

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK



COSTA-RICA

**REVENTAZÓN HYDROPOWER PROJECT**

(CR-L1049 AND CR-L1056)

ENVIRONMENTAL CATEGORY: A

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**ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT  
(ESMR)**

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## ENVIRONMENTAL AND SOCIAL MANAGEMENT REPORT (ESRM)

Country	Costa-Rica
Sector	Hydropower
Project Name	Reventazón Hydropower Project
Borrower and / or Sponsor	Government of Costa-Rica / ICE
Executing Agency and / or Company	Instituto Costarricense de Electricidad (ICE)
Transaction Type	Investment Loan SG (CR-L1049) / NSG (CR-L1056)
Total Project Cost (in US Dollars)	1,100 MUS\$
IDB A-Loan (if applicable)	150 MUS\$ (CR-L1049) + 200 MUS\$ (CR-L1056)
B-Loan/Co-lenders	470 MUS\$ (CR-L1056)
Environmental Category	A

### TABLE OF CONTENTS

<b>1. EXECUTIVE SUMMARY.....</b>	<b>4</b>
<b>2. DESCRIPTION AND LOCATION OF THE PROJECT.....</b>	<b>5</b>
<b>3. LICENSING, APPRAISAL PROCESS AND COMPLIANCE REQUIREMENTS .....</b>	<b>13</b>
<b>4. PUBLIC CONSULTATION.....</b>	<b>15</b>
<b>5. MITIGATION OF KEY ENVIRONMENTAL AND SOCIAL IMPACTS AND RISK....</b>	<b>16</b>
<b>6. EVALUATION OF ICE’S ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM AND CAPACITY.....</b>	<b>25</b>
<b>7. REQUIREMENTS TO BE INCLUDED IN THE LEGAL AGREEMENTS.....</b>	<b>26</b>
<b>ANNEXES</b>	
• <b>LIST OF DOCUMENTS DISCLOSED ON IDB’S WEBSITE AND LINKS.....</b>	<b>29</b>
• <b>ENVIRONMENTAL AND SOCIAL ACTION PLAN (ESAP).....</b>	<b>30</b>

## ABBREVIATIONS

<b>BBOP</b>	Business and Biodiversity Offsets Program
<b>BOT</b>	Build, Operate and Transfer
<b>CBVC-T</b>	Volcanica Central Talamanca Biological Corridor
<b>CENPE</b>	National Center for Energy Planning ( <i>Centro Nacional de Planificación Eléctrica</i> )
<b>CGSA</b>	Center for Environmental Management Services ( <i>Centro de Servicios de Gestion Ambiental</i> )
<b>COMCURE</b>	<i>Comisión de Manejo y Ordenamiento de la Cuenca Alta Río Reventazón</i>
<b>EIA</b>	Environmental Impact Assessment
<b>ESAP</b>	Environmental and Social Action Plan
<b>ESMP</b>	Environmental and Social Management Plan
<b>GE</b>	Electricity Department ( <i>Gerencia de Electricidad</i> )
<b>GHG</b>	Greenhouse Gases
<b>ICE</b>	<i>Instituto Costarricense de Electricidad</i>
<b>MINAET</b>	Ministry of Environment, Energy and Telecommunications
<b>MNCR</b>	National Museum of Costa-Rica ( <i>Museo Nacional de Costa-Rica</i> )
<b>PE</b>	Production Unit ( <i>UEN Producción</i> )
<b>PGA</b>	Environmental Management Plan ( <i>Plan de Gestión Ambiental</i> )
<b>PHR</b>	Reventazon Hydropower Project ( <i>Proyecto Hidroelectrico Reventazon</i> )
<b>PREVDA</b>	<i>Programa de Reducción de la Vulnerabilidad y Degradación Ambiental</i>
<b>PySA</b>	Projects and Associated Services ( <i>Proyectos y Servicios Asociados</i> )
<b>RPT</b>	Reventazón - Parismina – Tortuguero
<b>SBBB</b>	Barbilla Destierro Biological Sub-corridor ( <i>Sub-corridor Biologico Barbilla Destierro</i> )
<b>SETENA</b>	National Technical Secretary for the Environment ( <i>Secretaría Técnica Nacional Ambiental</i> )
<b>VECs</b>	Valued Environmental Components

## 1. EXECUTIVE SUMMARY

- 1.1 The Reventazón Hydropower Project (“PHR”) is a new hydropower facility of 305 MW capacity, currently under construction in the lower basin of the Reventazón River, Limón Province, Costa-Rica, about 8 km southeast from the city of Siquirres. It includes construction of a 130-m high dam, flooding of a 6.9 km<sup>2</sup> (690 ha) 8-km long reservoir and a 4.2 km river diversion between the dam and powerhouse. Although the storage capacity of the reservoir is not sufficient for inter-seasonal regulation, the PHR will be the hydropower facility with the highest energy production in Costa-Rica, and the fourth and most downstream hydroelectric dam of the *Instituto Costarricense de Electricidad* (ICE) on the Reventazón River.
- 1.2 The Project’s adverse environmental and social impacts, **if left unmitigated** would be significant. Key environmental and social impacts and risks include: a) **loss of connectivity due to the future reservoir of the Barbilla biodiversity corridor (Jaguar Corridor), a critical natural habitat**; b) **significant direct and cumulative impact of project’s construction and operation on the Reventazón River’s natural aquatic habitat**; c) potential economic displacement of at least 16 households; d) **potential adverse impacts during Project operation on the complex and ecologically sensitive Reventazón – Parismina – Tortuguero hydro-biological system**.
- 1.3 **A mitigation strategy and management framework has been developed** with the support of the technical cooperation CR-T1014 (“Reventazón Hydroelectric Project Complementary Environmental Studies”) and in collaboration with ICE. This strategy, which addresses the Project’s key impacts and risks, includes: restoring the connectivity of the biodiversity corridor at the tail of the reservoir; helping conserve an ecologically similar river system as a healthy and free flowing aquatic habitat to compensate for Project’s impact on the Reventazón River; adaptive management of potential downstream impacts; management of construction activities according to best environmental and occupational health and safety practices; and significant improvement of ICE’s land acquisition, compensation, and involuntary resettlement practices. **ICE is committed to ensuring adequate implementation of the mitigation strategy, including through securing necessary resources**. Legal agreements will include requirement to that effect, in particular those reflected in the Environmental and Social Action Plan (ESAP), and appropriate monitoring and supervision arrangements.
- 1.4 IDB’s safeguard policies requirements are either currently being met by the Project or, specifically for OP-703, Directives B.9 and B.12 and OP-710, are expected to be met through adequate implementation of the agreed management and mitigation measures and implementation system. Due to Project’s inherent complexity and third-party risks, some uncertainties will remain regarding the effectiveness of the planned mitigation and compensation measures of the Project’s impact on critical and natural habitats. Therefore subsequent to Project’s approval, IDB will actively supervise the performance of the implementation of the environmental and social mitigation and compensation measures, and where difficulties emerge changes in mitigation strategy will be pursued as feasible.

## 2. DESCRIPTION OF THE PROJECT AND AREA OF INFLUENCE

### A. Key Project Infrastructure Components

- 2.1 The Reventazón Hydropower Project (“PHR”) consists in the construction and operation of a dam and 305.5 MW hydroelectric power plants on the Reventazón River, Province of Limón, located at 8 kilometers southeast of the city of Siquirres (Caribbean side of Costa Rica). The Project design includes the construction of a 130-m high dam, flooding of a 6.9 km<sup>2</sup> reservoir, a diversion tunnel, and hydroelectric generation facilities. The Project involves a 4.2-kilometer river diversion between the dam and the powerhouse with a minimum flow of 15m<sup>3</sup>/s, and will maintain at all times during operation a flow downstream of the main powerhouse of at least 40 m<sup>3</sup>/s. Two hydropower plants constructed by ICE on the Reventazón River, Cachi and Angostura<sup>1</sup>, and one under a Build, Operate and Transfer (BOT) scheme, La Joya, are already in operation upstream.

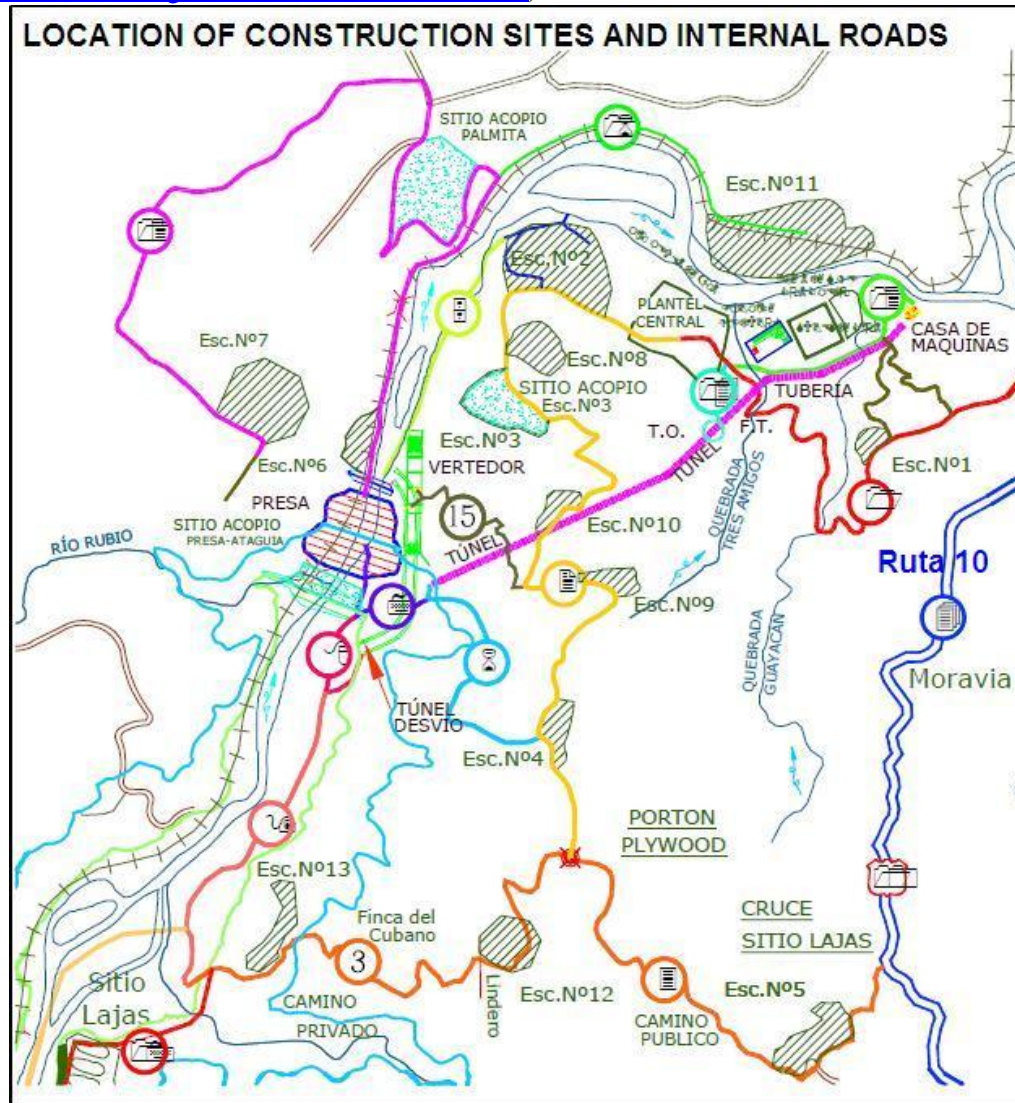


- 2.2 The PHR, when operational, is expected to be the hydropower facility with the highest energy production in Costa-Rica, although the limited active storage capacity of the reservoir (about 9 days of retention of the average annual flow) won't allow for inter-seasonal regulation. Design flow of the hydroelectric generation facilities is 240 m<sup>3</sup>/s (1.6 times the average annual flow), and the spillway has been designed to accommodate the flow of an estimated 10,000 year recurring flood (11,379 m<sup>3</sup>/s).

