and resources infrastructure that could be improved or restored. Look for general improvements in infrastructure efficiency.
LD3.1 Plan For Long-Term Monitoring & Maintenance	**10**	**Conserving** Puerto Bahía demonstrated a clear and comprehensive plan for monitoring environmental, social, and internal management activities related to occupational health control. Conceived in 2011, the plan provided enough time for allocating funds and planning monitoring activities before and during the construction period. Puerto bahía demonstrated a systematic and robust monitoring plan during the construction period. Since the project started its operation period in July of 2015, strong evidence supports monitoring activities will be effective in the long term. Several reports and monitoring sheets were provided supporting the measurement of assets specified in the Environmental Management Plan. The Environmental Management Plan defines the programs required to reduce negative impacts to the environment and the community involved with the project. Each program has a detailed plan where costs, goals, responsible persons, execution schedule, location, benefited population, monitoring indicators, and strategies of community participation are defined. The programs include the following assets: environmental and social management, occupational health and safety, soil management, water management, air quality management, protection and conservation of mangroves habitats (construction period only), disease control, biotic compensation program (construction period only), fishing management program (construction period only), monitoring of

		environment quality program, information communication and social participation program, environmental training and awareness (construction period only), labour hiring program, AID's training program, ethnocultural empowerment program (construction period only), preventive archeology (construction period only), social compensation program (construction period only), institutional management training program (operation period only) and training for project's workers program (operation period only).
		Source: *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011).* *Sociedad Portuaria Puerto Bahía. "Organigrama SPPB", (Internal Document Puerto Bahía, Unknown location and Date). 5.* *MCS, IDEAM, "Reporte de Sedimentos" in Programa de Seguimiento y Monitoreo en Etapa de Construcción de Sociedad Portuaria Puerto Bahía (SPPB), (Internal Document Puerto Bahía, Cartagena: 2014). 10.* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico Calidad de Aguas y Comunidades Hidrobiológicas" in Programa de Seguimiento y Monitoreo en Etapa de Construcción de Sociedad Portuaria Puerto Bahía (SPPB). (Document presented to Puerto Bahía, Bogotá, November, 2014).* *MCS, IDEAM, "Reporte de Resultados de Laboratorio MCS-14962 Monitoreo de Calidad de Aire y Ruido Puerto Bahía SO_2". (Internal Document Puerto Bahía, Cartagena: 2014). 1.* *MCS, IDEAM, "Reporte de Resultados de Laboratorio MCS-14962 Monitoreo de Calidad de Aire y Ruido Puerto Bahía PM10". (Internal Document Puerto Bahía, Cartagena: 2014). 1.* *MCS, IDEAM, "Reporte de Resultados de Laboratorio MCS-14962 Monitoreo de Calidad de Aire y Ruido Puerto Bahía NO_2". (Internal Document Puerto Bahía, Cartagena: 2014). 1.* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Monitoreo de Calidad del Aire de la Sociedad Portuaria Puerto Bahía Etapa de Construcción". (Document presented to Puerto Bahía, Bogotá: 2015). 4* *MCS Consultoría y Monitoreo Ambiental and Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Programa de Seguimiento y Monitoreo en Etapa de Construcción de Sociedad Portuaria Puerto Bahía (SPPB)". (Document presented to Puerto Bahía, Bogotá: 2014).* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico Fisicoquímicos y Bacteriológicos - Primer Semestral del Seguimiento y Monitoreo en Etapa de Construcción - Operación de Sociedad Portuaria Puerto Bahía (SPPB)".(Document Presented to Puerto Bahía, Bogotá: 2015). 12* *Asesorías de Estudios Ambientales S.A.S., "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazadas Ciénaga Honda". (Document Presented to Puerto Bahía, Cartagena: 2012). 18.* *Gestión y Control Ambiental S.A.S, "Informe de Monitoreo de Parcelas Permanentes en Ecosistemas de Manglar y Bosque Seco en Zonas Enriquecidas Forestalmente por la Sociedad Portuaria Puerto Bahía". (Document presented to Puerto Bahía, Cartagena: 2012).* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Monitoreo de la Fauna Asociada a las Raíces de Manglar". (Document presented to Puerto Bahía, Bogotá: 2014). 10.*
		MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico caracterización de Manglares Segundo Muestreo" in Monitoreo de los Manglares Puerto Bahía (Document Presented to Puerto Bahía, Bogotá: 2015). 10 - 16. *MCS Consultoría y Monitoreo Ambiental, "Acta de Inicio de monitoreo". (Document Presented to Puerto Bahía, Cartagena: 2014). 1.*
		RECOMMENDATIONS Continue to monitor and document the performance of the environmental, social, and organizational assets related to the project during operation period. Plan for funding and operational activities for long term monitoring and maintenance activities.
LD3.2 Address	**2**	**Enhanced**

Conflicting Regulations & Policies		Puerto Bahía created a clear Comprehensive Management Manual defining mechanisms for the systematic identification and assessment of existing and new regulations that apply to the project. Although the assessment was written in general terms and does not address specific issues related to sustainability, the project team has the necessary protocol in place to find conflicting regulations under the current management structure it has defined. Regulation conflict management includes a quality verification group, which could be internal or external, dedicated to inspect overall company performance in regulation compliance. Such management structure allow the project's team to identify a local regulation which was not safe enough for people working with the distribution, transportation, and storage of fuel. After the conflict was identified the project team decided to follow international standards in order to increase workplace safety. The conflict found was between the NPFA 30 regulation and Colombia's regulation "Decreto 0283 de 1990" in which regulates fuel storage, transportation, and distribution. According to the project's documentation, Colombian regulation allowed tall oil storage tanks whose height were deemed unsafe by the NPFA. According to the NPFA, tanks with high altitudes increase the risk of accidents generated by electric storms. Opting for caution, the Puerto Bahía project team decided to use the NPFA 30 regulation instead of the Colombian law in order to reduce risks. It is worth mentioning that Colombian law was followed for the design and management of other storing areas and the dikes area of the project. Additionally, the management manual pursues the implementation of flexible mechanisms allowing the addition of new regulations or policies to be smooth. Such attitude is defined in order to facilitate the implementation of changes required to solve possible conflicts or opportunities stemming from regulation revision.
		Source: *Sociedad Portuaria Puerto Bahía, "Manual Gestión Integral". (Internal Document Puerto Bahía, Unknown location and Date). 8, 9, 26, 37, 42, 49.* *Hidrocaribe, "Capítulo 2. Descripción del Proyecto", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 26.*
		RECOMMENDATIONS Increase the scope of the regulation assessment to a broader view where structural changes could be done in order to reduce issues related to sustainability. Assess changes in overall approaches, objectives, practices and philosophies that unintentionally run counter over sustainable practices.
LD3.3 Extend	**1**	**Improved**

Useful Life		Puerto Bahía was planned and built to last longer than what the owner of the project is currently able to achieve. The concession contract signed with the local authorities stipulates a maximum of 20 years for operating the port, however the buildings and machinery have a longer lifespan. The owner of Puerto Bahía suggested the possibility of renovating that contract with the intention of performing the required improvements and renovations to the project. The port, built at the water shoreline, is partially located over land and is owned by the national government, which is why Puerto Bahía was required to ask for a concession to build and operate the project. Project life span and other site considerations are defined by the environmental license "Resolución 1635/2010 MAVDT" approved by local authorities. Additionally, the owner of the project selected the site with long term use in mind. According to the POT of Cartagena (Planning document of Cartagena), the permitted uses of the area are Industrial and port activities, therefore it is unlikely that the project changes its use. However, no documentation was found regarding considerations of flexibility, durability and resilience of physical structures. There was also no documentation regarding the selection of materials easily adaptable for changing configurations, retrofits, or repairs.
		Source: *Hidrocaribe, "Capítulo 2. Descripción del Proyecto", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 64.* *Hidrocaribe, "Capítulo 10. Plan de Abandono y Restauración", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 1, 4, 5.*
		RECOMMENDATIONS Include flexibility into the constructed project so that it could expand, transform, and reconfigure for future users and needs. Purse practices and strategies to extend the durability of the project and its useful life.
LD0.0 Innovate Or Exceed Credit Requirements		*N/A*
	43	

