Jilamito Hydropower Project
Complementary Studies

Cumulative Impacts

Project # 0363579

Panamá City, November 3, 2016

Content

1.0 CUMULATIVE IMPACTS

1.1 *INTRODUCTION*

The present Cumulative IA follows the International Finance Corporation's (IFC) *Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets* (IFC 2013). Its proposed preliminary approach is applicable to private sector project developers or financers in emerging markets, identifying the most significant cumulative impacts through a methodology known as rapid cumulative impact assessment. This methodology focuses on environmental and social components rated as critical by the Affected Communities and the scientific community, which are cumulatively impacted by the project under evaluation, by other projects, and by natural environmental and social external drivers (IFC 2013).

Cumulative impacts occur when a Project activity acts together with other projects or third party activities to impact the same environmental or social resource or receptor. The IFC defines cumulative impacts as 'impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted'. Significant cumulative impacts can result from individually minor but collectively major actions taking place over a period of time. Cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales. In some cases, cumulative impacts occur because a series of projects of the same type are being developed; for example, when several hydroelectric projects are constructed or planned on the same river or within the same watershed.

Cumulative effects are often difficult to predict since they are the result of complex interactions between multiple projects or activities. This difficulty is compounded by the fact that details of future developments are largely unknown at this stage; in addition, whether or not a potential future development actually occurs is dependent on a number of factors that are unknown at the time of the assessment. Accordingly, landscape/visual cumulative impacts are qualitatively assessed in this section.

Past and present activities were considered in developing the environmental and social impacts for the Project. For example, the analysis of socio-environmental impacts for the transmission line associated with the Jilamito Project took into account impairment of visual landscape quality by construction related activities which have the potential to transform the natural landscape and resulted in an alteration of the visual landscape. Thus, such activities have already been considered and used to assess the potential cumulative impacts of the proposed Project activities.

1.2 *OBJECTIVES*

The objective of this Cumulative IA is to assess cumulative impacts in the Jilamito Project Area and identify the contribution of other projects in its vicinity.
The specific objectives are:

- Identify other existing and planned projects and external environmental and social drivers that could cumulatively impact VECs in the Jilamito Project Area.
- Identify the VECs that could be impacted cumulatively, considering the results of the stakeholder consultation process.
- Using the IFC methodology, assess the cumulative impacts on VECs, considering the other projects and external drivers in the area, and identify the contribution from other projects in the vicinity.

1.3 *SCOPE OF THE CUMULATIVE ASSESSMENT*

For Cumulative Impacts Assessment (CIA) to be a useful tool to decision-makers and stakeholders, it must be limited to effects that can be meaningfully evaluated, rather than explore infinite possibilities. Three important aspects that require consideration prior to the evaluation of cumulative impacts are listed below:

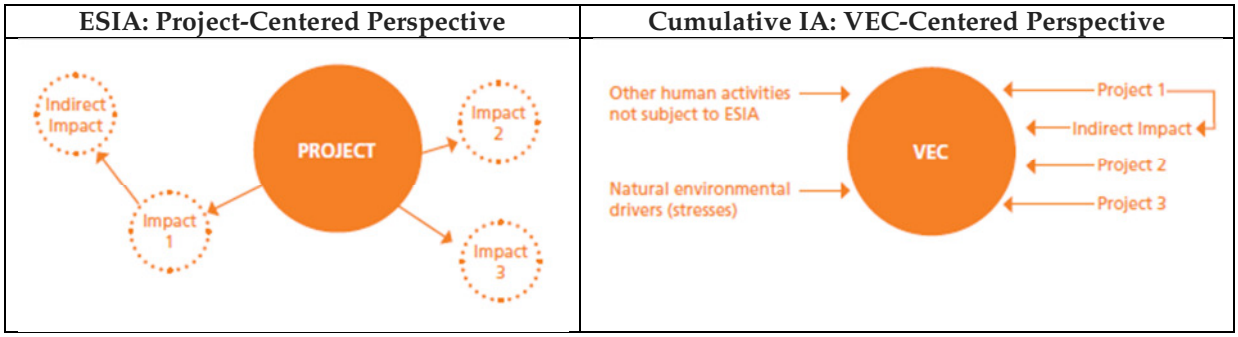
- Determining the appropriate spatial boundaries for evaluation;
- The identification of relevant, past, existing, and future activities for consideration; and
- Identifying the resources and/ or receptors at risk or likely to experience interactions with the Project.