<sup>1</sup> Cachi, the most upstream facility, was put in operation in 1966, has a capacity of 108 MW and a reservoir of 3.24 km<sup>2</sup>. La Joya was put in operation in 2005 and has a capacity of 50 MW. Angostura, currently the most downstream hydropower plant, was put in operation in 2000, has a capacity of 177 MW and a reservoir of 2.56 km<sup>2</sup>. The PHR is located about 38 km downstream of Angostura tailrace.



2.3 In addition to the main and permanent PHR components (dam, reservoir, diversion tunnel, powerhouse, electrical substation), construction of the hydropower facility requires substantial civil works, including about 20 km of new internal access roads, spoils disposal and construction materials extraction sites and construction camp. Most of the construction activities take place on the right bank of the Reventazón River, particularly in the area between the dam, the powerhouse and the Reventazón River. Total project area (including the reservoir, construction and ancillary sites) is approximately 16 km<sup>2</sup>. Total workforce at construction peak is estimated around 3300 workers (58 % being hired locally). Further technical description of the PHR is available in the Chapter 5 of the EIA (<http://www.iadb.org/document.cfm?id=36178215>)

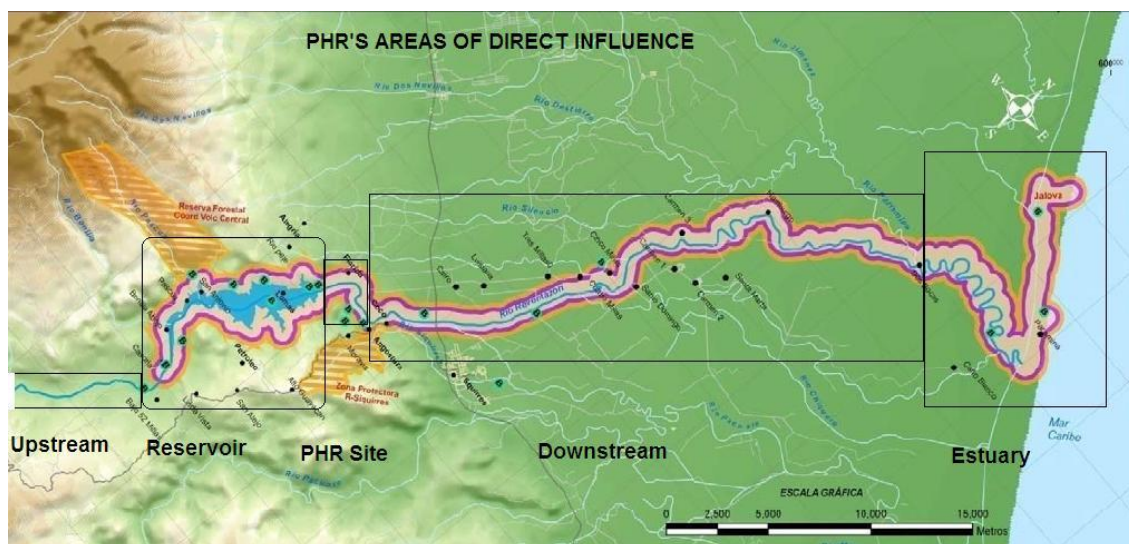


2.4 The Project will connect to the Costa-Rican electrical grid through the construction of a new 1.8 km 230-kV transmission line from the Project's substation to the existing Moín – Río Macho 230-kV transmission line which passes just on the eastern side of Road 10 to Siquirres. Right of way of the new 1.8 km long transmission line is expected to be 30-m wide and its construction to require installation of 8 to 10 towers.

## B. Project's Area of Influence

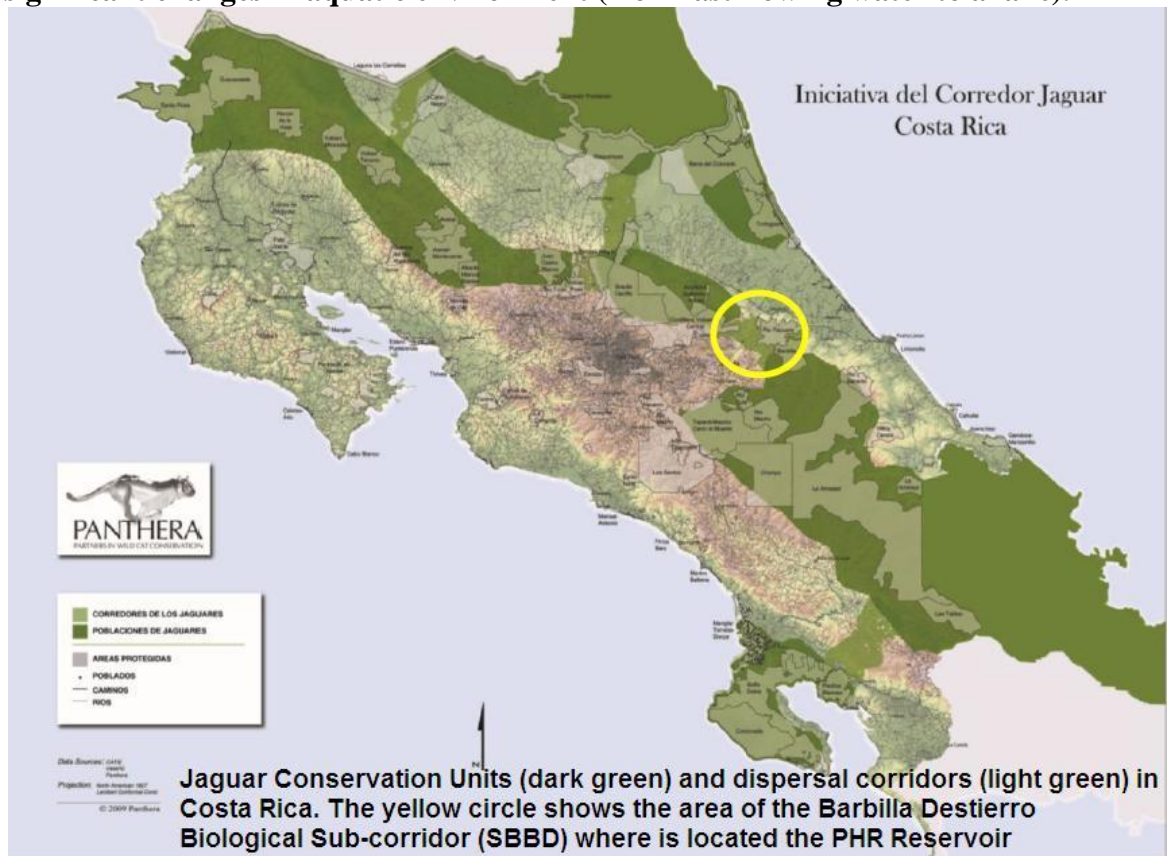
**2.5 General setting: the Reventazón River basin.** The Reventazón River, the second largest river in Costa Rica, is about 145 km long and flows into the Caribbean Sea. It originates from the Central Highlands and flows through the Orosí, Reventazón and Turrialba Valleys. After reaching the Caribbean coastal plains it joins the Parismina River and forms what is called the Reventazón-Parismina River. In its upper reaches, it provides a quarter of San Jose's drinking water. The Reventazón River basin, the third largest watershed in Costa Rica, covers an area of 2953 Km<sup>2</sup> (5.2 % Costa-Rica area), and includes around 550,000 inhabitants, mostly concentrated in the upper and middle sections. As mentioned above, three large hydropower projects located in the upper and middle sections of the Reventazón River are currently in operation (Cachi, La Joya and Angostura). Including also smaller hydropower facilities, total hydropower generation in the basin represents between 25 % and 36 % of the total power generation in Costa Rica. The PHR is located in the lower section of the Reventazón River, at the transition with the coastal plains.

**2.6** In view of the national importance of the Reventazón River basin, the law 8023 of September 27, 2000 created the *Comisión de Manejo y Ordenamiento de la Cuenca Alta Río Reventazón* (COMCURE: see: <http://sites.google.com/site/comcurecr/Home>). Its main mission is to protect the water resources (quantity and quality) of the Reventazón River; however its mandate does not include the lower section of the basin. ICE is a key COMCURE's member. A Watershed Management Plan was initially developed in 2000 by ICE in the context of construction and operation of the Angostura hydropower facility. It was updated for 2008-2010 with the support of the European Union (EU) financed *Programa de Reducción de la Vulnerabilidad y Degradación Ambiental* (PREVDA). It now needs a new update to take into account latest developments in the watershed, including construction and future operation of the PHR.



**2.7 PHR's area of direct influence.** The PHR's area of direct influence can be divided into five different areas, which have various environmental and social settings, and will be subject to different changes in their environmental conditions due to the construction and operation of the PHR: upstream, reservoir, project's site, downstream and estuary.

- 2.8 Upstream: the section of the Reventazón River between the Angostura dam and the tail of the Reventazón reservoir. **Main impact will relate to the barrier effect created by the PHR's future dam on the river's integrity and connectivity.** Three species of fish considered to be migratory are found in throughout the Reventazón River between confluence with the Parismina River and the Angostura dam: the bobo mullet, (*Joturus pitchardii*), the mountain mullet (*Agonostomus monticola*) and the goby *Sicydium altum*. These species are not endemic to the Reventazón River and are found in several other major rivers of Central America. There is anecdotal evidence that these fish species, particularly the bobo mullet, are much appreciated for recreational and self-consumption fishing in the middle Reventazón basin.
- 2.9 Reservoir: the approximately 7 km<sup>2</sup>, 8-km long area that will be permanently or seasonally flooded when the dam is completed and the PHR is in operation. **Main impacts will relate to loss of terrestrial natural habitats, potential loss of structural and functional connectivity of the Mesoamerican biological corridor (Critical Natural Habitat), and significant changes in aquatic environment (from fast flowing water to a lake).**



- 2.10 *Natural habitat*: the area is highly fragmented with pastures, farms, tree plantations, and roads. There are some good patches of forest, not primary forest, but older re-growth that was logged previously for plywood. It is however located within the Volcanica Central Talamanca Biological Corridor (CBVC-T), one of the most important areas for ecological connectivity in Mesoamerica within the larger, regional framework of the internationally-



recognized Mesoamerican Biological Corridor project. The CBVC-T (biological corridor) connects two large expanses of protected areas: on the left bank the Cordillera Volcanica Central Forest Reserve; on the right bank the Siquirres River Watershed Protection Zone and Pacuare River Forest Reserve and further south La Amistad Biosphere Reserve (shared with Panama). Within the CBVC-T lies the Barbilla Destierro Biological Sub-corridor (SBBD) - Path of the Jaguar designated by the NGO Panthera and others as a critical corridor for movement and genetic flow for jaguars and their prey species between the protected areas. The CBVC-T, which includes the SBBD, is recognized as one of the official corridors of the country by the Biological Corridors National Program of the Ministry of Environment, Energy and Telecommunications (MINAET). It is considered a **critical natural habitat** as per Directive B.9 of IDB's OP-703. In terms of aquatic habitat the PHR reservoir is located at the transition between the middle and lower Reventazón and shows similar characteristics as the upstream area.

## 2.11 Social setting (PHR Reservoir and site)



Overall, the PHR is inserted in an area of transition between the mountain area and the coastal zone, characterized by agricultural economy, mostly small scale cattle ranching, as well as industrial forest plantations and cash crops for export (e.g. pineapple). The broader area around the PHR counts about 6000 inhabitants. Most communities on the left bank emerged and flourished because of the construction of the Atlantic Railway, which closed in 1995. Closure of the railway significantly depressed the economic and demographic conditions in this area. Human settlements on the left bank tend to be smaller, poorer and more isolated than communities on the right bank, which, due to better access and shorter distances to the largest population centers in the region such of Siquirres have better economic opportunities. In this respect, the most vulnerable communities are those of San Antonio and Pascua, with respectively 56 and 21 households.

2.12 The total land area to be acquired by ICE for the construction and operation of the PHR is about 20 km<sup>2</sup>. There is no permanent housing in this area, and therefore no physical displacement is expected. However this is productive land (mostly livestock grazing and forestry) and there is a risk of economic displacement, particularly on the left bank where the affected people are more vulnerable. In total the PHR requires the acquisition of 87 properties (33 on the left bank, 54 of the right bank), affecting directly 56 land owners. Right bank properties are mostly large farms and forest plantations, while left bank properties are mostly smaller plots used for extensive livestock grazing. Three-quarters of the 16 land owners considered as vulnerable due to their strong reliance on the land to be

acquired for the PHR and low income are located on the left bank. The farms and forest plantations acquired and to be acquired employed or are employing about 18 workers.