CATEGORY II: CLIMATE AND ENVIRONMENT		
RESOURCE ALLOCATION		
	Score	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**
RA1.1 Reduce Net Embodied Energy	**0**	**No Score** Embodied energy is described as the sum of energy that was used in the production of a material or product, including raw material extraction, transport, manufacture, and all undertaken processes until the material or product is completed. There is no evidence of a life cycle energy assessment done by the project to account for the embodied energy of the materials used. The project's team considered consumption reduction of energy but no evidence was found about selecting materials according to their embodied energy, therefore this credit is considered to be a non score. <u>Source:</u> *Tetratech Colombia S.A.S., Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación, (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014),7, 49.* <u>RECOMMENDATIONS</u> Perform a Life Cycle Assessment for future materials used in the project in order to reduce the net embodied energy consumption. Design the selection process where materials required don't increase operational or maintenance energy over the project lifespan. Energy consumption is accounted for in every step of material extraction, processing, manufacturing, and transportation. Therefore selecting materials that consider embodied energy contained could improve the performance in this credit.
RA1.2 Support Sustainable Procurement Practices	**2**	**Improved** Puerto Bahía has clear and detailed material procurement policies committed to obtaining materials, equipment and services from suppliers who adhere to the highest sustainable practices and standards. According to selection process documentation, certification ISO 14001 is prefered for companies providing the following services of materials: Stone materials, waste transportation and management, water and energy supply, civil construction, electric and mechanic installation and assembly, maintenance services, food services, community work, monitoring services, and topographic services. Selection and recruitment processes include control and monitoring of the contractors regarding compliance of applicable laws, including: environmental laws, safety regulations, commerce regulations, and applicable quality certificates. Acquired products should follow the internal requirements and formats of Puerto Bahía including: supplier evaluation format, supply request format, purchase request format, supply receipt format and supply return format. In addition, suppliers are provided with technological support from the Puerto Bahías project team about environmental issues and management. Although the project demonstrated commitment to sustainable procurement practices, there was no documentation found regarding the percentage of material suppliers following sustainable practices. <u>Source:</u> *Puerto Bahía, "Niveles de Requerimientos ASSISO Procesos de Contratación". (Internal Document Puerto Bahía, Unknown: 2014). 7* *Sociedad Portuaria Puerto Bahía, "Manual Gestión Integral". (Internal Document Puerto Bahía, Unknown location and Date). 63 - 68* <u>RECOMMENDATIONS</u>

		Encourage suppliers to take into account environmental, economic, and social impacts products by selecting products that are certified by third parties which go beyond the ISO 14001 and that follow sustainable sources as a criteria for the selection of manufacturers. Increase the amount of suppliers following sustainable practices to up to at least 51% of the total material required in the project Consider documenting the percentage of materials purchased from suppliers that have implemented sustainable policies and practices.
RA1.3 Used Recycled Materials	**2**	**Improved** This credit looks to reduce the use of new materials by maximizing the use of recycled or pre-used materials, structures, and supplies. The Environmental Management Plan stipulates a percentage of waste generated during construction should be reused if possible and unused waste should be properly managed and transported to the city dump or to recycling companies. Both construction debri and excavated material will be stored in an expansion area of the project. Material stored in this area will be covered so soil and water will be protected from contamination derived from waste. <u>Source:</u> *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 29, 30.* <u>*RECOMMENDATIONS*</u> Considering the waste management issues identified in the area of influence, increase efforts to use discarded material from the construction debri so that a reduced amount is sent to the municipal dump. Perform better documentation of the volume or quantity of reused material for future performance evaluations. Take into account possible beneficial use of reused materials or materials with recycled material in their content.
RA1.4 Use Regional Materials	**6**	**Enhanced** Puerto bahía is committed to acquiring materials from local companies and suppliers. According to the Environmental Management Plan, 100% of the concrete should come from companies located at maximum distance of 12Km from the project and contracted material supply companies including Agos (cement), CANNAN and La Ramada (gravel and sand) are located within that distance. Aculpas, a company established within the local community provided trees and plants for the landscape of the project as well for mangrove restoration. Additionally, the Plan specifies the project should always look first for local companies when acquiring a new service or product. Such internal policy applies to the acquisition of all construction materials. Although the project team demonstrated commitment to using local suppliers, specialty machinery and hard-to-source material was imported for the project, which reduced the amount of total supplies provided by local vendors. <u>Source:</u> *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 29, 30, 104 - 106.* *Corporación Autónoma Regional del Canal del Dique (CARDIQUE), "Resolución No. 0679 Por Medio del cual se establece un Plan de Manejo Ambiental" (Unknown: 2000). 1.* *Corporación Autónoma Regional del Canal del Dique (CARDIQUE), "Resolución No. 1284 Por Medio del cual se resuelve una solicitud y se dictan otras disposiciones". (Unknown: 2013). 2-8.* *Corporación Autónoma Regional del Atlántico. "Resolución 0000503 Por medio de la cual otorga una licencia ambiental a la sociedad centro de apoyo logístico S.A". (September 30th, 2010). 1-6.* *Puerto Bahía, "Contrato No SPPB-025-2014 para la Concertación de Áreas de Compensación Forestal a Desarrollar por parte del Proyecto SPPB, en Sitios Pertenecientes al de Influencia Directa". (Internal Document Puerto Bahía, Unknown Location and date).* <u>*RECOMMENDATIONS*</u>

		Increase the percentage of acquired materials, plants, from local vendors. Document volumes and quantities of acquired local materials and the distance traveled for supplies arriving at the construction site.
RA1.5 Divert Waste From Landfills	**3**	**Improved** Puerto Bahía has a sound and complete waste management strategy which includes actions to divert waste from landfills during construction and operation. It identifies appropriate methods and practices for storing and transporting waste that prevents air, water, and soil contamination. It also defines material classification methods for optimization of recycling processes and prevention of possible contamination. According to the Plan there are 17 types of waste, and each type has suggested methods for storage, transportation, health risk management. This plan suppliments the Environmental Management Plan where the general waste disposition policies are described. According to the Environmental management Plan, solid waste should be stored by type in at least three trash cans identified by color (blue for recycled materials, red for contaminated material and green for organic materials). Classification practices facilitate reuse and prevent contamination from toxic materials. The plan also demands for the identification of local firms interested in the recycled materials. According to Puerto Bahía's documentation, at least three local companies bought cardboard, paper, and metal form the project's waste. Coreca, a recycling corporation in Cartagena received at least 1,000 kg of paper and cardboard and 436 kg of plastic between January and May of 2015. "Comercializadora excedentes y Metales SA received around 90,000 kg of metallic material between the same period. Although the Waste Management Plan and Environmental Management plans are comprehensive and complete and document the amount actual recycled material, Puerto Bahía's indicators show recycled waste accounts for a small percentage of total waste produced. <u>*Source:*</u> *MCS Consultoría y Monitoreo Ambiental S.A.S., "Plan Residuos Peligrosos Fases Construcción y Operación". (Document Presented to Puerto Bahía, April: 2015). 67, 69.* *Hidrocaribe, "Capítulo 7. Plan de Manejo Ambiental", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011).,141 -144.* *Puerto Bahía, "Índices ambientales - Resumen Anual - 2015". (Internal Document Puerto Bahía, Unknown Location and Date). 1.* *Corporación Reciclajes de Cartagena, "Certificado de Reciclaje" (Cartagena, May, 8th, 2015).* *Corporación Reciclajes de Cartagena, "Certificado de Reciclaje" (Cartagena, Feb, 25th, 2015).* *Corporación Reciclajes de Cartagena, "Certificado de Reciclaje" (Cartagena, April, 7th, 2015).* *Puerto Bahía, "Tiquete de Báscula SPPB" (Cartagena, August, 01th, 2015).* *Puerto Bahía, "Tiquete de Báscula SPPB" (Cartagena, August, 03th, 2015).* *Puerto Bahía, "Tiquete de Báscula SPPB" (Cartagena, July, 31st, 2015).* <u>*RECOMMENDATIONS*</u> Increase efforts to follow the Waste Management Plan and Environmental Management Plan. Increase efforts to improve the percentage of recycled material.
RA1.6 Reduce Excavated Materials Taken Off Site	**4**	**Enchanced** The project demonstrated commitment to reducing transportation of the site's excavated materials. According to annual metrics for 2015, 4,027m3 of the 6,127m3 (around 65%) excavated materials was reused inside the project. This metric follows the recommendations of the Environmental Management Plan where excavated materials should be temporary stored in an expansion area of the port for future reuse inside the project. Excavated material should be used as filling material or topographic reconfiguration. Material that could not be stored inside the project's expansion area will be transported to the local landfill by tucks. These trucks should be free of perforations in the floor and walls of the container and should follow local regulations for exhaust emissions. Transported material should also be covered in order to avoid air contamination.