1.4 *METHODOLOGY*

The present Cumulative Impact Assessment follows the methodology established by the IFC's *Good Practice Handbook - Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets* (IFC 2013). The methodology is consistent with IFC Performance Standards (PS).

Unlike an Environmental and Social Impact Assessment (ESIA), a Cumulative Impact Assessment focuses on Valued Environmental and Social Components (VECs) as receptors of impacts from different projects and activities and not on a project as a generator of impacts on various environmental and social receptors. In addition, an ESIA estimates the significance of an impact using indicators to reflect incremental changes on a receptor (for example, loss of forest cover area). In a Cumulative IA, the indicators reflect the overall resulting condition of the receptor (for example, total forest cover) and its resulting viability.

Figure 1.1: Comparing ESIA and Cumulative IA

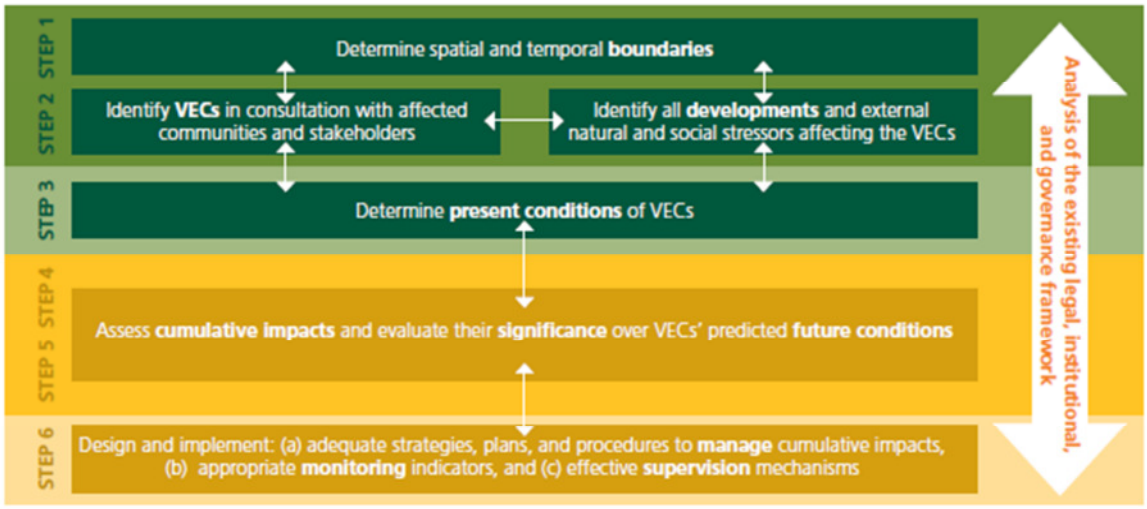


Source: IFC 2013.

This Cumulative IA was based on a desktop review of information provided by INGELSA, publicly available information and satellite imagery, in addition to information obtained during a site visit and key stakeholder interviews.

Based on the IFC methodology, the assessment carried out by ERM was developed following the six steps for a rapid cumulative impact assessment (see Figure 3.2). The process is iterative and therefore steps, although sequential, were revised and adjusted in the process of information collection and analysis. The steps are described in detail below.

Figure 1.2: Rapid Cumulative Impact Assessment Methodology



Source: IFC 2013.

1.4.1 Determination of Spatial and Temporal Boundaries

The two subtasks described below were carried out simultaneously and in an integrated and iterative manner with Step 2, as shown in Figure 3.2.

The spatial delimitation of the Cumulative IA's Study Area was established taking into consideration: i) the Jilamito Project area and the hydroelectric power projects; (ii) the extension of the selected VECs, and (iii) the extension of the impacts from the hydroelectric power projects, Other Projects and External Drivers.

Temporal delimitation for the timeframe of the assessment was established taking into account the status and timeline of the Jilamito hydroelectric Project and other projects.
The spatial and temporal boundaries are described in below under Spatial and Temporal Boundaries.

1.4.2 Identification of VECs, Other Projects, and External Drivers

1.4.2.1 VECs

According to IFC, VECs are environmental and social attributes that are considered to be important in assessing risks; they may be physical features, ecosystem services, natural processes, social conditions, or cultural aspects.