- 2.13 *Cultural Heritage*. To date, ICE's archaeologists have surveyed an area of 392 ha, and have identified and registered with the National Museum of Costa-Rica (*MNCR*) a total of 10 petroglyphs and 41 pre-Columbian sites, providing evidence of human occupation in the area dating more than 13,000 years. Half of the sites were found in the area of direct influence of the PHR (reservoir, construction sites). The majority presented low to medium density of archaeological fragments of pottery and lithics, i.e. flakes and chipped stones dated between 2,000 BC-1,500 AC., and only one had architectonic structures arranged in a particular order. This particular site, San Antonio, is located outside of the PHR direct area of influence in the town with the same name and is the largest archaeological site found in the area so far. It extends 29.9 ha in size in private farmland and comprises several architectonic structures with distinct funerary features. The site will be preserved in situ for future scientific research and restoration as well as development of a cultural center/museum.
- 2.14 *Rafting (PHR Reservoir and site)*. Two sections of the Reventazón River are currently used for whitewater rafting: The Pascua section, a class IV+ section for experienced rafters almost entirely located within the future PHR reservoir; and the Florida section, a class III section located in the stretch between the PHR dam and powerhouse which will be diverted when the PHR enters into operation. The main operator of these tours is an eco-tourism firm based in San Jose, *Rios Tropicales* (see <http://www.riostropicales.com/adventure-travel/whitewater-rafting>).
- 2.15 PHR site: the main project's site, mostly located between the dam and the powerhouse on the right bank on the Reventazón River. **Impacts relate to the PHR construction activities, and in the future when PHR operation starts, to the water diversion on the 4.2 km stretch of the Reventazón River between the future dam and powerhouse.** During operation, except when the dam spills in rainy season, this section will experience a significant diminution of its flow. Environmental and social setting is largely similar to the reservoir area.
- 2.16 Downstream: the section of the Reventazón River located between the future powerhouse and the confluence with the Parismina River. **Impacts will relate mostly to the changes in flow, water quality, and sedimentation processes that will be experienced when PHR operation commences.** When the Reventazón River transitions to coastal plains just after the future powerhouse, velocity decreases significantly, and sediments in excess start settling down, creating small islands and meanders in the river bed. About half of the 65 fish species known to inhabit the Reventazón River basin have been found in this section, including the 3 migratory fish species also encountered upstream of the PHR (bobo and mountain mullets, machaca). Large scale banana plantations and more recent palm oil plantations exist all along this section of the river. Bank erosion and instability are preponderant, and in order to avoid flooding some adjacent land owners have built earthen dykes. Raw material extraction (sand, gravels) also contributes to the instability of the river

bed. There is no significant direct water abstraction from the River, either for irrigation or domestic purposes.

- 2.17 Estuary: includes the Reventazón-Parismina River downstream of the confluence of the Reventazón River with the Parismina River, the Parismina canal and Jalova lagoon, and the most downstream section of the Parismina River. This is a complex and ecologically sensitive hydro-biological system. Depending on tides, flows, salinity, sedimentation processes, water can flow in various directions within this system. **Impacts relate mostly to the changes in flow, water quality, and sedimentation processes that will be experienced when PHR operation commences.** Red-listed species found in the estuary system include the sawfish *Pristis perotteti* (Critically Endangered, a large, previously widely distributed marine, estuarine and freshwater sawfish) and the reptile *Crocodylus acutus* (Vulnerable, wide distribution throughout Central America). The Reventazón-Parismina River is connected through the Parismina canal to the canals of the Tortuguero National Park, a wetland of international importance under the Ramsar Convention and the third most visited national parks in Costa Rica. The town of Parismina, just on the right bank of the Reventazón-Parismina estuary, provides important access to the Park through the Parismina canal and has developed some eco-tourism activities (mostly lodging and boat transportation services). The beaches along the Tortuguero National Park are key nesting areas for critically endangered sea turtles hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*) and the endangered green sea turtle (*Chelonia mydas*). The canals and rivers within the Park are home to populations of manatees (*Trichechus manatus*, Vulnerable)



## C. Analysis of Alternatives

- 2.18 *Options for power generation expansion.* In 2009 ICE has developed a plan for the expansion of power generation in Costa-Rica for the period 2010-2021<sup>2</sup>. This plan includes

<sup>2</sup>[http://www.grupoice.com/wps/wcm/connect/3bd3a78047cdebee904df9f079241ace/plan\\_expansion\\_generacion.pdf?MOD=AJPERES](http://www.grupoice.com/wps/wcm/connect/3bd3a78047cdebee904df9f079241ace/plan_expansion_generacion.pdf?MOD=AJPERES)

a detailed cost-benefit comparison of various power generation options, both in terms of sources of power and potential projects. Renewable energy sources (hydropower, wind power, geothermal power, biomass) is given high priority, particularly in consideration of the significant greenhouse gas emissions associated with fossil fuel based power generation. Geothermal sources are promising but many of them are located in the Central Volcanic mountain ranges of Guanacaste, where national parks have been established. Intermittent nature of wind power requires a gradual introduction into the grid rather, although complementarities with hydropower are also noted since the strongest winds are experienced during the dry season. The expansion plan proposes to increase installed capacity from 2,313 MW (2009) to 4,748 MW (2020), 67 % hydropower, 18 % thermal (peaks and dry season), 8 % wind and biomass and 7 % geothermal.

2.19 *Hydropower alternatives.* Four specific hydropower projects with a capacity greater than 100 MW are considered in the expansion plan: Reventazón (314 MW), Diquis (608 MW), Savegre (160 MW) and Pacuare (167 MW). Diquis raises complex and sensitive environmental and social issues, including physical displacement of indigenous communities<sup>3</sup>. Savegre and Pacuare are located on rivers which are still free flowing rivers, and have each about half of the nominal capacity of Reventazón. On the contrary the Reventazón River is already impacted by three hydropower projects in operation, and its potential environmental and social adverse impacts are likely to be less significant and easier to mitigate than those caused by a new large hydropower project on a currently undeveloped river. Provided that cumulative impacts are adequately managed, and that the Project is designed and implemented in a manner to ensure no net loss of biodiversity, Reventazón is therefore the preferred alternative from an environmental and social perspective.

2.20 *Project design alternatives.* Potential for further hydropower development on the Reventazón was identified by ICE in 1998. Project design at that time was contemplating a reservoir at a level of 380 masl, which would have implied physical displacement of affected communities and flooding of nationally important wetlands. The prefeasibility analysis carried out in 2003 identified various design options, some of them including trans-basin diversion of water from the Pacuare River to the project. The final recommendation of the prefeasibility stage was of a maximum operating level of the reservoir at elevation 275 masl, with an operating range of 15 m. During feasibility analysis it was further decided to lower the dam crest at 270 masl, with a maximum operating level of 265 masl. Such optimization was mostly done in order to maximize the cost-benefit ratio (not including environmental and social externalities), but has the advantage of reducing of size of the reservoir and therefore the project's environmental and social footprint. Lowering further the level of the reservoir would now only marginally reduce Project's adverse environmental and social impacts.

2.21 The length of the diverted section between the dam and the powerhouse (4.2 km) is reasonable for a project of that capacity. Besides, except for rafting activities, this section

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<sup>3</sup> Report of the UN Special Rapporteur on Indigenous Peoples Rights: <http://unsr.jamesanaya.org/special-reports/la-situacion-de-los-pueblos-indigenas-afectados-por-el-proyecto-hidroelectrico-el-diquis-en-costa-rica-2011>



of the Reventazón River does not present special environmental or social features. An adequate ecological flow study has been performed during the EIA process to determine a minimum flow to be left at all times in the diverted reaches. An approximately 13 MW turbine will be installed at the foot of the dam in order to generate electricity with the release of the ecological flow.

### **3. LICENSING, APPRAISAL PROCESS AND COMPLIANCE REQUIREMENTS**

- 3.1 *Compliance with national regulatory framework.* As required under Costa-Rica's General Law on the Environment (*Ley Orgánica del Ambiente No. 7574*), an Environmental impact assessment (EIA) for the Project was developed by ICE, submitted to the relevant regulatory agency, SETENA, and approved in 2009 (Resolution SETENA N° 1778-2009) under the condition of implementation of the Environmental Management Plan (*Plan de Gestión Ambiental*, PGA, Chapter 12 of the EIA). The project was declared of national interest in April 2010 (Executive Decree N° 35603-MINAET). SETENA is expected to supervise the execution of the PGA.
- 3.2 *Environmental and social assessment process.* In general the EIA developed by ICE is of good quality. It does include the key components expected to be found in a typical EIA, including sound baseline information. However through an early review of the EIA in the project cycle, some gaps were identified vis-à-vis IDB policies, and a Technical Cooperation (CR-T1074: Reventazón Hydroelectric Project Complementary Environmental Studies) was developed to address those gaps, which include: assessment and management of impacts on biodiversity, assessment of cumulative effects, assessment of social impacts and development of a resettlement framework, evaluation of greenhouse gases ("GHG") emissions from the Project. Phase 1 additional environmental studies were finalized in February 2012, and it was decided then to proceed with Phase 2 studies to help ICE developing sound mitigation strategy and management framework for those key impacts identified through the Phase 1 process. Phase 2 studies were finalized on March 30, 2012. In line with the IDB's Access to Information Policy (OP-102) the initial EIA, Phase 1 and Phase 2 additional environmental studies and management plans, and the resettlement framework have been disclosed on IDB's website (see Annex 1).
- 3.3 *Classification. IDB's safeguard policies and Directive triggered.* Due to the significance of the Project's potential adverse environmental and associated social impacts, the Project has been classified as Category A. The Environment and Safeguards Compliance Policy (OP-703 - Directives B1 through B7, B.9, B.11, B12 and B.15), Involuntary Resettlement Policy (OP-710), Disaster risk Management Policy (OP-704) and the Operational Policy on Gender Equality in Development are triggered.
- 3.4 *Project's compliance with applicable IDB Policies.* IDB's safeguard policies requirements are either currently being met by the Project or, specifically for OP-703, Directives B.9 and B.12 and OP-710, are expected to be met through adequate implementation of the agreed management and mitigation measures and implementation system. The table below describes further current compliance status and required actions for continuous compliance with applicable IDB's policies and directives.