		Source: *Puerto Bahía, "Índices ambientales - Resumen Anual - 2015". (Internal Document Puerto Bahía, Unknown Location and Date). 1.* *Hidrocaribe, Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena, October, 2011),29, 30.*
		RECOMMENDATIONS Plan and design opportunities to reduce the amount of excavated site material. Improve efforts to increase the percentage of reuse of the site's excavated material.
RA1.7 Provide for Deconstruction & Recycling	**0**	**No Score** Puerto Bahía has yet to consider project deconstruction or recycling, or construction typologies aligned to simplify the process in the future. Although the concession contract with the national government is 30 years, project managers strongly believe its use as a port will extend far beyond the contracts stated time period. Land use regulation specified the area as suitable for shipping activities and its location is strategically valuable for port and transportation activities. The project did not assess any material inventory that could retain some value for the future or consider using components that could be easily disassembled. Uncertainty of future needs regarding technology and social and economic changes, the port structure could become obsolete and disassembly or deconstruction could be required. Therefore, this credit is considered to be non score.
		Source: *Hidrocaribe, "Capítulo 10. Plan de Abandono y Restauración", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 3, 5.*
		RECOMMENDATIONS For future expansion areas of the project, plan and design considering future reuse of materials and products. Look for prefabricated units that could be easily separated and materials that could retain value for future use. In addition, conduct an inventory of materials designed to be reusable materials.
RA2.1 Reduce Energy Consumption	**0**	**No Score** Puerto Bahía identified possible mechanisms to reduce energy consumption during construction and operation. However, there was no evidence found showing real energy reduction achieved during any phase of the project. In the efficiency report "Informe sobre la ND3 del IFC para el proyecto Puerto Bahía" the project team specified "Cleaner Production Mechanisms" to fulfill the ND3 (Efficiency of resource use and contamination prevention) of the IFC, the World Bank's General and sectoral Guidelines of the Environmental, Health, and Safety (EHS). According to the efficiency report, during the first year of operation the project should have reduced its energy consumption by >20%. However, by October of 2015, three months after the operation activities started, there is no evidence of any energy reduction. The project identified 13 mechanisms to reduce energy consumption: design and selection of air conditioning systems, design a proper insulation system for buildings, discourage opening windows and doors in spaces with A/C, design windows sizes and openings to optimize daylight use, design separate light switches, use LED lights, clean lights and lamps every 6 months, design ceiling openings for circulation areas, use solar tubes as storage areas, perform periodic maintenance to electric equipment, turn off unused equipment, disconnect equipment without "ENERGY STAR" label, and design shaded and ventilated parking to reduce air conditioning use in vehicles. Lastly, the report recommends an annual control of reduction indicators that inform a new plan with goals and indicators for the future, nevertheless considering that no evidence has been provided, so no score can be given at this point. There is a pilot project for using solar energy in a container, however such project does not represent a significant reduction in energy consumption.

		Source: *Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 40, 44, 47, 53.*
		RECOMMENDATIONS Increase efforts to follow indicators and mechanisms described in Tetratech's efficiency report. Look for designing a whole-system approach that enables further energy consumption. Such a whole-system approach may require a single comprehensive life cycle assessment to be conducted. Increase efforts to connect to the national electric grid in order to reduce gas emissions from generators powered by fossil fuels.
RA2.2 Use Renewable Energy	**4**	**Improved** Puerto Bahía is constantly increasing its use of renewable energy. For example, the project has a wind power extractor and a 2sqm solar panel used to help power offices. However, there was no documentation found showing how much renewable energy contributes to total energy usage. Given the scale and considerable energy demands of the project, little evidence suggests renewables provide more than 10% of total energy consumption. Despite playing a minor role, renewables provide energy for important functions. The wind power extractor and a photovoltaic system provide 130W of the 195W per month required for the port's surveillance systems. The solar panel system works with two solar panels located at the roof of a container, which functions as office space, and consumes around 6000W per day. The panels offset fuel consumption by 5 gallons per day, which are instead used to power an electric generator. The solar system is a pilot project and was implemented on only one container, as the rest of the containers that are used as offices are powered by an oil-powered electric generator.
		Source: Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 23 Pert, "Informe Seguimiento a la Gestión en HSEQ". (Internal Document Puerto Bahía, Unknown Location and Date). 1, 2.
		RECOMMENDATIONS Improve efforts to source energy from large scale renewable energy sources and to increase the percentage of renewable energy use of the project. Connect to the national energy network which provides 70 to 80% of the energy by hydropower which are considered a semi-renewable source.
RA 2.3 Commission & Monitor Energy Systems	**3**	**Enhanced** Puerto Bahía has commissioned TetraTech to report and monitor energy systems. TetraTech is a third party who recommended the project monitor and quantify monthly energy consumption. Using energy consumption figures as support, TetraTech recommended creating new yearly consumption aimed at reducing energy consumption. According to TetraTech, 2,850,000 kWh were estimated to be consumed during the total construction period and 9,030,000kWh during one year of operation period. While Tetratech suggested a goal of reducing energy consumption by 20%, evidence showing progress monitoring has not been provided. There was also no evidence found showing workers were properly trained in maintenance and monitoring energy systems.
		Source: Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 51
		RECOMMENDATIONS

		Increase efforts to perform a long-term monitoring process where workers are trained in maintenance and monitoring activities and new monitoring equipment is installed. Increase efforts that go beyond monthly measurements and create the long term plan proposed by the commissioned company.
RA3.1 Protect Fresh Water Availability	**9**	**Superior** Puerto Bahía is committed to protecting freshwater availability. The project team conducted an Environmental Impact Study and an Efficiency Report. The Environmental Impact Study describes water availability, quality, and management of the area of influence of the project and its region. The Efficiency Report defines mechanisms and practices of water management of the port. Following the conclusions and recommendations of both reports the project conducted a comprehensive water management plan in which the project's wastewater is treated and returned to its original source or to specific treatment sites when required. According to the Environmental Impact Study, Dique's Canal is the major freshwater source of the region. However, the water is not suitable for human consumption due to high contamination levels, and needs to be treated before consumption. Cartagena's aqueduct takes water from two different points in the Dique's Canal. Afterward it directs diverted water to a treatment plant before reaching the local community. Puerto Bahía and the populations located in Barú's area (excluding Pasacaballos) are not connected to the aqueduct network, therefore water is trucked in. Because trucking in water is prohibitively expensive, the project has encouraged water reuse and efficiency measures such as: using portable toilets, reusing industrial water, discharging rainwater into the bay, treating wastewater. The project's wastewater will be collected and treated in two plants, one for domestic water waste and another for industrial water contaminated with oil or other pollutants coming from the port's operation. After being treated, domestic water will be discharged into the bay, and industrial water will be transported by tanker trucks to other facilities dedicated to managing contaminated water. In addition,Puerto Bahía performed a detailed report monitoring the quality of underground water. According to the document "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar", 10 monitoring wells were constructed to measure water quality and to clean contaminated water. The report includes measurements during 2014 and 2015 demonstrating the project's commitment to solving long term negative impacts for contaminated freshwater. *Source:* Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 39,40. Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 24. Geototal. "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar"." (Document presented to Puerto Bahía, Bogotá: 2015). 4. *RECOMMENDATIONS* Follow the Efficiency Report recommendation about reuse of wastewater inside the project. Measure project's water requirements including estimations of average peak demands and long term needs. Conduct calculations of the volume of freshwater discharge after use.
RA3.2 Reduce	**4**	**Improved**