While VECs may be directly or indirectly affected by a specific development, they often are also affected by the cumulative effects of several developments. VECs are the ultimate recipient of impacts because they tend to be at the ends of ecological pathways. The acronym VECs refers to sensitive or valued receptors of impact whose desired future condition determines the assessment end points to be used in the CIA process.

Preliminarily, ERM identified environmental and social recipients based on existing environmental and social studies. Then, we evaluated the input from the stakeholders interviewed. ERM carried out interviews with key stakeholder including government agencies, international organizations, local communities, local industries, cultural heritage sites, and project developers in order to identify importance and value of receptors. The stakeholders interviewed by ERM are presented in Table 3.1; these interviews were conducted during the site visit of August 24 to 26th of 2016.

Table 1.1: Stakeholders interviewed during ERM field work (August, 2016)

N°	Name	Role	Community
Local Authorities / Social representatives			
1	Fabriciano Ortez	President of Patronato President of Junta de Agua	Caserío el Empalme
2	Tomas Gandalmes	President of Patronato	Aldea Jilamito Nuevo
3	Anastacio Gandalmes	President of Patronato	Aldea Jilamito Viejo
4	Adelmo Arita	President of Patronato	Aldea Mezapita
5	Raul Castro	President of Patronato	Aldea Mezapa
6	José Roberto Martinez	President of Junta de Agua Member of Cooperativa Agro Forestal CALIJINUL	Aldea Jilamito Viejo
7	Adolfo Pagoada saybe	Mayor of District	District of Arizona
8	Elder Licona	Vocal of Patronato Pastor of Principe de Paz Church	Aldea Jilamito Nuevo

N°	Name	Role	Community
9	Angel Contreras	President of Patronato	Caserío El Retiro
10	Arnulfo del Cid	Owner	Caserío San Rafael
Representatives of INGELSA - SEMSA			
11	Alicia Gabriela Vargas	Lawyer in charge of land acquisition process	
12	Jorge Rodriguez	General Manager	
13	Hegel Ernesto Velasquez	Socio Environmental and Permits Manager	

Source: ERM 2016

To be included in this Cumulative IA, an environmental and social component must first be demonstrated to be valued by some identifiable stakeholder group, be it the scientific community or any group of national, regional and local stakeholders. Second, the VEC must be reasonably expected to be affected by both the projects under evaluation (here, the Jilamito hydroelectric plant) and some combination of Other Projects and External Drivers. This second requirement is that the VEC should be expected to be affected by cumulative impacts; if the VEC is affect only by the Jilamito Project and not by Other Projects and/or External Drivers or vice-versa, it can be "scoped out" of the Cumulative IA.

1.4.2.2 Other Projects

Through a thorough review of publicly available information, past, existing, and future projects located within the spatial and temporal boundaries of the Cumulative IA were identified. The following sources of information were used:

International, multilateral, and bilateral organizations: projects planned or being carried out by international organizations. Information was sought in the organization's web pages. The consulted organizations included: IFC, World Bank, United Nations Development Program (UNDP), US Agency for International Development (USAID), and the Inter-American Development Bank (IDB).

The IFC methodology recommends considering projects whose start is expected within a period of three years, in order to minimize the uncertainty linked to the execution of such projects (IFC 2013).

1.4.2.3 External Drivers

External pressure sources include socio-economic activities of the population (agriculture, fisheries, and ecotourism), environmental management, natural disaster (earthquake, flood, volcanic activity and drought) and climate change.