*Compliance Status Table*

Policy / Directive	Project Compliance Status (At Board Approval)	Actions required for continuous compliance
<b>OP-703 Environment and Safeguard Compliance Policy</b>		
<b>Introduction</b> (mitigation hierarchy)	<b>Compliance requirements met.</b> Key impacts identified. Mitigation and where impacts cannot be fully mitigated compensation strategies have been agreed with ICE.	Further development and adequate implementation of agreed mitigation and compensation strategies.
<b>B.1-B.3 (Bank Policies, country Laws and Regulations, Screening and Classification)</b>	<b>Compliance requirements met.</b>	Monitoring that the Project is carried out in compliance with environmental Country Laws and Regulations.
<b>B.4 Other Risk Factors</b>	<b>Compliance requirements met.</b> Other risk factors adequately identified and managed.	Monitoring.
<b>B.5 Environmental Assessment Requirements</b>	<b>Compliance requirements met.</b> Gaps identified through review of the EIA have been adequately addressed.	Monitoring and adaptive management.
<b>B.6 Consultations</b>	<b>Compliance requirements met.</b>	Adequate implementation of the Community Engagement Plan.
<b>B.7 Supervision and Compliance</b>	<b>Compliance requirements will be met.</b>	Supervision.
<b>B.9 Natural Habitats and Cultural Sites</b>	<b>Expected to meet compliance requirements through adequate implementation of the agreed management and mitigation measures and implementation system. Some degree of risk of not meeting full compliance requirements with Directive B.9 remains.</b>	Further development and adequate implementation of agreed mitigation and compensation strategies (biological corridor, river offset, adaptive management for estuary). Close supervision by Lenders and implementation of corrective actions as necessary.
<b>B.11 Pollution Prevention and Abatement</b>	<b>Compliance requirements met.</b>	Monitoring.
<b>B.12 Project under Construction</b>	<b>Expected to meet compliance requirements through adequate implementation of the agreed management and mitigation measures and implementation system.</b>	Adequate implementation of the Project's Construction ESMP and Changes in ICE's internal monitoring/supervision system. Close supervision by Lenders.
<b>B.15 Co-financing Operations</b>	<b>Compliance requirements met.</b>	Joint supervision activities with the IFC as possible.
<b>OP-710 Involuntary Resettlement Policy</b>		
	<b>Expected to meet compliance requirements through adequate implementation of the resettlement framework.</b>	Further development and adequate implementation of the livelihood restoration measures, including for those lands already acquired by ICE. Close supervision by Lenders.
<b>OP-704 Disaster Risk Management Policy</b>		
	<b>Expected to meet compliance requirements through development and implementation of an Emergency Preparedness and Response Plan.</b>	Adequate implementation of the Emergency Preparedness and Response Plan.
<b>OP-270 Operational Policy on Gender Equality in Development</b>		
	<b>Compliance requirements met.</b> Project has been inclusive and sensitive of gender equal participation in project-related consultation and, paid work, and training.	Adequate implementation of ICE's human resources strategy and Social Management Plan

## 4. PUBLIC CONSULTATION

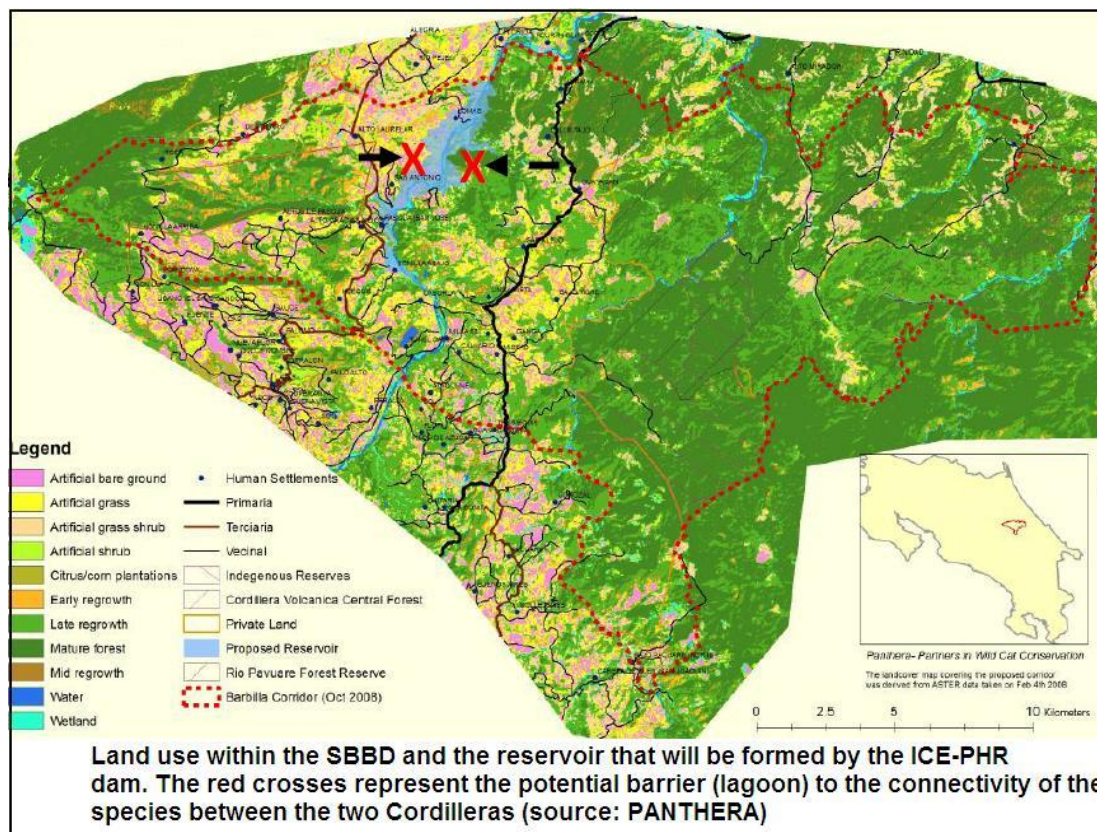
- 4.1 *Public consultation related to the environmental assessment process.* During preparation of the environmental impact assessment (EIA) for PHR, multiple public participation and consultation workshops and meetings were carried out by ICE as mandated by Costa Rica's national legislation. In this process, ICE carried out a total of 52 workshops and meetings with the communities in the Project's broader area of influence, in which a total of 1,090 people participated. ICE also conducted surveys, household visits, and collected socio-economic data and information. Common and shared concerns among residents were around loss of income/employment, fair compensation for acquired land, uncertainty about the PHR benefits and future opportunities for the communities, alteration of community relations and values due to the presence of outsiders, and more pressure and demand on basic health, sanitation and educational services.
- 4.2 Those meetings and workshop contributed to the development of a set of mitigation measures. Those measures were reviewed and validated by each of the affected communities and incorporated these into the Environmental Management Plan (PGA). Subsequently a protocol agreement was signed between ICE and all 15 affected communities thus formalizing ICE's commitment to comply with the mitigation measures established in the PGA. Copies of the EIA were distributed among the municipal authorities of Siquirres, with whom ICE also signed a cooperative agreement to work together promoting an integrated development of the municipality.
- 4.3 *Affected communities' engagement process.* Since 2007, ICE has developed and executed various communication and community relations strategies and activities to keep the 15 affected communities informed and actively engaged in PHR key decisions. Specifically, ICE established and staffed a community relations office in Moravia, Siquirres, appointed 'community liaisons officers to provide personalized attention to community concerns and issues, organized an environmental fair to attract community residents' interest and inform them about the PHR, carried out community meetings and public presentations, and created a visitors' program for guided tours to the project's construction site. The implementation of these activities from the onset of the project may have helped eased any potential tension with the communities and could prevent future social conflict.
- 4.4 *On-going and future communities' engagement activities.* ICE will ensure that affected communities receive adequate and timely information and have meaningful participation and engagement throughout the life of the PHR project, through: a) a participatory mechanism for evaluation, participation and community follow up in the PHR area of direct influence including implementation of a permanent social monitoring program to inspect and report on changes in the social baseline or social dynamics of the affected communities, possible fluctuation on the water sources and water table levels; changes in socioeconomic uses or activities (rafting, fishing, etc) in the Reventazón dewatered stretch; changes in noise levels; changes in traffic patterns and official transit routes for PHR; b) an environmental education program; c) a training and local development program; and d) a community investment program. Those activities are described in further details in the Communities Engagement Plan developed by ICE.

- 4.5 *Grievances redress mechanism.* ICE will implement a grievances redress mechanism to address and resolve public complaints and disputes that may arise during the life of PHR. Such mechanism is described briefly in the Communities Engagement Plan, and a proper protocol has yet to be established. Evidence that the grievance redress mechanism for affected parties is in place and operational will be presented prior to first disbursement.

## 5. MITIGATION OF KEY ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS

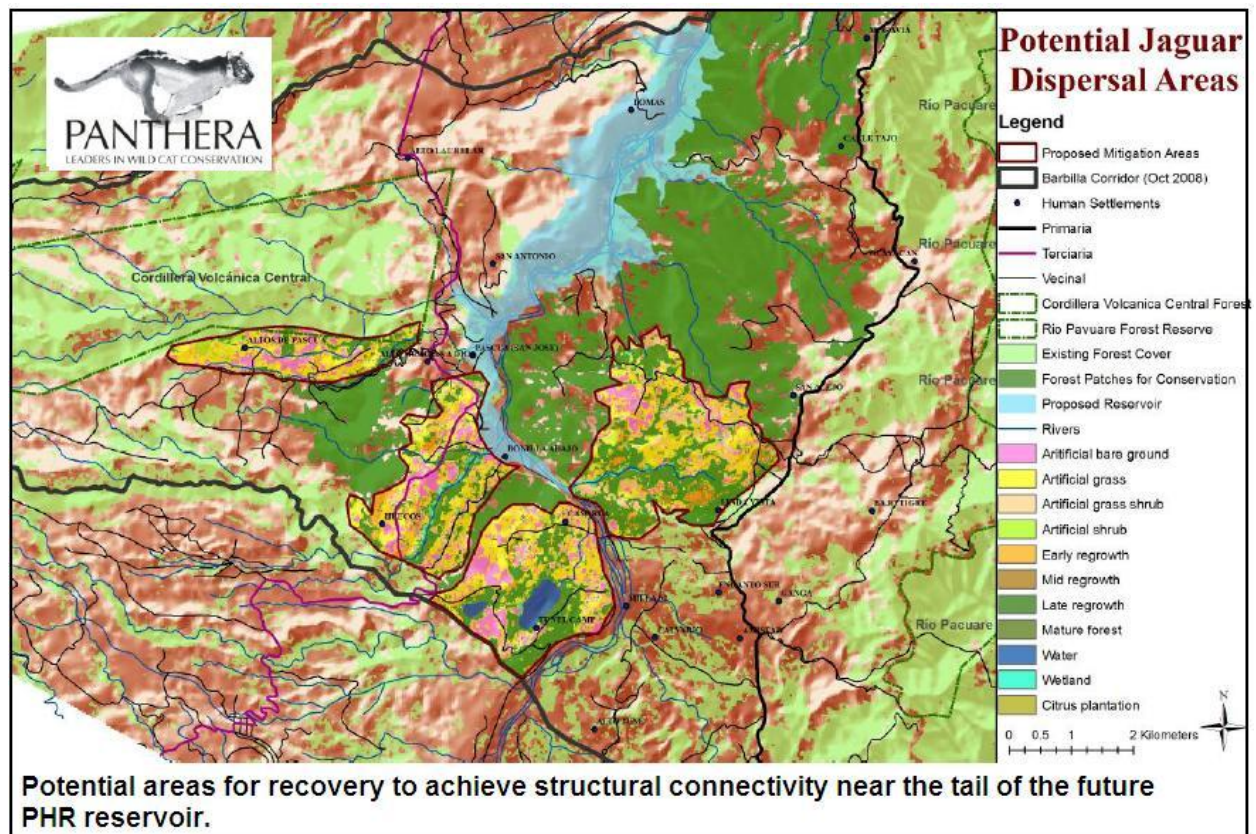
### A. Critical Natural Habitat: loss of connectivity of the Barbilla Destierro Biological Sub-corridor (SBBB) - Path of the Jaguar

- 5.1 *Summary of impact.* The key ecological function of the Barbilla Destierro Biological Sub-corridor – Path of the Jaguar is to allow for connectivity for fauna and flora between conservation units, as habitat fragmentation is one of the most important factor in long term biodiversity decline. The PHR reservoir will adversely impact that connectivity. The reservoir can be a barrier to the movements of animals and plants and so affect ecological connectivity. The location of the reservoir coincides with the area that is the shortest route with best vegetation coverage between the Cordillera Volcanica Central Forest Reserve and the Siquirres River Watershed Protection Zone / Pacuare River Forest Reserve. Such an impact, if left unmitigated, could potentially threaten the effectiveness of the important efforts carried out in the context of the Mesoamerican Biological Corridor.





- 5.2 *Mitigation strategy.* Since 2009 the NGO Panthera has been working in conjunction with the SBBB Local Council to evaluate the structural connectivity within the SBBB and monitor passage (functional connectivity) of medium and large mammals throughout corridor, using genetic tracking as well as infra-red camera traps. In addition, Panthera generated maps which identified important connectivity areas around the future PHR reservoir. The process consisted in identifying the existing patches of forest, which could ensure connectivity of wildlife once the reservoir is present. The tail of the reservoir (bordering to the south) has been identified as the best option to restore connectivity.