Potable Water Consumption		The project has an increasing commitment to reduce water consumption. According to the Efficiency Report done by Tetratech, no water consumption monitoring was conducted from 2013 to 2014, however, in 2015 the project measured water consumption on a monthly basis from January until June (when documentation was provided for the present case study). According to the annual measurements, potable water consumption was 196Lts from January to June of 2015. although there is no data to verify water consumption reduction, the Efficiency Report recommends design strategies, maintenance actions, training actions, and equipment specification in order to reduce consumption. Puerto bahía has followed the recommendations and applied them during 2015 year, therefore there is evidence that commitment to reduce water consumption exists in the project's team. Community meet their water needs by purchasing large water bottles which are shipped in. Water used for fire control, cleaning, and landscape irrigation is provided (through tanker trucks) by the public services company, Cartagena ACUACAR. Although water provided by ACUACAR is not suitable for human consumption, it is the main water source of the region, therefore it should be preserved as much as possible. Tetratech recommends several actions to reduce consumption of water provided by ACUACAR: perform periodic maintenance to water control boxes in order to avoid or identify possible leaks, perform periodic maintenance to water transportation systems and storing, conduct awareness campaigns of water use, design an education campaign using posters and visual aids about water consumption reduction, forbid shipping companies from washing their ship hulls, use low consumption toilets, and use faucets with infrared sensors. The Efficiency Report also identifies water reuse opportunities specifically for wastewater treated inside the project. Rain water will be contained in perimetral canals and directed to the project's water treatment tanks before discharge in Cartagena's Bay. The report identified the opportunity of using such water as water for landscape irrigation and toilet lavatories.
		Source: Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena, October, 2011) 39,40. Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 24,37,38 Puerto Bahía, "Índices ambientales - Resumen Anual - 2015" (Internal Document Puerto Bahía, Unknown Location and Date). 1
		RECOMMENDATIONS Continue measuring water consumption use in order to implement specific mechanisms designed to reduce water consumption at the highest achievable percentage. Implement the recycle program proposed by Tetratech to reuse treated water for landscape irrigation and toilets lavatories. Consider collaborating with neighbor communities that may benefit from the treated water that the project discharge.
RA3.3 Monitor	**6**	**Superior**

Water Systems		Although monthly water consumption monitoring recently begun in Puerto Bahía, there is proof of the project's commitment to monitoring water systems.Two companies were commissioned to perform project's water consumption strategies and assess groundwater quality and quantity during construction and operation periods. Geototal was commissioned to construct 10 monitoring wells in order to identify groundwater characteristics and to clean such water whenever possible. The performed activities included: identifying lithological soil profile, cleaning contaminated water, georeferencing the wells dispersed around the project's area and to formulate recommendations to extend the useful life of the well. The report contains the technical information derived from well monitoring and delineates conclusions and recommendations such as prevention of cross contamination, design strategies to identify the well, prevention of storing materials near the wells, and monitoring water table levels periodically using specific equipment. Tetratech was commissioned to plan monitoring programs for water consumption, discharge, and reuse. The company suggests several monitoring actions such as: periodically cleaning the project's water meters, periodic maintenance of the transportation, storing and treatment systems, cleaning and painting water equipment, corrosion control, valves review, and replacement of damaged equipment.
		Source: Geototal. "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar"." (Document presented to Puerto Bahía, Bogotá: 2015). 4. Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 33
		RECOMMENDATIONS Improve efforts to perform management actions based on information from monitoring activities. Continue with the monthly basis water systems monitoring and increase efforts to perform the corrective and preventive actions formulated by the commissioned monitoring companies.
RA 0.0 Innovate Or Exceed Credit Requirements		*N/A*
	43	

NATURAL WORLD		
	Score	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**
NW1.1 Preserve Prime Habitat	**14**	**Conserving** According to the Archeological project and the Biodiversity Action Plan commissioned by Puerto Bahía, the project is not located at a prime habitat. Previously the area was occupied by a port and a by shrimp cultivation infrastructure which had a negative impact in the previous natural ecosystem richness. However, mangroves ecosystems and swamps located along the shoreline of the Dique's Canal and Bahía Honda still remain but in deteriorated conditions. In order to improve the existing conditions of the remaining prime habitat in terms of connectivity and biodiversity, Puerto Bahía commissioned several monitoring reports of the conditions of the flora and fauna and a reforestation program designated to plant local species in 65 ha of the area of influence. Some of the planting areas were located beyond the perimeter of the project in the nearby communities of Pasacaballos and Araca. For these reasons it is considered that Puerto Bahía not only avoids use of prime habitat but it also improves its conditions by enlarging its size and increasing its connectivity. According to Archeological Project and the Protection and Conservation Program for Mangroves and Endangered Species, the area of influence of the project includes strategic ecoregions such as the Dique's Canal delta and Cienaga Honda swamp. Three monitoring studies addressing impacts of the construction and operations actions in addition to the mitigation actions done in the the prime habit ecosystems of "Cienaga Honda" and "Dique's Canal" were conducted from 2012 until 2015. Such ecoregions are crucial components of wetland networks and biodiversity both of flora and fauna. In the Protection and Conservation Program living conditions and threats were reported for the following groups species: flora, fauna, entomofauna, herpetofauna, bird fauna, mammalian fauna, phytoplankton, zooplankton and ictiofauna. Several recommendations such as reforestation, access restriction, domestic animal restriction and fishing practices regulation were provided in the report in order to protect and start renovation processes for the region ecosystems. From 2011 until 2014 65 ha of dry forest located in diverse sectors of the direct area of influence of the project were planted with new timber trees. A total of 1100 trees by hectare were planted with an expectation of survival of 600. Additionally 25 ha of mangroves areas were planted with 2500 new plants by hectare. The sites selected for planting were 4 water bodies (arroyo Tucu Tucu, Arroyo Doña Juana, Arroyo San Quintin y Paricuica, and Arroyo Plata) which were in degradation conditions. Although identifying and taking actions to restore prime habitat near to the project was required by the local regulation "Licencia Ambiental Resolución 1635 de 2010" and "Licencia ambiental Resolución 0950 de 2012", Puerto Bahía went beyond requirements by following international standards such as the Performance Standard No 6 of the International Finance Corporation (IFC). According to the biodiversity action plan "Plan de Acción para la Biodiversidad Informe Final. 2015" The IFC international standard establishes norms and practical guidelines for biodiversity conservation, sustainability of the ecosystem services benefits and promotion of sustainable management of natural resources. Puerto Bahía followed the IFC standards performing periodic monitoring and corrective actions every year.

		Source: *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015). 5, 6, 41.* *Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 3, 4, 6.* *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía." (Document presented to Puerto Bahía, Bogotá, July, 2009). 2 - 4, 8, 15.* *Asesorías de Estudios Ambientales S.A.S., "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazadas Ciénaga Honda". (Document Presented to Puerto Bahía, Cartagena: 2012). 10 - 13.* *MCS, IDEAM, "Informe Técnico Fauna Asociada a Manglar" in Monitoreo de la Fauna Asociada a las Raíces de Manglar. (Document presented to Puerto Bahía, Bogotá: 2014). 9 - 11.* *Gestión y Control Ambiental S.A.S, "Informe de Monitoreo de Parcelas Permanentes en Ecosistemas de Manglar y Bosque Seco en Zonas Enriquecidas Forestalmente por la Sociedad Portuaria Puerto Bahía". (Document presented to Puerto Bahía, Cartagena: 2012). 7* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico caracterización de Manglares Segundo Muestreo" in Monitoreo de los Manglares Puerto Bahía (Document Presented to Puerto Bahía, Bogotá: 2015). 8.*
		RECOMMENDATIONS Continue the monitoring actions taken since 2012 until 2015. Continue following the actions established by the Biodiversity Action Plan.
NW1.2 Preserve Wetlands and Surface Water	**4**	**Enhanced** Puerto Bahía is a multifunctional port, therefore, by definition is located on the sea shoreline. However, perimeters other than the port itself are setback from existing water bodies by 30 mt. The project is designed to leave a 30 mts buffer zone following to the natural preservation requirements of the the local regulation "Licencia Ambiental Resolución 1635 de 2010" and "Licencia ambiental Resolución 0950 de 2012". Within such setbacks the port provides a natural buffer zone without any construction to the Dique's Canal shoreline and "Bahía Honda", a canal and a swamp located at the east and west side of the project's site. Although the buffer zone distance is the consequence of following the local regulation, Puerto Bahía has done persistent and sound programs designated to protect and restore the conditions of the mangroves and water ecosystems associated to "Bahía Honda" swamp and the Dique's Canal. According to the documentation provided, Dique's Canal is a 115km canal connected to the Magdalena River, that is part of a wetland network of approximately 60,000Ha. "Cienaga Honda" or "Bahía Honda" is a swamp surrounded by 17ha aprox of mangroves ecosystems of 8 to 100 meters width. They are both identified as strategic ecoregions that require protection and restoration because of long processes of degradation derived from industrial water discharge, dump of waste material and deforestation. Puerto Bahía was informed about the importance of the water system ecosystems by the companies commissioned to perform the Archeological Project and the Environmental Impact Study. Such reports recommended periodic monitoring of the flora and fauna associated to the ecosystems, strategic monitoring areas of the ecosystems, and monitoring of the water quality and availability. Additionally there was a comprehensive protection program that included mechanisms to protect and restore mangrove ecosystems and its endangered species. Such report proposed restoring practices such as reforestation in mangroves areas, limit human access to the protected areas and restriction of fishing. The project team responded accordingly performing monitoring activities from 2012 until 2015 and conducting a reforestation program designated to improve water ecosystems functions.

		<u>Source:</u> *Asesorías de Estudios Ambientales S.A.S., "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazadas Ciénaga Honda". (Document Presented to Puerto Bahía, Cartagena: 2012). 12 - 13.* *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía". (Document presented to Puerto Bahía, Bogotá: 2009). 5 - 6.* *MCS, IDEAM, "Informe Técnico Fauna Asociada a Manglar" in Monitoreo de la Fauna Asociada a las Raíces de Manglar. (Document presented to Puerto Bahía, Bogotá: 2014). 13 - 21* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico caracterización de Manglares Segundo Muestreo" in Monitoreo de los Manglares Puerto Bahía (Document Presented to Puerto Bahía, Bogotá: 2015). 12 - 36.* *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015). 25 - 29, 62.*
		<u>*RECOMMENDATIONS*</u> Perform design actions to increase the buffer zone between Dique's Canal and Bahía Honda's swamp and the project. Continue the monitoring actions taken between 2012 and 2015, following the recommendations of the protection and conservation program: "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazadas Ciénaga Honda" and the "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía.".
NW1.3 Preserve Prime Farmland	**0**	**No Score**
		Although Puerto Bahía commissioned an identification of the quality of the soil and the land use of the area of influence as part of the Environmental Impact Study, there was no specific addressing about soil designated as prime farmland in the area.The study identifies soils quality which can be used as agricultural land and the areas where agricultural activities of Cartagena takes place. However none of these agricultural areas were found within the project's site. And there was no specific assessment regarding conservation or improvement of agricultural land. Therefore, this credit is considered to be non score.
		<u>*Source:*</u> *Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 30, 142.*
		<u>*RECOMMENDATIONS*</u> Perform studies to identify the location of prime agricultural land in the area of influence of the project. Look for government surveys or studies where these information could have been identified before and consider performing protection and conservation actions such as avoiding construction and plantation of soil regenerative plants.
NW1.4 Avoid	**3**	**Superior**

Adverse Geology		Identification of adverse geology was done in the Environmental Impact Study performed in 2011 before the construction of the project started. According to such study, Puerto Bahía is located at a low risk seismic threat and over an aquitard that is part of the water system of the Dique's Canal aquifers. It was identified as part of a hydrological unit characterized by sand and gravel with primary medium porosity and a 12m depth. The soil is able to retain and transmit a reduced quantity of groundwater that is suitable for human consumption only in specific locations away from the project's site. Additionally, the study includes geological studies of the region including: soil composition and characteristics, structural geology, lithostratigraphic units and geomorphology. The Environmental Impact Study, that is very detailed and well documented with maps defining every ecological zone, was the input information for the formulation of soil management mechanisms proposed for construction and operation period of the project. According to the Environmental Management Plan, several actions regarding avoidance of oil and contaminated water spill and groundwater quality treatment were planned in order to reduce the contamination of underground ecosystems. The geological characterization was derived from on site measurements and governmental reports from Ingeominas, the Geological Institute of Colombia.
		Source: *Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena, October, 2011). 6 - 8, 11, 30, 76 - 78.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 29 - 37.*
		RECOMMENDATIONS Increase efforts to create buffers around identified geological faults. Continue the periodic ground water cleaning and monitoring process.
NW1.5 Preserve Floodplain Functions	**2**	**Improved**
		Since the port is a water dependent infrastructure, floodplain areas were compromised by the project construction. According to the Environmental Management Plan, the project's site is over the Deltas of the Dique's Canal and over the high tide line. Over the Dique's Canal Delta 8,3Ha of mangrove located at a flooded area has removed, however, following the local regulations, Puerto Bahía compensated the caused environmental impact at more than 1:2 ratio. Puerto bahía went beyond the legal requirements by creating a reforestation plan of 131Ha with new mangroves and dry forest vegetation located in water bodies of the area of influence, plus 18Ha of dry forest vegetation and 8,5Ha of ornamental vegetation inside the project. Puerto Bahía's objective was to mitigate the impact that constructing the project had in the fauna and flora biodiversity of the area and the flooding patterns. As an additional effort, submerged structures of the port were constructed in steel metal in order to allow flow of fish and sediment. Finally, the project does not have flooding as one of the risks of the project, although there is a comprehensive plan for emergencies such as explosions, earthquakes, hurricanes and electric storms there is no contingency plan for flooding.

		Source: *Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 4,7.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 29, 75 - 78, 81-87.*
		RECOMMENDATIONS Perform actions to monitor aquatic connectivity and sediment transport in the restored areas of the area of influence. Conduct a contingency plan for flooding emergencies and continue the monitoring activities of the conditions of the new planted vegetation.
NW1.6 Avoid Unsuitable Development on Steep Slopes	**1**	**Improved** Most of Puerto Bahía's site can be considered flat except from a mound located near the litoral bay area. The project's archaeological project assessed the selected site existing conditions before construction in which serious erosion processes were identified in the mound. According to the provided documentation, the mound was removed transforming the site it into a flat area. However, the project's team defined erosion preventive actions such as removing soil immediately after the elimination of the vegetal layer, storing of stripping material away from waterbodies and vehicle transportation, and restitution of the vegetal layer by planting grass, trees and shrubs.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 31* *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía." (Document presented to Puerto Bahía, Bogotá, July, 2009). 2, 9 - 10.*
		RECOMMENDATIONS Document how steep slopes were considered as a site selection decision factor.
NW1.7 Preserve Greenfields	**10**	**Superior** According to the project' Archaeological Project Report, there was a comparatively small area of the site, located at the east near the Dique's Canal, that was not developed before Puerto Bahía's construction. Most of the project's site was previously occupied by small port constructions and shrimp cultivation pools, therefore, it can be considered a greyfield field. Although, previous uses had severe impacts on the site's vegetation, soil configuration and topography, the site was not considered as a brownfield or contaminated site.The major environmental impact was related to the removal of the mangroves forest that the archeologist presumed could existed before the arrival of the industrial uses. The littoral bay area was a flat plain artificially modified, behind this area there was a mound with serious erosion processes, the remaining area was occupied by pools created by modifying the topography.
		Source: *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía". (Document presented to Puerto Bahía, Bogotá: 2009). 2, 9 - 10.*
		RECOMMENDATIONS

		Consider performing remediation measures for the artificially modified areas found in the project's site that were not developed by the project. If enlarging the project area, look for areas previously developed before avoiding the deforestation of the remaining mangrove areas of the region.
NW2.1 Manage Stormwater	**4**	**Enhanced** Puerto Bahía storage, treats and reuse rainwater. The project has a canal network system that conducts rainwater to a sedimentation tank or a sedimentation lake. In the sedimentation tank, water is treated for reuse inside the project's industrial activities. During construction period Puerto Bahía defined several practices for preventing soil and surrounding waterbodies contamination. According to the Environmental Management Plan, there was a policy for digging ditches surrounding temporal camps, working fronts, accumulated excavated material and building construction material. Moreover, there was a policy for covering excavated material with polyethylene in order to avoid run over of additional sediments. Sediments remaining from rain water storage will be used as fill material inside the projects area. Additionally, the project planted 8,6 Ha of grass and some ornamental vegetation and 18ha with native trees typical of the dry forest and dry tropical forest. Reforestation actions contribute to increment water infiltration and evapotranspiration while improves groundwater quality. Moreover 10 wells were constructed in a dispersed manner around the project's area for monitoring groundwater quality and performing cleaning activities during construction and operation periods. According to the documentation provided, every three months monitoring and cleaning activities are performed. Moreover, Puerto Bahía performs periodic monitoring of the Dique's Canal and Cienaga Honda's swamp water quality. Such reports will inform the effectiveness of the implemented stormwater systems. *Source:* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 30, 34, 35, 54, 75, 137, 138, 141.* *Geototal. "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar"." (Document presented to Puerto Bahía, Bogotá: 2015). 4,26.* *Puerto Bahía, "Planta Drenajes de Pluviales". (Internal Document Puerto Bahía, Unknown location and Date). 1.* *RECOMMENDATIONS* Increase percentage of stormwater storage capacity by replacing impervious surfaces whenever there is no risk of soil contamination with permeable ones. Consider constructing green roofs, rain gardens or vegetated swales and continue monitoring and cleaning activities of both groundwater and stormwater.
NW2.2 Reduce	**1**	**Improved**