- 5.3 **The Project will restore and maintain connectivity within the SBBB through the restoration and maintenance of habitat at the tail of the reservoir.** The Project will establish, and ensure the long term maintenance, of the institutional and organizational basis for the effective functioning of the SBBB. This will include providing direct support to complete baseline research, establishing a five-year plan and securing the legal and financial basis for management interventions. The management interventions will include prioritized programs of reforestation, land purchase, payments for environmental services, environmental education, and establishing sustainable agricultural practices within the corridor.
- 5.4 The specific interventions, to be completed prior to the filling of the reservoir creating the barrier to connectivity, will include performance of a rapid ecological and social evaluation of the SBBB, development of a five year plan for the SBBB, establishing a legal basis for operations for the SBBB Commission, initiating reforestation of all priority areas identified

in the plan, purchase all priority lands required for the effective functioning of the corridor, establishing a mechanism and initiating payments for the maintenance of habitat in all forested parcels within the corridor. The SBBD program will also incorporate a program of environmental education in all priority communities and a program to work with farmers to establish agricultural practices consistent with ensuring long term connectivity through the corridor. Sequencing of those activities vis-à-vis project milestones is further detailed in the Environmental and Social Action Plan (ESAP). Initial costs for implementation of this program until the filling of the reservoir is estimated about 2.7 millions US\$ over the first three years.

- 5.5 *Residual impact and risk.* Provided the mitigation strategy is adequately implemented, it is expected that medium term ecological connectivity of the SBBD be restored or even enhanced vis-à-vis pre-project situation. The Project's residual adverse impact on the critical natural habitat would be of limited significance, and not qualify as a significant conversion or degradation. However, since effective restoration of and enhancements to the ecological connectivity of the SBBD ultimately depends not only on ICE but also on third-parties, particularly land owners and local communities, some uncertainties will remain during implementation regarding whether the mitigation efforts are working as expected. In order to ensure continuous compliance with requirements of Directive B.9, OP-703, it will be critical that results of monitoring be closely analyzed (e.g. through further collaboration of ICE with the NGO Panthera), effectiveness of mitigation efforts periodically reviewed and, if necessary, corrective actions developed and implemented.

## **B. Significant conversion and degradation of a natural habitat: the Reventazón River**

- 5.6 *Summary of impact.* The aquatic habitats within the Reventazón River have already been subject to significant anthropogenic pressures including through the establishment of three hydropower facilities in the upper and middle Reventazón and agriculture along the lower Reventazón. Despite this, the section of the Reventazón between Angostura Dam and the estuary has retained native fauna and is considered natural habitat in accord with Directive B9 of OP-703. The operation of the PHR will have significant direct and cumulative impacts on the river (shift from lotic to lentic habitat over 8km, flow, water quality, sedimentation, and creation of a barrier to faunal movements and connectivity<sup>4</sup>) which will substantially reduce the river's ability to maintain viable populations of its native species and will result in a severe diminution of the integrity of the habitat. This is especially relevant for migratory fish species, which will no longer be able to reach their juvenile and adult foraging and mating habitats in the Reventazón River, upstream of the new dam. The project will therefore result in a significant conversion and degradation of a natural habitat.
- 5.7 In accord with the mitigation hierarchy, the PHR will mitigate impacts to the extent possible. For flow rates, this includes maintaining a minimum flow rate of 40 m<sup>3</sup>/s downstream of the power house. However, the provision of additional flow between 40 and 240 m<sup>3</sup>/s would have substantial effects on power generation. The 8km of river in the PHR

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4 For a more complete description of the effects on the river, see Phase I additional environmental studies including Sections B (Water Quality), C (Sediments), G (Fish), and H (Cumulative Effects)

reservoir area will be permanently modified from a lotic to lentic. Water quality downstream of the powerhouse could be improved through installing multiple water intakes – however, this measure would be costly and impossible to implement at this stage of project construction. During the first 20 years of operation of the PHR, sediments will be trapped in the reservoir below the level of the water intake making active sediment discharge management through controlled discharge impossible. Project design (including the height of the dam) and the location of the dam at the transition between the mountainous and coastal areas make it unfeasible to construct an effective fish passage system (ladder, canal, or elevator) to restore river connectivity for fish including several migratory species. Consequently, even with the inclusion of cost effective mitigation actions, significant residual impacts on the river itself are unavoidable. In accord with OP-703, Directive B9 and the introduction to the safeguards section, this project will require the development and implementation of an offset<sup>5</sup>.

- 5.8 **Mitigation strategy. The Project will develop and implement a protected area, in an ecologically equivalent river system with no existing barriers to connectivity**, to compensate for the residual impacts on the aquatic habitats and biodiversity and ecosystem services in such a way as to result in no net loss or net gain for biodiversity in the context of the project. Three ecologically equivalent river systems have been identified for the offset: Rio Sixaola, Rio Pacuare, and Rio Parismina. ICE has selected the Rio Parismina for implementation of the offset and is committed to the establishment of the selected offset.
- 5.9 Prior to first disbursement, ICE will undertake the social and ecological evaluation of the proposed site and complete a full feasibility study for the implementation of the offset. No later than twelve months after first disbursement, ICE will have established the legal basis for the offset, undertaken any consultations with affected parties, and developed a management plan for the site. The proposed offset management plan will be consistent with the relevant principles that have been developed through the Business and Biodiversity Offsets Program (BBOP)<sup>6</sup> and will include: identifying conservation objectives measureable against the baseline, environmental education actions, monitoring actions, and identification of the institutional framework and long term financial resources for implementation. Substantial progress in the implementation in the offset management plan will be demonstrated through achievement of the key milestones and/or indicators included in the management plan prior to filling of the reservoir. Initial costs estimate for development and implementation of the offset until the filling of the reservoir is about 2.7 millions US\$.

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<sup>5</sup> OP-703, Introduction to part B, “for impacts that cannot be fully mitigated, compensation or offsets should be implemented” and OP-703, Directive B9 “The Bank will not support operations involving the significant conversion or degradation of natural habitats unless: . . . (iii) mitigation and compensation measures acceptable to the Bank, including as appropriate . . . establishing and maintaining an ecologically similar protected area that is adequately funded, implemented and monitored.”

<sup>6</sup> BBOP defines biodiversity offsets as “measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people’s use and cultural values associated with biodiversity.” See <http://bbop.forest-trends.org/>

5.10 *Residual impact and risk.* Provided the offset is adequately designed and implemented, it is expected no significant net residual adverse impacts on biodiversity and associated ecosystem services. However effectiveness of the offset efforts depends not only on ICE but also on third-parties, including other existing and potential river users, and activities which could affect the protected river ecosystem. Some uncertainties will therefore remain during implementation regarding whether the compensation efforts are working as expected to achieve no net loss or net positive gain. It will be critical that results of monitoring and effectiveness of offset efforts be periodically reviewed and, if necessary, corrective actions developed and implemented.

**C. Risks of adverse impacts on the downstream Reventazón – Parismina – Tortuguero Hydro-biological System (including potential effects on the Tortuguero National Park)**

5.11 *Summary of impact.* As mentioned above, the Reventazón - Parismina – Tortuguero (RPT) hydro-biological system is a complex and ecologically sensitive system. On the basis of currently available information and visual inspection<sup>7</sup>, it is expected that the impact of operation of the PHR on the ecological integrity of this system, including potential adverse effects on the Tortuguero National Park, would be of limited significance. However, to minimize any residual risk, it will be important to establish a hydro-biological baseline prior to Project's operation to fully understand how the RPT hydrological system functions.

5.12 *Mitigation strategy.* **ICE will develop and implement an adaptive management program for the RPT hydro-biological system.** Objectives of the management plan are: i) to maintain conditions favorable for navigation between the town of Parismina and the entry of the Tortuguero National Park; ii) to prevent, monitor and mitigate possible erosion of the river banks in some sections of the, which may damage infrastructure and properties; iii) to maintain physical and chemical conditions in the estuary and canals consistent with the conservation of the habitat's diversity ; and iv) to prevent, monitor and mitigate any adverse impact on the Tortuguero National Park. Objectives will be met through a) development of a hydro-biological baseline for the RPT system, including sediments, flows, water quality, biological indicators; b) initiation of the monitoring program<sup>8</sup> as soon as filling of the reservoir commences; and c) implementation of corrective actions<sup>9</sup> in case monitoring results show high risk of adverse impacts caused or likely to be caused by PHR operation,. First results on the baseline will be provided at the latest one year after first disbursement and the final adaptive management program prior to filling of the reservoir. Costs for development of the baseline and monitoring activities are estimated around 110,000 US\$ for the first year, and \$60,000 US\$ per year the following years. Further

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<sup>7</sup> For example, at the time of a site visit in November 2011, it was observed that the water from the Park canal (high organic content) and from the estuary (high sediments content) did not mix. It is however unknown how the location and characteristics of the interface change over the year, and may be sensitive to changes in flow or water quality.

<sup>8</sup> It is expected that the monitoring program will include participatory monitoring from potentially affected stakeholders, and public disclosure of the key monitoring results.

<sup>9</sup> As much as possible range of corrective actions and their triggers will be predefined in the adaptive management program.



technical details on the adaptive management strategy are available in the Additional Environmental studies – Phase 2 Report.

- 5.13 *Residual impact and risk.* Provided adequately designed and implemented, the adaptive management program is expected to ensure that potential adverse impacts on the ecological integrity of the RPT system are promptly identified and corrected. As a worst case option if severe impact was found to be imminent (e.g. that sediments flushing would result in negative impacts), hydrological connection between the Reventazón – Parismina River and the Jaloba lagoon – Tortuguero National Park canals could be temporally closed or restricted, hence ensuring that residual adverse impacts are kept of limited significance.

#### **D. Risk of economic displacement**

- 5.14 *Summary of impact.* The Project will directly impact a total of 87 properties and 56 land owners. Of which at least 16 household present moderate to high vulnerability for economic displacement due to their sole economic dependence on the land to be acquired for construction and operation of the PHR.,.. There is a significant risk that in the absence of an adequate mitigation strategy small farmers and their families forced to sell their lands to the Project would not find other similar productive lands within or nearby their communities, which will likely result in physical displacement as they'll be forced to migrate elsewhere. The number of affected vulnerable households may increase given that ICE has yet to evaluate the level of vulnerability for 11 more landholders. Moreover, the farms and forest plantations already acquired by ICE on the river right bank employed about 12 workers, who have lost their job and at that time only source of income. Six additional workers are expected to become unemployed as ICE completes the land acquisition process necessary for the PHR.

- 5.15 *Mitigation strategy.* In 2009 ICE has started construction of the PHR and acquisition of the land needed for the Project without the input or participation of social experts, a socioeconomic baseline to analyze and evaluate the impact of a forced land transaction for vulnerable landholders and their families, and without considering criteria of social vulnerability for a package of compensation schemes and assistance to affected populations. In April – December 2011, at the Bank's request ICE prepared a **Strategic Resettlement Policy Framework which has incorporated key elements and principles for the land acquisition process to meet requirements of IDB's Involuntary Resettlement Policy (OP-710)**, including provisions for: a detailed socio-economic analysis of affected stakeholders and impacts, criteria of social vulnerability for physical and/or economic displacement, legal context and gaps for restitution of livelihoods, compensation and rehabilitation schemes, alternatives to replacing land for restoration of livelihoods for affected population, set up a cut-off date, consultation and participation of affected population, mechanisms for grievances and dispute resolution, provision of technical assistance to reconstitute sustainable production of livelihoods, social assistance for restoration of social networks and adaptation to a new environment, qualitative and quantitative indicators of progress and milestones, and a budget. The Resettlement Framework is available on the IDB's website at: <http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36878994>.

- 5.16 To date socio-economic analysis of affected landowners is almost complete, most of the vulnerable households have been identified, and land replacement options are being analyzed. ICE will prepare and implement a Livelihoods Restoration Plan consistent with the Resettlement Framework and requirements of IDB's Involuntary Resettlement Policy. The Plan will focus on the 16 identified land owners and their families who present moderate to high vulnerability and the 18 workers who lost or will lose their job due to the land acquisition process required for the Project. The Livelihoods Restoration Plan will be finalized prior to first disbursement.
- 5.17 *Residual impact and risk.* It is expected that with adequate implementation of the Resettlement Framework and Livelihoods Restoration Plan, residual risk of involuntary displacement is minimal. A key component of the Livelihoods Restoration Plan in order to mitigate effectively such risk will be to ensure that affected landholders and their families whose livelihoods depended (for those lands already acquired) or currently depend on the land will find equally productive land within or adjacent to the same geographic area where they currently live, or, in case such land would not be available, will benefit from assistance to improve land productivity (including transitioning support).