Pesticides and Fertilizer Impacts		In order to reduce pesticides use Puerto Bahía defined a plague control policy that includes using adhesive tramps, the construction of physical barriers and implementation of biologic methods such as parasitoids, predators and pathogens before selecting chemical pesticides during construction and operation periods. Whenever the biological barriers are not sufficient, Chemical pesticides are used for control. According to the documentation provided, used pesticides should be included in the allowed substances of the by Annex III of Rotterdam Convention and Annex A and B of Montreal Protococol. Additionally the project states that no products considered in the category "Ia" (Extremely hazardous) or "Ib" (Highly hazardous) of WHO (World health association) will be purchased, stored, produced or sell inside the project. Within the integrated pest management, populations of rodents,termites, beetles, cockroaches and insects and pigeons will be controlled inside the port. Pesticides such as STORM, MALATHION, ULV AND SOLFAC 5C will be used following the safety policies of the producer and Puerto Bahía. In order to prevent water bodies or soil contamination, runoff strategies such as the construction of ditches sorrounding the port facilities and water bodies quality monitoring are implemented inside the project.
		<u>Source:</u> *Pacific Infrastructure, "Marco de Gestión para la Eficiencia en el Uso de los Recursos y Prevención y Control de la Contaminación para Pacific Infrastructure y sus Compañías Vinculadas". (Internal Document Puerto Bahía, Bogotá: 2013). 14 - 15, 22.* *Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 23, 48 - 49, 53.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 73, 83, 165.* *Puerto Bahía, "Planta Drenajes de Pluviales". (Internal Document Puerto Bahía, Unknown location and Date). 1.* *Atlantic Paste & Glue Co.,Inc. "Hoja de Seguridad Catchmaster y gato de papel - trampas agrícolas". (Internal Document Puerto Bahia, Miami:Unknown). 1 - 4.* *Proficol. "Malathion U.L.V", (Internal Document Puerto Bahía, Unknown: 2010). 1-2.* *BASF The Chemical Company, "Hoja de Seguridad Storm Bloque". (Internal Document Puerto Bahía, Bogotá: 2009). 1-9.* *Bayer, "Solfac 5 Ficha Técnica". (Internal Document Puerto Bahía, Unknown Location and Date).. 1-3.*
		<u>RECOMMENDATIONS</u> Procure selection of vegetation that require no pesticides herbicides or fertilizers whenever possible. Continue plague control preferring biological methods over chemical ones. Research for the least toxic and easily degraded fertilizers and pesticides available in the market following your own policies stated in the resources efficiency management report.
NW2.3 Prevent	**14**	**Conserving**

Surface and Groundwater Contamination		In the Environmental Management Plan, Puerto Bahía defines several actions regarding surface and groundwater contamination treatment actions during construction and operation periods. For domestic water management the project has provided an aqueduct that conducts water to a treatment plant. For Industrial water or water contaminated with oil, the project has provided an oil separator tank where oil will be separated from water at a rate of 300 gallons by minute. For rainwater treatment, the project created a drainage channel system that conducts water to a sedimentation tank. For groundwater, the project commissioned the construction of 10 wells for identifying contaminated water and for cleaning it whenever founded. Regarding prevention, the Environmental Management Plan formulates several practices that minimize water contamination risks. Solid waste should be located in designated places inside plastic containers, oil spillage in water bodies and soil is forbidden, fuel and oil storage floor areas should be covered with a high density plastic and excavated material should be stored in a designated area surrounded by ditches and covered with a high density plastic. Additionally, machinery used both in construction and operation periods should receive periodic maintenance to avoid leaks. Moreover, when performing ground water monitoring activities cross contamination prevention practices are defined such as: painting and maintenance of the exterior of the penetrating tube, clearing of well's surrounding area of vegetation and waste, avoidance of material storage near the well and using an special level probe to monitor water table level without contaminating existing water. Finally, monitoring of water systems is performed on a periodic basis. Wells are monitored every three months, solid waste management program every month and water treatment program every six months during construction period and every month during operation period.
		Source: *Puerto Bahía, "Planta Drenajes de Pluviales". (Internal Document Puerto Bahía, Unknown location and Date). 1.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013).. 35, 39 - 45, 137 - 146.* *Geototal. "Perforación Exploratoria e Instalación de Piezómetros en Puerto Bahía - Cartagena, Bolivar"." (Document presented to Puerto Bahía, Bogotá: 2015). 4 - 9, 26.*
		RECOMMENDATIONS Continue performing water treatment activities with the periodic monitoring actions stated by the environmental management plan. Consider reduction of future contamination of existing water bodies such as the Dique's Canal and Bahia Honda's swamp by proposing land use controls or avoiding water discharge into these areas.
NW3.1 Preserve Species Biodiversity	**16**	**Restorative** Credit detailPuerto Bahía commissioned the elaboration of a program for protection and conservation of mangrove habitats and endangered species for Cienega Honda's area, additionally it commissioned a comprehensive action plan for conserving and increasing biodiversity in the area of influence of the project. Both projects included the identification of the habitat conditions of the species present in the area, the identification of threats and the formulation of conserving and restoring activities for each habitat. According to the documentation provided Puerto Bahía performed some of the suggested restoration activities including creating an ecological corridor between Cienaga Honda's shore line and the Dique's canal in order to maintain the ecological connection of the coastal line. The corridor has an extension of 7 Ha aprox and a width between 11m and 15m. Cienaga Honda's swamp is the most studied area within the project. A monitoring and evaluation report was elaborated in 2001, 2012, 2014 and 2015 by Asesorias and Etudios Ambientales J.D.S. Each report included: flora and fauna identification of aquatic habitats associated to the mangrove such as: flora, entomofauna, herpetofauna, bird fauna, mammalian fauna, phytoplankton, zooplankton, fish fauna and invertebrates. Additionally ecosystemic services such as supply,

		regulation, support and cultural services were identified. Finally, conclusions and recommendations were formulated for conserving and protecting existing habitats. For example, ecosystemic importance of mangrove species Laguncularia racemosa "mangle blanco", Rhizophora mangle "mangle rojo" and Avicennia germinans "mangle salado" were highlighted because of their function as shelter and food source for wildlife in general (insects, ants, termites, spiders, bees, fishes, invertebrates such as Mytilidae spp and mangrove oyster (Crasostrea rizophorae), violinist crab and bird species both local residents as migratory). It was also identified the high levels of lead and mercury in the water which lead to fishing restriction policies, restricting access to the water and strict water quality monitoring actions. Additionally it was strongly recommended to monitor the presence of bats and forbid domestic animals presence in the area in order to prevent local and migratory birds hunting. Conservation actions were deeply involved with collaboration and training of the local community regarding the importance of the existing habitats of the area.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 76-79.* *Asesorías de Estudios Ambientales S.A.S., "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazas Ciénaga Honda (Periodo Seco 2014)". (Document Presented to Puerto Bahía, Cartagena: 2014). 3 - 5, 153 - 160.* *Asesorías de Estudios Ambientales S.A.S., "Programas de Protección y Conservación de Hábitats Manglar y Especies Amenazadas Ciénaga Honda". (Document Presented to Puerto Bahía, Cartagena: 2012). 3 - 5.* *GGestión y Control Ambiental S.A.S, "Informe de Monitoreo de Parcelas Permanentes en Ecosistemas de Manglar y Bosque Seco en Zonas Enriquecidas Forestalmente por la Sociedad Portuaria Puerto Bahía". (Document presented to Puerto Bahía, Cartagena: 2012). 3-5.* *Asesorias y Estudios Ambientales J.D.B. S.A.S., "Programas de Protección y Conservación de Hábitats (Manglar) y Especies Amenazadas de Ciénaga Honda". (Document Presented to Puerto Bahía, Cartagena: 2011). 3-5.* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Monitores de la Fauna Asociada a las Raíces de Manglar." (Document presented to Puerto Bahía, Bogotá, November, 2014) 3-5.* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Informe Técnico caracterización de Manglares Segundo Muestreo" in Monitoreo de los Manglares Puerto Bahía (Document Presented to Puerto Bahía, Bogotá: 2015). 3-5.*
		RECOMMENDATIONS Continue the annual monitoring programs of flora and fauna of the habitats associated to mangrove ecosystem. Continue training and diffusion programs among local communities. Consider measuring the positive impacts of the actions performed.
NW 3.2 Control	**5**	**Superior**

Invasive Species		Control of Invasive Species inside the project is done both in aquatic habits as well as in the project's vegetation. According to the Biodiversity Action Plan and the Environmental Management plan, identification of local species and invasive species were done in the project's area of influence. The Environmental management plan establishes planting of local species as an internal policy present both in the large reforestation plans of the area of influence of the project as well as the internal landscaping of the port. The Biodiversity Action Plan identified the lionfish as an invasive species that required management strategies such as increasing fishing and communicating to the local communities about its negative effects. The direct area of influence reforestation plan (65Ha in total) was made with native timber trees such as Oak, Cedar, Campania, Caracolí, Red Kapok and Mahogany. Additionally the ecological corridor between Cienaga Honda's swamp and Dique's Canal was planted with local species of dry forest such astrupillo (Prosopis juliflora), olivo (Capparis odoratissima) and dividivi (Caesalpinia). coriaria) and Aromo (Acacia farnesiana).
		Source: *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015). 79 - 83.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013).. 76 - 86.*
		RECOMMENDATIONS Increase efforts to control and eliminate lionfish invasion in Cienaga Honda and Cartagena's bay. Perform periodic awareness activities among the community and the communication strategies about the negative impacts of the species for other ecosystems. Monitor lionfish populations decrease over time to demonstrate restoration of the water habitat. Continue the implementation of reforestation activities with local species both of timber trees as well as mangrove species.
NW3.3 Restore Disturbed Soils	**0**	**No Score**
		Although puerto bahía defined preservation practices for organic soil removal and destination of the excavated material inside the projects área, no evidence was found regarding the restoration of a large percentage of disturbed soil. Moreover, documentation was found regarding the remotion of 7 ha of existing mangrove ecosystem and the intention of disposing excavated material in the same areas as debri. Both practices go against the restoration of disturbed soils. However, several strategies about storing excavation processes and transportation of organic soil where clearly defined in order to allow for reusing removed organic soil. Additionally the project has a policy of restoring soil composition of excavated areas that were not subject of the projects facilities. However, no evidence was found regarding the existence of soil restored areas.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 30 - 36, 51.*
		RECOMMENDATIONS Consider better practice for soil restoration processes that allow performance of reuse function comparable to their original conditions. For example, topsoil used as topsoil and subsoil used as subsoil. Consider implementing such practices in the total extent of the soil disturbed by the project's construction.
NW3.4 Maintain	**15**	**Conserving**

wetland and surface water functions.		Puerto Bahía maintains hydrologic connection, maintains water quality, enhances habitat and maintains sediment transport. Hydrologic connection is maintained through the ecological corridor of the mangrove streep planted between Cienga Honda's swamp and the Dique's Canal. Such streep will restore the Dique's canal wetland network of approximately 60,000Ha. which is a 115km canal connected to the Magdalena River. "Cienaga Honda" or "Bahía Honda" is a swamp surrounded by 17ha approx of mangroves ecosystems of 8 to 100 meters width. This strategic ecoregion will be positively affected by the restoration of the hydrologic connection provided by the project as well as habitat enhancement. Water quality is maintained according to the sediments and contamination reports done throughout 2011 until 2015 where it was demonstrated that contamination levels did not increase during and after the port's construction. Since Puerto Bahía does not discharge industrial or domestic water to the existing water bodies and on the contrary it provides water treatment plants inside it's facility, there are few water contamination sources inside the port. Finally, sediment transport was maintained thanks to the use of stain steel structures for submerged constructions, the storm water channelling system and the reforestation program performed in the shore lines of existing water bodies including Cienaga Honda's swamp.
		<u>Source:</u> *Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 29.* *Puerto Bahía, "Informe de Evaluación Arqueológica Proyecto Puerto Bahía." (Document presented to Puerto Bahía, Bogotá, July, 2009). 5 - 6.* *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013).. 29, 75 - 78, 81-87.* *Sociedad Portuaria Puerto Bahía, "Programa de Compensación Forestal". (Document presented to Puerto Bahía: Unknown: 2015). 4,7.*
		<u>RECOMMENDATIONS</u> Increase efforts to go beyond maintenance of water quality and sediment transportation to restore disturbed functions. Since all the reports indicate the high contamination levels of the water of the Dique's Canal Cienaga Honda, the project could increase efforts to not only maintain this contamination levels but to restore them to a cleaner condition. Cleaning water bodies will increase vegetal and animal habitat connectivity and will improve their habitats conditions.
NW 0.0 Innovate Or Exceed Credit Requirements		*N/A*
	89	

CLIMATE AND RISK		
	Score	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**
CR1.1 Reduce Greenhouse Gas Emissions	**4**	**Improved** Puerto Bahía performed a carbon footprint analysis for construction and operation periods following methodologies stated in the WBC (name to confirm), WRI (idem), and the colombian environmental public agency: "Secretaria de Medio Ambiente y Recursos Naturales". According to the agencies listed above in addition to the Kyoto protocol, the assessment included measurements of CO_2, CH_4, N2O, HFC, PFC, and SF_6. During construction period Puerto Bahía measured a total Greenhouse Gas (GHG) of 21,953 metric tons of CO_2. 21,452 metric tons produced by construction equipment and 501 metric tons of electricity consumption emissions. During operation period the project team did an emissions projection of 4,611,444.94 CO_2 metric tons per year. Operation projection was done instead of an actual measurement because the project has not been operating for a full year yet. The assessment identified that the major CO_2 emissions source during construction period was due to the use of Diesel fuel in vehicles and machinery. Moreover, the major CO_2 emissions source during operation period is estimated to come from tanker trucks required for oil transportation. According to the findings of the CO_2 emissions report,the following recommendations of GHG emissions reductions were done: 1) Perform of an annual inventory of GHG, 2) develop an action energetic efficiency plan, 3) look for an ISO 51000 certificate 4) define selection mechanisms for contractors that requiring to demonstrate GHG emissions reduction, 5) Define goals and objectives of emission reduction, 6) use equipment and vehicles with motors certified after 2010, 7) create and update a list of machinery in use in order to inform adequate emission reduction strategies, 8) Reduce tanker trucks emission by building an oleoduct or by using alternative fuel sources such as natural gas: 9) use low sulfur marine fuel to manage boats using bunker oil or heavy fuel, 10) use alternative fuel source such as propane gas or natural gas for the port equipment and 11) reduce operation time whenever possible in order to minimize machinery inactivity time. Although the previous recommendations were part of the GHG emissions report, no evidence was found about performed actions following them. There was also no evidence regarding emissions reduction of any kind during construction or operation periods. There was also no assessment of used material's CO_2 emissions. *Source:* *Tetratech Colombia S.A.S., "Reporte sobre la Norma de Desempeño Número 3 del IFC, Eficiencia del Uso de los Recursos y Prevención de la Contaminación". (Document presented to Sociedad Portuaria Puerto Bahía S.A., Bogotá: 2014). 11 - 21; 43 - 45; 63.* *RECOMMENDATIONS* Reduce carbon emissions by performing the recommendations formulated by the efficiency report. Go beyond requiring emissions data to the contractor's firm to perform internal reduction action inside puerto bahía. Consider embedded carbon emissions of used materials including extraction, refinement and manufacture and distance transported.
CR1.2 Reduce Air	**2**	**Improved**