#### **E. Management of environmental impacts during construction**

- 5.18 *Summary of impact.* Project construction has started since 2009. The excavation of the temporary diversion tunnel for the construction of the dam has been finalized. Excavation of the spillway has been initiated. Most of the ancillary infrastructure (e.g. access roads, construction camp, borrow pits) is completed. The overall footprint of the construction activities (about 800 hectares) and duration of the works (5-6 years) is important. A key potential environmental impact of the construction activities relates to discharge into the Reventazón River and/or its tributaries of (i) run-off with high sediments content and (ii) contaminated wastewater during excavation of the permanent diversion tunnel. At the time of a site visit in November 2011 it was observed that some construction activities were not following best environmental practices, particularly in terms of erosion prevention and management, drainage and sediments control. In addition, there were no detailed environmental management plans, and no adequate independent environmental supervision<sup>10</sup>.
- 5.19 *Mitigation strategy:* **an environmental and social management plan** for the PHR construction activities in line with international good practices **was developed** in the context of the additional environmental studies (Phase 1 report, Section D) and will be implemented by ICE. **An independent<sup>11</sup> environmental supervision unit for the PHR has now been created** within the Center for Environmental Management Services (CSGA)

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<sup>10</sup> A specificity of the PHR construction arrangements vis-à-vis similar projects is that there is no EPC Contractor. To a large extent ICE are constructing the PHR themselves. The typical arrangements between an Owner and an EPC Contractor in terms of environmental management requirements, monitoring and supervision are therefore absent.

<sup>11</sup> Independent means that the supervision unit is independent from the unit in ICE charge of construction of the PHR (including management of environmental matters), although they both reports to the same Manager.

of the Projects and Associated Services Department (PySA). The main objectives of this unit are to ensure that the environmental management of construction works for the PHR follows adequate standards and practices, and that non-compliances be timely identified, reported and corrected. This unit initially comprises a Manager, four environmental inspectors and administrative support. It reports non-compliances directly to the PHR Manager. In case of severe non-compliance it has the authority to suspend the construction works where such non-compliance has been identified, until corrected. Further details about the supervision unit, including responsibilities and supervision protocol, are presented in the Phase 2 report.

**5.20 Residual impact and risk.** Significant adverse environmental and social impacts related to construction of the PHR can be avoided through proper management of the construction activities. While construction may not have followed best environmental practices so far, tools and systems are now in place to improve those practices. Such system and tools are however an innovation for ICE, and would generally take some time to become fully operational. Given that construction is already well advanced, technical assistance will be provided to ICE in order to help with prompt implementation.

## **F. Cumulative effects of hydropower development on the Reventazón River**

**5.21 Summary of impact.** The initial cumulative effects analysis carried out in the context the additional environmental studies (see Phase 1 report, Section H) has identified the key Valued Environmental Components (VECs) that would be affected by the cumulative effects of construction and operation of the PHR and other interventions in the PHR area of influence. They are summarized in the table below. The report also includes a more detailed analysis of the expected effects on each of these VECs (Analysis Matrix).

Valued Environmental Component	Suggested Cause
Basic Services	Increased demand for services as a result of construction
Fish and Biodiversity	Alterations to terrestrial and aquatic habitat as a result of dam construction in conjunction with other land use changes
Water Quality	Changes in water quality as a result of inputs – organic, fertilizer, industrial effluent, pesticides and changing land use
Wetlands	Impacted as a result of changes in drainage patterns and flows from dam construction and agriculture
Cultural Resources	Impacts as a result of construction and dam establishment
Sediments	Changes in sediment patterns as a result of changes in land use and alteration of sediment deposition as a result of dam construction
Forest fragmentation	Same as biodiversity above

- 5.22 *Mitigation strategy:* The initial cumulative effects analysis has indicated a number of cumulative effects issues that should be addressed through a comprehensive management response at the Reventazón basin scale. A key recommendation of the analysis is that **COMCURE mandate is extended to the management of cumulative effects of the overall Reventazón watershed**, including activities such sharing information about development plans, developing a State of the Reventazón report, establishment and coordination of zoning strategies, joint mitigation and management actions. ICE has agreed to take leadership in a proposed extension of COMCURE activities to the Middle and Lower Reventazón watershed and management of cumulative effects. ICE's commitment to this effect is included in the Environmental and Social Action Plan (ESAP).
- 5.23 *Residual impact and risk:* significant residual cumulative effects on biodiversity are addressed through the river offset strategy summarized in section D above.

## **G. Other key impacts and risks**

- 5.24 *Potential social impacts downstream of the dam.* A key social impact downstream of the dam is on ecotourism companies using the Florida section of the Reventazón River for whitewater rafting. ICE has established contacts and initiated discussions with *Rios Tropicales*. **A compensation plan will be developed** prior to first disbursement. Downstream of the powerhouse, the minimum flow of 40 m<sup>3</sup>/s will be sufficient to accommodate any existing water user. Social impacts associated with potential erosion of river banks, and changes in navigation conditions to allow for access from the town of Parismina to the Tortuguero National Park will be monitored and managed through the adaptive management program for the RPT (see Section C above). .
- 5.25 *Cultural heritage.* Construction of the PHR and flooding of the reservoir will have a negative impact on the cultural heritage sites already discovered, or yet to be found as field investigations continue. Except for San Antonio (which is outside of the Project's area of direct influence), sites discovered to date appear to lack archaeological architectonic structures of cultural significance for on-site restoration or preservation. ICE's Archaeological Program and the Environmental Management Plan (PGA) include appropriate measures to protect integrity of discovered sites and artifacts. Petroglyphs already found in the future reservoir area have been relocated to PHR campsite for protection. As per the PGA, **ICE plans also to acquire the private land where San Antonio site is located and to further archaeological research and excavations on the site as well as create a cultural center or museum.** A specific action plan for acquisition and development of the San Antonio site will be prepared prior to first disbursement, and its implementation substantially completed prior to filling of the reservoir.
- 5.26 *Safety of dams (disasters risk management).* The initial EIA (Chapter 13) includes a contingency plan which assesses the risk of natural disasters (seismicity, volcanic eruptions, flooding) and includes appropriate risk management measures, including monitoring and instrumentation. An **Emergency Preparedness and Response Plan**, including dam break scenarios, will be prepared prior to filling of the reservoir.



5.27 *GHG emissions.* Gross greenhouse gases (GHG) emissions of the PHR once in operation were estimated in the context of the additional environmental studies (Phase 1 report, Section I). They are expected to be around 400,000  $\text{teqCO}_2$  per year, which would translate in a GHG emissions intensity around  $0.19 \text{ teqCO}_2/\text{MWh}$ <sup>12</sup>. **From the perspective of net GHG emissions, the project is expected to be neutral**, i.e. not to increase or decrease in any significant way the average GHG emissions intensity of the electrical grid in Costa Rica. It should be noted that as at this time there does not exist any internationally recognized predictive model for GHG emissions of freshwater reservoirs, those preliminary estimations will need to be confirmed through actual measurements of GHG emissions during PHR operation.

## 6. EVALUATION OF ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM AND CAPACITY

6.1 *ICE's organization for management of environmental and social impacts related to the development of the electricity sector.* The environmental management functions within ICE's Electricity Department (*Gerencia de Electricidad*) for generation projects are distributed among various business units: the Planning Unit (*CENPE*), in charge of the general environmental strategy and policies; within the Projects and Associated Services (*PysA*), between the Center for Environmental Management Services (*CSGA*), in charge among other responsibilities of the development of specific projects EIAs, and the Projects Management Centers, in charge of the environmental management during project construction; and the Production Unit (*PE*) to which are transferred projects once commissioned, and more specifically in charge of watershed management. The Electricity Department as a whole does not have a formalized environmental and social management system, although specific power generation facilities, when in operation, are certified ISO 14001 and 18000. As a result, while each of the business unit has in general good environmental capacity, **such organization is detrimental to an integrated approach and continuity in the management of environmental and social issues associated with development of a specific project**, particularly as it passes through the project cycle: planning (*CENPE*), feasibility (*CSGA*), construction (Project) and operation (*PE*).

6.2 *ICE's environmental and social management capacity to implement the mitigation strategy and management plans.* For a project such as the PHR, where potential impacts are significant and implementation of the key mitigation strategies is complex and requires specific expertise and adequate management capacity across the project cycle, the organization described above creates a significant risk of not achieving the desired objectives. In order to mitigate this risk, **an Environmental Coordination function within ICE's Electricity Department (*Gerencia de Electricidad*) has been created at the to ensure i) proper coordination between the various internal stakeholders; and ii) overall management of the effective implementation of the Project's environmental and social mitigation strategies through construction and operation.** Besides, scale and

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<sup>12</sup> Such GHG emission intensity is significantly lower than any thermal alternative using fossil fuel. For comparison purpose, the most efficient and less carbon intensive fossil fuel based power generation technology, a combined cycle gas turbine, has emissions intensity in the range of  $0.33\text{-}0.45\text{teqCO}_2/\text{MWh}$ .

complexity of the environmental and social issues to be managed is unprecedented for ICE, and will likely require capacity strengthening including through external technical assistance.

- 6.3 *Supervision arrangements.* ICE internal supervision will be performed by the independent supervision unit in CSGA and the Environmental Coordination structure with the Electricity Department (GE). Until Project Completion, ICE will provide quarterly monitoring reports to the Lenders and annual reports thereafter. In addition, an independent environmental and social consultant reporting to the Lenders will supervise the Project, report any non compliance, and recommend any follow up action, on a quarterly basis, during construction, semi-annual basis the first years of operations, and annually thereafter.

## **7. REQUIREMENTS TO BE INCLUDED IN THE LEGAL AGREEMENTS**

### **A. Throughout the life of the Loans**

- 7.1. The IDB will require within its Loan Agreements that the Borrower (ICE for the operation CR-L1049, and the PHR Fideicomiso for the operation CR-L1056) will, at all times during the life of the Loan Agreement, comply with the following requirements:
- a. All applicable environmental, social, health and safety, and labor regulatory requirements in Costa-Rica.
  - b. All requirements associated with any environmental, social, health and safety, and labor related permits, authorizations, or licenses that apply to the Project, the Borrower or any party responsible for executing the Project or its mitigation measures.
  - c. All aspects and components of all of the Project's environmental, health and safety, social and labor documents, including the initial EIA, and the additional environmental and social management, mitigation and compensation plans.
  - d. All relevant IDB policies such as the Environment and Safeguards Compliance Policy (OP-703), the Involuntary Resettlement Policy (OP-710), and the Disaster Risk Management Policy (OP-704).
  - e. Consult with IDB before approving or implementing any and all substantive changes to the Project (including its environmental and social management and mitigation plans) or its timetable which could potentially have negative environmental, social, labor, or health and safety effects.
  - f. Send written notice of any and all noncompliance with any environmental, health and safety, social and labor requirement of the loan agreement and any significant environmental, social, labor, health and safety accident, impact, event, claim or material complaint.
  - g. Ensure that all the Borrower's contractors hired for construction and Project activities comply with the applicable environmental, labor, social and health and safety requirements of the loan agreement.
  - h. Implement ongoing information disclosure and consultation activities related to environmental, labor, social, and health and safety aspects of the Project..
  - i. Implement an environmental, health and safety, social and labor management system that is consistent with ISO 14001 and OHSAS 18001.

- j. Comply with all the requirements indicated in the Environmental and Social Action Plan (ESAP).

**B. Prior to Financial Close**

- 7.2. Prior to Financial Close, the Borrower shall present to the satisfaction of the Bank the final Environmental and Social Action Plan (ESAP).

**C. Prior to First Disbursement**

- 7.3. Prior to First Disbursement of the Loan, the Borrower shall present to the satisfaction of the Bank all agreed upon environmental, social, health and safety and labor management, mitigation or compensation plans not already presented or scheduled for a later date, as per the Environmental and Social Action Plan (ESAP).

**D. Prior to filling of the reservoir and Project Completion:**

- 7.4. No later than 90 days prior to filling of the reservoir, the Borrower shall submit to IDB in form and substance satisfactory to IDB
  - a. All the documentation required as per the Environmental and Social Action Plan (ESAP) prior to filling of the reservoir.
  - b. An Environmental and Social Management Plan (ESMP) for Project operations.
- 7.5. The Borrower shall as a specific requirement for Project Completion submit to IDB, in form and substance satisfactory to IDB
  - a. A Final Construction Phase Environmental and Social Compliance Report
  - b. All the documentation required as per the Environmental and Social Action Plan (ESAP) as condition of Project Completion
  - c. Evidence of completion of the following environmental and social programs: the SBBD ecological connectivity restoration program, the Parismina River offset program and the livelihood restoration program, as per the schedule, milestones and indicators presented in each program.