Pollutant Emissions		Puerto Bahía performed an air quality assessment for the construction period following the air quality standards of the Environmental Ministry: "Ministerio de Ambiente Vivienda y Desarrollo Territorial. According to the study, the project's impact on air quality is under the maximum values for the yearly percentage of particle pollution (PM10), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and carbon monoxide (CO) emission. However, Puerto Bahía's particle pollution emission by day was above the maximum level established by the local legislation, particle pollution is the only one emission above the local regulation requirements, carbon dioxide, nitrogen dioxide and sulfur dioxide emissions registered indicators are way below the maximum indexes. Although, during construction period Puerto Bahía performed actions such as humidifying non vegetated areas, coverage of construction and excavated materials and vehicle speed control, the major air pollutant is PM10. Major emissions sources were inorganic material emitted by the use of unpaved roads, the storage of excavated material, construction material grinding and construction materials transportation. Other air pollutant emissions were reported as following: 28,67 ug/m3 of PM10, which the maximum limit is 100 ug/m3; 0.12ug/m3 of NO_2, which the maximum limit is 150 ug/m3, and no emissions of SO_2 or CO. There was no information found about air pollutant emissions measurements during operation period besides that the emissions will be within the local standards.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 132 - 134, 46 - 49* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Monitoreo de Calidad del Aire de la Sociedad Portuaria Puerto Bahía Etapa de Construcción". (Document presented to Puerto Bahía, Bogotá: 2015). 46 - 47, 132 - 133.* *MCS Consultoría y Monitoreo Ambiental e Instituto de Hidrología, Meteorología y Estudios Ambientales IDEAM, "Altura de Chimenea" (Document presented to Puerto bahía, Unknown location, February, 2015) 1 - 8.*
		RECOMMENDATIONS Consider reducing or restoring air quality during operation period by performing an air quality assessment considering parameters beyond the local regulation such as the South Coast Air Quality Management or the California Ambient Air Quality Standards. Continue performing the emissions reduction strategies formulated by the Environmental Management plan including the periodic monitoring activities.
CR2.1 Assess Climate Threat	**0**	**No Score**
		Puerto Bahía commissioned a study for identifying the characteristics of the abiotic environment of the direct area of influence including an oceanic description with water temperature, water salinity and sea tides. According to the study Cartagena's sea level has increased for the last 50 years. Additionally it has collaborated with local authorities to create a port adaptation plan for the threats associated to climate change. However such plan is under construction and no additional information was found regarding plans for addressing expected flooding of Puerto Bahías site or inventories of possible affected structures, therefore this credit is considered as No Score.
		Source: Hidrocaribe, "Capítulo 3. Caracterización Medio Abiótico". in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2011). 84 - 86.
		RECOMMENDATIONS Perform a climate change assessment including calculations of expected flooding, strategies to confront the sea level rise and possible affected communities in the area of influence of the project. Create an inventory of build structures possibly affected by the increase of the sea level and propose design strategies to address flooding.

CR2.2 Avoid Traps And Vulnerabilities	**6**	**Enchanced**
		The project has identified some of the vulnerabilities in the areas affecting the fishing community. They have been trained and provided with support for better fishing practices that will protect the affected fish ecosystem. Moreover, Puerto Bahía demonstrated to have relocated correctly existing fauna of the project's area which resulted on overall biodiversity conservation. This will minimize the vulnerability of a possible influence on the environmental cycles that can affect the related communities. Also Puerto Bahía, the project has performed restoration activities that will minimize certain vulnerabilities such as water contamination, vegetation loss on the shoreline and mangrove areas, or overfishing. The construction of the waste and stormwater treatment systems will improve the water quality of the Cienaga Honda's Swamp and the Dique's Canal, the reforestation strategy of planting a total of 34,8Ha of shoreline vegetation and 74.8Ha of dry forest vegetation will reduce flooding risk.
		Source: *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015). 50 - 55, 58, 65 - 74.*
		RECOMMENDATIONS Consider improving protection and restoring actions beyond local regulation that will create long term impact over some of the vulnerabilities that the communities are facing. Perform the conservation programs suggested by Equal's the biodiversity action plan such as extending the monitoring and restoring reforestation activities for three more years, monitor the Zoo and forestal park Cacique Dulio, reforestation of Bahía Honda's mangrove limit, continuation of the fishing community support, reinforcement of lionfish control campaigns and continuation of the birds and iguana monitoring.
CR2.3 Prepare For Long-Term Adaptability	**0**	**No Score**
		Although the project performed shoreline reforestation activities and it is build 1.5mt over the sea level, there is no evidence of addressment of extreme weather events such as water scarcity, sea level rise or increased ambient temperature. There is also no evidence of plans addressing future needs for recovery restoration or rehabilitation from long term change like wetland loss or sea level rise.
		Source: *N/A*
		RECOMMENDATIONS Consider future scenarios were climate altered conditions may occur. As it was addressed in the abiotic characterization of the environmental management study, sea level rise is a threat for the project and therefore its structures should be resilient to the consequences of altered climate conditions.
CR2.4 Prepare	**3**	**Improved**

For Short-Term Hazards		Puerto Bahía identified possible natural and artificial threats associated with the port's operation. The project team performed a risk analysis, an emergency contingency plan and a communication strategy involving community participation. According to the documentation provided communities from the area of influence of the project were threatened by possible vehicle collisions, fire ball explosion, oil spill, nafta spill, jet fire explosions, contaminated vapor emissions, flash fire, pedestrian run over and health deterioration.Such risks where specifically identified as community risks. There is a detailed communication plan for emergencies, that describe processes and support networks that would operate in case of an emergency. Puerto bahía is part of APELL and ANDI associations, which developed a mutual help plan in case of an emergency. The plan includes a network of satellites radios distributed among the major industries of Mamonal, the industrial area located in the area of influence of Puerto Bahía. Community was also part of the threat and risk identification performed by the projects team. According to the documentation provided community located in the area of influence received training about which were the threats associated with the operation of the port and how to react in case of an emergency. The environmental pressure posted by water contamination, Dique's Canal water sedimentation, overfishing, deforestation, predatory lionfish, infrastructure development on the shore and boat traffic, increases the risk of flooding, biodiversity loss and overall water ecosystem detriment. Threats were ranked according to their threatening level and response actions were recommended for each of them. The restoration activities performed by the project were done following the requirements of the environmental license provided by the local environmental authority.
		Source: *Puerto Bahía, "Complemento del Plan de Contingencias Sociedad Portuaria Puerto Bahía". (Document presented to Puerto Bahía, Unknown: 2014). 1-5, 38 - 55.* *Fundación Puerto Bahía, Puerto Bahía, "Plan de Atención de Emergencias de las Comunidades del Área de Influencia Directa de SPPB". (Internal Document Puerto Bahía, Unknown Location and Date). 2 - 12.* *Equal, "Plan de Acción Para la Biodiversidad Sociedad Portuaria de Puerto Bahía".(Document presented to Puerto Bahía, Bogotá: 2015). 50 - 55.*
		RECOMMENDATIONS Go beyond identification and response plans for emergencies and create a plan to reduce identified risks with substantial costs. Continue collaborating with the community when creating risk reduction plans and procure new guides for future infrastructure development.
CR2.5 Manage Heat Island Effects	**0**	**No Score**
		Puerto Bahía planted 18 ha of the project area with dry forest vegetation, 8,5 Ha of ornamental vegetation and a 8,5 square meters of green walls. These surfaces will reduce the heat island effect by absorbing solar radiation, however, the project did not asses the heat island effect that build surfaces may produce on the area. No solar reflectance indexes were measured or a calculation of the percentage of solar reflective surfaces.
		Source: *Hidrocaribe, "Capítulo 3. Plan de Manejo Ambiental Consulta Previa con la Comunidad de Barú y/o el Consejo Comunitario de la Comunidad Negra de la Unidad Comunera de Gobierno de Barú", in Estudio de Impacto Ambiental, (Document Presented to Puerto Bahía, Cartagena: 2013). 75 - 87.*
		RECOMMENDATIONS Considering Cartagena's weather it may be specially important to control air and surface heating. Procure to reduce paved and hard surfaces of the project that could absorb solar radiation and produce heat. Additionally use materials with low solar reflectance index (SRI) based on calculations of hardscape versus vegetated areas.
CR0.0		*N/A*
	15	

OVERALL:	**293**	**MULTIPUTPOSE PORT PUERTO BAHÍA - COLOMBIA**

APPENDIX E: SOURCES

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