**E. Prior to Each Disbursement**

- 7.6. Prior to each disbursement, the Sponsor shall certify compliance with all environmental social, health and safety and labor requirements in the loan agreement.

**F. Reporting, Monitoring and Supervision**

- 7.7. During the life of the Loan Agreement, the Borrower must prepare and submit an Environmental and Social Compliance Report, in form, content and frequency acceptable

to IDB. It is expected that during Project construction (i.e. until Project Technical Completion), the Borrower must prepare a quarterly report and the report must be received by the IDB in the subsequent month. After Project Technical Completion, the report must be prepared annually and must be submitted within 60 days after the close of the Calendar Year. In addition, the Borrower may be required to submit quarterly Environmental Monitoring Reports, in form and content acceptable to IDB, of evolving social or environmental conditions which the parties agree need to be closely monitored during construction, execution or both even if they are not specifically included in any Project environmental or social management or mitigation plan.

- 7.8. To provide for Bank monitoring of the Project's environmental, social, health and safety, and labor aspects the Loan Agreement shall provide for:
- (a) Direct Bank supervision actions (e.g., site visits, review of documentation, consultations with affected parties and third parties, etc.);
  - (b) The Bank's right to contract an external independent environmental consultant to perform more detailed supervision/monitoring actions during the Project construction and initial operation by the Sponsor/Borrower, and, as needed through the life of the loan.
  - (c) The Bank's right to contract for the performance of an independent environmental, social, health and safety, and labor audit, if the Bank deems necessary;
  - (d) The Borrower's agreement to provide access to all relevant documentation, facilities and personnel and cooperate fully with any inspection or audit by the Bank or its designated consultants.
  - (e) The Borrower's agreement to cooperate fully with the IDB's Independent Consultation and Investigation Mechanism (ICIM).
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## **ANNEXES:**

Annex I: List of documents publicly disclosed on IDB's website and their web links.

Annex II: Draft Environmental and Social Action Plan (ESAP).



**ANNEX I**  
**List of documents publicly disclosed on IDB's website and their web links.**

**1. Initial EIA (2009)** – Disclosed on October 4, 2011

Part 1 <http://www.iadb.org/document.cfm?id=36178215>  
Part 2 <http://www.iadb.org/document.cfm?id=36178218>  
Part 3 <http://www.iadb.org/document.cfm?id=36178220>  
Part 4 <http://www.iadb.org/document.cfm?id=36178224>  
Part 5 <http://www.iadb.org/document.cfm?id=36178225>  
Part 6 <http://www.iadb.org/document.cfm?id=36178228>  
Part 7 <http://www.iadb.org/document.cfm?id=36178229>  
Part 8 <http://www.iadb.org/document.cfm?id=36178232>  
Part 9 <http://www.iadb.org/document.cfm?id=36178236>  
Part 10 <http://www.iadb.org/document.cfm?id=36178237>  
Part 11 <http://www.iadb.org/document.cfm?id=36178244>  
Part 12 <http://www.iadb.org/document.cfm?id=36178242>  
Part 13 <http://www.iadb.org/document.cfm?id=36178245>  
Part 14 <http://www.iadb.org/document.cfm?id=36178238>

**2. Additional environmental studies Phase 1** – Disclosed on February 18, 2012

Parte A - Resumen Ejecutivo  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689432>  
Parte B - Estudio de Calidad del Agua  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689437>  
Parte C - Estudio de sedimentos  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689438>  
Parte D - Plan de Manejo de la Construcción  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689442>  
Parte E - Plan de Manejo de la Biodiversidad  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689443>  
Parte F - Propuesta de Proyecto de Compensación de Biodiversidad  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689445>  
Parte G - Peces y su hábitat  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689446>  
Parte H - Efectos Acumulativos  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689449>  
Parte I - Emisiones de Gases de Efecto Invernadero  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36689431>

**3. Additional environmental studies Phase 2** – Disclosed on May 24, 2012

INFORME 1 – Planes de Manejo Adaptivo Parismina – PN Totuguero  
INFORME 2 – Sub-Corredor Biológico Barbilla-Destierro  
INFORME 3 – Proyecto de Compensación Ambiental del Ecosistema Fluvial  
INFORME 4 - Unidad de Supervisión Ambiental del PHR  
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36879024>

**4. Strategic Resettlement Framework** – Disclosed on May 24, 2012

<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=36878994>

**ANNEX II**  
**Reventazón Hydroelectric Power Project (PHR) –Environmental and Social Action Plan (ESAP)<sup>13</sup>**

Issue	Actions	Evidence of Completion	Timing
<i>PS1- Social and Environmental Assessment and Management System / IADB O.P. 703 (B5,B6, B7 and B11)</i>			
<p>1. PHR's Environmental and Social Impacts Assessment is of good quality and was developed following international good practice. The Environmental, Social and Health and Safety Management Procedures outlined in the ESIA are generic "intentional" guidelines.</p> <p>Even though ICE has a large and capable environmental, social and health and safety management team, they do not constitute a single unit, but are distributed in different business operational units.</p> <p>Additionally, because for this project ICE is functioning as its own EPC contractor, there is no independent supervision team to assure and enforce compliance with the ESHS management plans and procedures.</p> <p>In compliance with the Lenders' policies and coherent with GIIP, the environmental, social and health and safety teams need to be integrated in a systematic manner (Environmental, Social and Health and Safety Management System – ESHS-MS) and be operational and effectively executed, supervised, and documented in</p>	1.1. Final version of the Environmental, Social, Health and Safety Management System (ESHS-MS) for the Construction Phase of the Project based on internationally recognized standards (e.g. ISO 14001), incorporating IDB's applicable Operational Policies, IFC's Performance Standards and applicable aspects of IFC's EHS General Guidelines.	1.1. ESHS MS (Construction) Manual and key procedures in form and substance acceptable to the Lenders	Prior to first Disbursement
	1.2. Develop and implement an Environmental, Social, Health and Safety Management System (ESHS-MS) for the Operation Phase: Implement an ESHS-MS based on internationally recognized standards (eg. ISO 14001), incorporating IDB's applicable Operational Policies, IFC's Performance Standards and applicable aspects of IFC's EHS General Guidelines.	1.2. ESHS MS (Operation) Manual and key procedures in form and substance acceptable to the Lenders.	Condition of Project Completion.
	1.3. Create an independent supervision unit, with a clear mandate, capacity to halt construction works and/or operations if and when needed, detailed procedures and field supervision protocols, and adequate personnel and budget.	1.3. Evidence that the Independent Supervision Unit has been created  1.4. Evidence that the Independent Supervision Unit is operational to a level acceptable to the Lenders.	Prior to Board Approval.  On or prior 3 months after Board Approval.

<sup>13</sup> The Environmental and Social Action Plan has been discussed and agreed with ICE and IFC.

# Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

<p>the field.</p> <p>This ESHS-MS must include an independent supervision unit, with direct reporting line to the Manager of the Projects and Associated Services Department (UEN PySA).</p>			
<p>2. The RHP will be the fourth hydroelectric project constructed and operated by ICE in the Reventazón River. The Reventazón River watershed is very intervened by anthropogenic activities (e.g banana and coffee plantations, cattle ranching). If un-managed, accumulated residual impacts and risks related to poor watershed management could jeopardize the operation of the RHP and reduce its useful life. Via the COMCURE, ICE has implemented a good strategic watershed management program in the higher section of the watershed that has proven to be successful, effectively reducing erosion and deforestation, achieving annual crop substitution for fruit trees and sustainable timber, and increasing awareness of neighboring communities on how to contribute to good watershed management practices, among others.</p> <p>Such Program does not exist in the mid and lower sections of the watershed.</p>	<p>2.1. Assist in extending COMCURE's mandate to the mid and lower sections of the Reventazón watershed</p> <p>2.2. Update the Watershed Management Plan, including extensions of the successful Programs to the mid and lower sections. This Plan is expected to include not only general Programs, but expected targets and indicators to measure success.</p> <p>2.3. Implement the actions of the Watershed Management Plan under ICE responsibility</p>	<p>2.1. Evidence of ICE efforts to extend COMCURE's mandate,</p> <p>2.2. Updated Watershed Management Plan, including relevant programs for the mid and lower sections of the watershed, in form and content acceptable to the Lenders.</p> <p>2.3. ICE Implementation Plan of the Watershed Management Plan</p>	<p>3 months prior to filling of the Reservoir.</p> <p>March 30<sup>th</sup>, 2014</p> <p>Condition of Project Completion.</p>

## Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

<p>3. There are potential downstream cumulative environmental and social impacts in the complex and ecologically sensitive RPT hydro biological system including impacts on local livelihoods based on fishing, agriculture, and tourism.</p>	<p>3.1. Complete a baseline study of the RPT hydro biological system</p> <p>3.2. Develop and implement as part of the ESHS-MS an Adaptive Management approach that will include detailed monitoring protocols with clear physical, chemical, biological and social indicators and associated thresholds to detect and mitigate –using Mitigation Hierarchy principles- any significant unpredicted downstream impact, including effects on the Tortuguero National Park</p>	<p>3.1. Baseline study of the RPT hydro biological system in form and content acceptable to the Lenders</p> <p>3.2. Adaptive Management Program for the RPT area in form and content acceptable to the Lenders.</p>	<p>On or prior one year after first disbursement</p> <p>3 months prior to filling of the Reservoir</p>
<p>4. Community Engagement / Grievance Mechanism</p>	<p>4.1. Implement a robust Grievance Redress Mechanism as part of the Community Engagement Plan.</p>	<p>4.1. Evidence that the Grievance Mechanism for potentially affected parties is in place and operational (e.g. grievances register and follow-up actions)</p>	<p>Prior to First Disbursement</p>
<p>5. Cumulative Impact Assessment (CIA) – The CIA states a series of recommendation which are for the most part covered in this ESAP (e.g. PMAS / PMACA PS1 action 4; watershed management plan covered under PS1 action 2, and the offset and management of the SBBA corridor covered under PS6 action 11 and 12) However, aligned with good practice, the CIA recommends ICE to validate the proposed VECs with relevant stakeholders to achieve credibility and legitimacy.</p>	<p>5.1. Present a Plan for Broad discussion of the CIA findings and validate proposed VECs with relevant stakeholders per the recommendation of the CIA (pp9).</p> <p>5.2. Execute the communication plan, and document validation of VECs.</p>	<p>5.1 VEC validation plan presented in from and content acceptable to the Lenders</p> <p>5.2 Documental evidence of broad VEC validation among relevant stakeholders</p>	<p>Prior to First Disbursement.</p> <p>3 months prior to filling of the Reservoir</p>
<p>6. River rafting activities will be affected, and some economic displacement is also expected, especially for those companies operating in the sector La Pascua.</p>	<p>6.1. Develop a White Water Rafting Mitigation Plan aimed at: fully identifying potential impacts on rafting operations; mitigate potential adverse impacts; and ensure ongoing engagement with the</p>	<p>6.1. Strategy for developing the White Water Rafting Mitigation Plan</p>	<p>Prior to First Disbursement</p>



Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

	operator during different project stages.	6.2. White Water Rafting Mitigation Plan agreed with the key operators in form and content acceptable to the Lenders	On or prior one year after First Disbursement
<i>PS2- Labor and Working Conditions / IADB – O.P. 703</i>			
7. Grievance Mechanism for Workers not formalized or documented	7.1. Develop and implement a Grievance Redress Mechanism for Workers –direct and subcontracted- in accordance with IFC's PS2.	7.1 Grievance Redress Mechanism for Workers in form and substance acceptable to the Lenders	Prior to First Disbursement.
<i>PS3 – Pollution Prevention and Abatement / IADB O.P. 703 (B11 &amp; B12)</i>			
8. Reservoir management at Cachi and Angostura HPP could be improved. Both reservoir show extensive coverage with water hyacinth, which is a known sign of reservoir eutrophication, reduces water storage efficiency (evapo-transpiration), may increase infestation of mosquitoes and other water-related pest, and cause operational complication and increased costs.  This is considered a liability, because it is certain that if un-mitigated, the Reventazón Reservoir will also be colonized by water hyacinth where it will cause similar problems.	8.1 Implement a pilot program to manage the wáter hyacinth and control (mechanically or biologically) the wáter hyacinth in the Cachi and Angostura reservoirs.	8.1. Program developed and implemented at least in one of the existing reservoirs.	On or prior one year after first disbursement
	8.2 Develop a Water Hyacinth Introduction Prevention and Dispersion Control and Monitoring in the Reventazón Reservoir.	8.2 Water Hyacinth Prevention and Control presented in form and content acceptable to the Lenders.	3 months prior to filling of the Reservoir
9. Reservoirs are important sources of greenhouse gases (GHG). It is estimated that once in operation the Reventazón Reservoir will generate approximately 400,000 teqCO2 per year.	9.1 Design and implement a Greenhouse Gases Emission Monitoring program to monitor the GHG emission coming from the Reventazón Reservoir.	9.1. Greenhouse Gases Emissions Monitoring Program developed in form and content satisfactory to the Lenders and consistent with the methodology developed by the international Hydropower Association (IHA)	3 months prior to filling of the Reservoir

Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

		and UNESCO (GHG Measurement Guidelines for Freshwater Reservoirs).	
<i>PS4 – Community Health, Safety, and Security / IADB O.P. 704</i>			
10. Dam Safety and Downstream Operational Awareness and Emergency Preparedness and Evacuation Plan.	10.1. Adapt existing emergency preparedness and evacuation plans for Cachi and Angostura, to include the PHR, and incorporate all potentially affected downstream areas in case of a catastrophic event.	10.1 Existing Emergency Preparedness Plan modified to include PHR in form and content acceptable to the Lenders	3 months prior to filling of the Reservoir
	10.2. Develop and implement a warning and alarm system to assure that downstream communities are notified when (a) regular operational or extraordinary but planned downstream flows are expected to abruptly increase, and (b) there are emergency releases or other emergency situations. This system must assure that downstream communities are trained and understand the different risk situation, understand what actions to take and what behaviors to avoid, and know who to contact in case of doubts or emergencies.	10.2. Evidence that the alarm system has been developed and is operational and downstream communities have been appropriately trained.	[ 3 months] prior to filling of the Reservoir
11. PHR needs to develop as part as the construction and operation ESHS-MS a Natural Disaster Management Plan.	11.1. Develop and implement a Contingency Plan and Natural Disaster Management Plan (NDMP) for Construction Phase	11.1. Contingency Plan and Natural Disaster Management Plan (NDMP) for Construction Phase in form and substance acceptable to the Lenders	Prior to First Disbursement.
	11.2. Develop and implement a Contingency Plan and Natural Disaster Management Plan (NDMP) for Operation Phase	11.2. Contingency Plan and Natural Disaster Management Plan (NDMP) for Operation Phase in form and substance acceptable to the Lenders	Condition of Project Completion.

Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

<i>PS5 – Land Acquisition and Involuntary Resettlement / IADB O.P. 710</i>			
<p>12. The PHR will require a land acquisition of approximately 1700 ha.</p> <p>This involuntary resettlement process must be planned and implemented in accordance with PS5 and OP-710 on Involuntary Resettlement and Compensation, and livelihood of affected people must be restored.</p>	12.1. Develop and implement a Resettlement Framework/Preliminary Land Acquisition and Involuntary Resettlement Plan in form and content acceptable to the Lenders.	12.1. Resettlement Framework / Preliminary Land Acquisition and Involuntary Resettlement Plan in form and content acceptable to the Lenders.	Prior to Board Approval (IFC needs it 60 days before Board Approval)
	12.2. Develop a Livelihood Restoration Plan covering all those affected by project-related land acquisition consistent with the Resettlement Framework and IDB's and IFC's resettlement policies. .	12.2 Livelihood Restoration Plan in form and content acceptable to the Lenders.	Prior to First Disbursement.
	12.3. Perform a Resettlement Completion Audit demonstrating compliance with IFC PS5 and IDB OP-710 or, if necessary, identifying any remaining gaps and corresponding corrective actions	12.3 Resettlement Completion Audit in form and content acceptable to the Lenders.	Condition of Project Completion.
<i>PS6 –Biodiversity Conservation and Sustainable Natural Resource Management / IADB O.P 703 (B.9)</i>			
13. The future reservoir is likely to act as a barrier to connectivity within the Barbilla-Destierro Biological Sub-Corridor (SBBD) and therefore may adversely affect corridor ecological and evolutionary processes including genetic flow for key species including the Jaguar ( <i>Panthera onca</i> ).	<p>13.1 Establish the institutional and organizational arrangements sufficient to ensure the effective functioning of the SBBD:</p> <p>a) Assist in establishing a clear legal basis for the functioning of the SBBD Commission</p> <p>b) Provide assistance in the development and implementation of annual operational plans for the SBBD Commission.</p>	<p>13.1 a) Evidence that SBBD is established and functioning under a clear legal basis</p> <p>13.1 b) Annual reports of the SBBD Commission</p>	<p>Prior to First Disbursement</p> <p>Annually following first disbursement</p>

Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

	<p>13.2 Develop an Operational Framework (“SBBD Operational Framework”) aiming to maintain long term functionality of the SBBD including:</p> <p>a) Five-year programs for reforestation, land purchase, payments for environmental services, environmental education, and sustainable agricultural practices in the areas surrounding the reservoir,</p> <p>b) Identification of the institutional, organizational, human resource and financial requirements for implementation of the SBBD Operational Framework,</p> <p>c) Financing plan for the implementation of the SBBD Operational Framework over the lifetime of the Reventazon Project.</p>	<p>13.2 SBBD Operational Framework in form and substance acceptable to Lenders</p>	<p>Prior to First Disbursement</p>
	<p>13.3 Implement the SBBD Operational Framework to maintain long term functionality of the SBBD, including the following activities:</p> <p>a) Reforest priority areas that will guarantee long term connectivity:</p> <p>b) Finalize the purchase of all priority lands required to restore connectivity of the SBBD</p> <p>c) Establish a special program of payments for environmental services (PES) to protect forests and to reforest areas using native species in priority areas</p> <p>d) Implement a program of environmental education in priority communities within the SBBD</p>	<p>13.3a) Evidence that reforestation (planting) has been completed in all priority areas</p> <p>13.3 b) Evidence that purchase of 80 % of priority lands has been completed</p> <p>13.3 c) Evidence that 50 % of PES contracts in priority areas are in force</p> <p>13.3 c) Evidence that 80 % of PES contracts in priority areas are in force</p> <p>13.3 d) Evidence that 80% of students in priority communities, as identified in the Operational Framework, have been involved</p>	<p>3months prior to filling of the Reservoir</p> <p>3 months prior to filling of the Reservoir</p> <p>On or prior two years after First Disbursement</p> <p>3 months prior to filling of the Reservoir</p> <p>3 months prior to filling of the Reservoir</p>



Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

	e) Implement a program of best agricultural practices in priority areas within the SBBB	in the environmental education program and understand the purpose of the SBBB 13.3 e) Evidence that 80 % of farmers in the priority areas of the SBBB have adopted and implemented at least one agricultural technique or practice consistent with ensuring long term connectivity	3 months prior to filling the Reservoir
	13.4 Conduct technical evaluations necessary to demonstrate the long term ecological functionality of the SBBB:  a) Complete a rapid ecological and social evaluation of the SBBB that identifies key biodiversity values and that is adequate to establish a baseline of biodiversity values and social data for long-term monitoring  b) Develop and implement an integrated biological and ecological monitoring plan (BEMP), which includes the identification of metrics and indicators adequate to assess the enhancement of the SBBB's functional connectivity and habitat integrity and to demonstrate net positive gain in critical habitat qualifying values	13.4 a) SBBB rapid ecological and social evaluation in form and substance acceptable to Lenders  13.4 b) BEMP in form and substance acceptable to Lenders  13.4 b) Six-monthly monitoring reports in form and substance acceptable to Lenders	Prior to first disbursement  Prior to first disbursement  Every six-months following first disbursement
14. The construction and operation of the PHR will have adverse impacts on the aquatic habitats of the Reventazón River potentially leading to significant residual impacts including, but not limited to, its ecological integrity and functionality of migratory fish pathways. These residual impacts cannot be effectively mitigated within the Reventazón River and an offset will be required to compensate.	Design and implement a Biodiversity Offset, compatible with international best practices, to compensate for the residual impacts on the Reventazón River.  ICE has selected the ecologically similar river system Parismina for the Biodiversity Offset, and by restoring/conserving/protecting the selected river system, it will assure the preservation of a healthy and free flowing aquatic habitat, with the ultimate goal of assuring no net biodiversity loss – and ideally positive gain – over time through the following actions:		

# Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

	14.1 Undertake a rapid ecological and social evaluation of the proposed offset site	14.1 Offset site ecological and social analysis in form and substance acceptable to Lenders	Prior to first disbursement
	14.2 Complete a feasibility study including a technical rationale for offset site selection and metrics sufficient to establish a baseline for long term monitoring to demonstrate no net loss of biodiversity over time.	14.2. Feasibility study in form and substance acceptable to Lenders	On or prior six months after First Disbursement
	14.3 Identify and establish the legal basis for the demarcation and management of the offset site	14.3. Based on the results of the feasibility study, required legal basis for the offset established	On or prior one year after first disbursement
	14.4 Complete required consultations for the future management of the proposed offset site	14.4. Evidence of consultations (including consultation report)	On or prior one year after first disbursement
	14.5 Develop a plan for the management of the offset including clearly identifying conservation objectives measureable against the baseline, environmental education actions, monitoring actions, and identification of the institutional framework (responsible parties for the implementation of proposed management actions) and long term financial resources for its implementation over the lifetime of the of the Reventazon Project. Monitoring actions should include: identification of a set of metrics and indicators adequate to determine no net loss, and preferably net gain, of biodiversity values at the offset site; key milestones, and interim targets.	14.5. Offset Management Plan in form and substance acceptable to the Lenders	On or prior one year after first disbursement
	14.6 Implement the management and monitoring plan for the offset including monitoring of achievement of key milestones and indicators	14.6 Evidence of substantial progress in the implementation in the offset management plan demonstrated, e.g. through achievement of the key milestones and indicators in the management plan	3 months prior to filling of the Reservoir

# Environmental and Social Action Plan (ESAP) – May 16<sup>th</sup>, 2012

15. External advisory group to support the design and implementation of the biodiversity-related activities to enhance the SBBB and create the offset	15. Engage a reputable, qualified and internationally recognised advisory group of conservation specialists in the fields of landscape-scale biodiversity evaluation, corridor ecology and biodiversity offsets design and implementation with the scope of providing strategic, long-term direction and advise to the Project, which will be needed to adequately plan and manage the suite of biodiversity activities and programs to ultimately reach no net loss and net positive gain goals. The terms of engagement will include processes that allow Lenders to have independent access to the expert advisor groups upon notification that this advice and opinion is being sought.	15. Evidence that the advisory group is functioning	Prior to first disbursement
<i>PS 8- Cultural Heritage/IADB-OP 703 (B.9)</i>			
16. To date, 41 sites archaeological sites (and 10 petroglyphs have been found in the area of direct influence or adjacent of PHR. These sites will be impacted or are at risk of being altered or destroyed by PHR's construction work and flooding of the reservoir. Only the pre-columbian site of San Antonio appears to be of cultural and scientific importance for conservation in situ, protection and development. The site measures 29.9 ha and has architectonic structures/possibly a cemetery, and some petroglyphs. The site is located in private property.	16. Develop and implement a specific action plan for acquisition and development of the San Antonio site	<p>16.1 San Antonio Acquisition and Development Plan in form and substance acceptable to the Lenders.</p> <p>16.2 Evidence of substantial progress in the implementation of the San Antonio Acquisition and Development Plan (e.g. land acquired, agreement has been signed between ICE, Costa Rica's National Museum, and Universidad of Costa Rica signed)</p>	<p>Prior to first disbursement</p> <p>[3 months] prior to filling of the Reservoir</p>