1.5 *SPATIAL AND TEMPORAL BOUNDARIES*

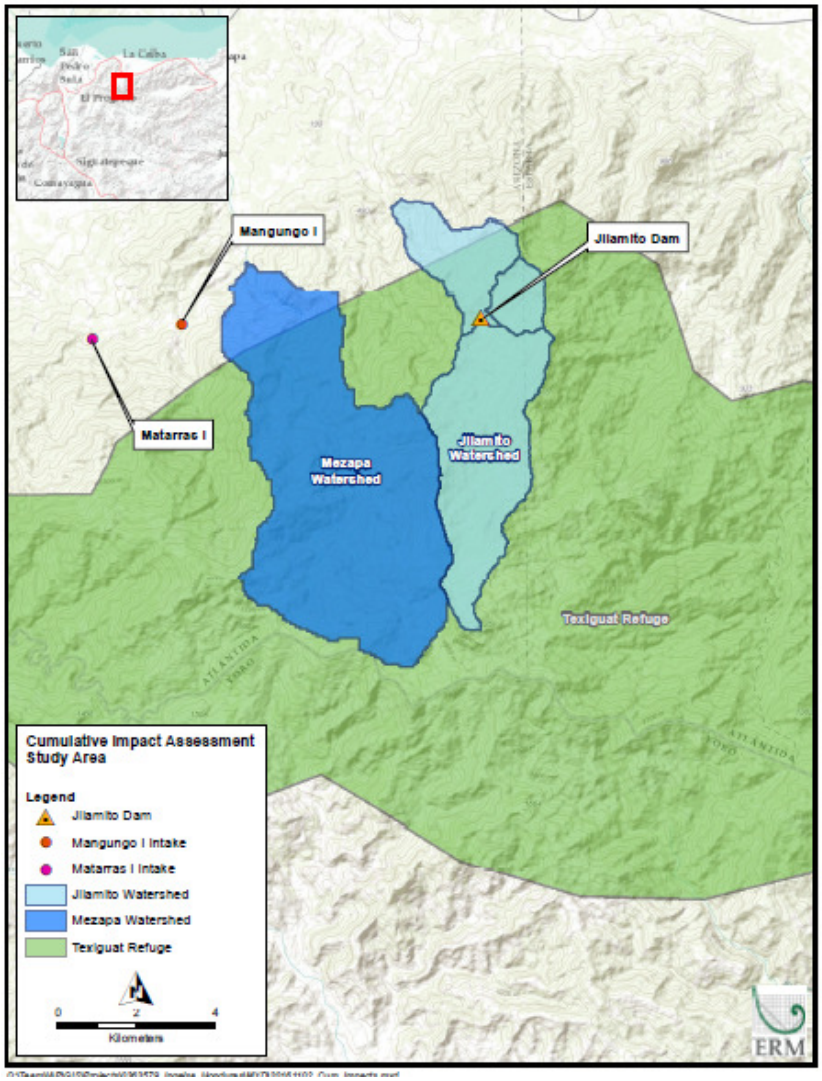
1.5.1 Study Area

ERM utilized desktop information provided by INGELSA, information gathered during the site visit and other available public information. The study area was determined based on

previous environmental studies, such as the *Diagnóstico Ambiental Cualitativo* prepared for Jilamito in 2013 and presented to the environmental authority – SERNA; and information on the Mezapa hydropower project, developed and managed by SEMSA.

- **Other Projects**: During the site visit, ERM visited the Mezapa hydroelectric plant, which has been developed by SEMSA, parent company of INGELSA. This plant is located in the Mezapa river basin, located west of Jilamito.
- **External Drivers**: Given the nature of the study area, external drivers considered are abundant rain and the earthquakes.
- **VEC hydrological resources**: Considering the Jilamito and Mezapa sub-basins and the streams associated with them in relation to the Project.
- **VEC forests**: Forest lands and the Texiguat natural refugee were considered within the VECs.

FIGURE 1-1: CUMULATIVE IMPACT ASSESSMENT STUDY AREA



1.5.2 Spatial and Temporal Boundaries

From the information provided by INGELSA and obtained during the site visit on project status, there are three hydro Projects in operation in the region, Mangungo I (1.48 MW); Matarras (1.5 MW); and the MEZAPA project (8.8 MW), which started operating in 2015. Other projects in the conceptual design phase may exist at this point in time. ERM was not able to establish a timeline for most Other Projects. However, it was assumed these will be developed in the near future, e.g. within the next five to ten years.

The timeframe being considered for this Cumulative IA begins with the initiation of activities of MEZAPA project in 2015.

1.6 *OTHER PROJECTS*

1.6.1 Other Projects

The Other Projects and External Drivers identified within the spatial and temporal limits of the Cumulative IA are presented below. The location of the Other Projects is presented in Figure 1-1.

1.6.1.1 Mangungo I Project

The Mangungo Hydroelectric Project is located in the municipality of Arizona, department of Atlantida; located south of the Mezapita village. The Mangungo I is a small run-of-river hydro power plant with an installed capacity of 1.48 MW connecting to the national Honduran Electricity Grid, that uses water from the Mangungo River to generate the power. Operations began in 2013.

1.6.1.1 Matarras Project

The Matarras Hydroelectric Project is located in the municipality of Arizona, department of Atlantida; located 1 Km South East of the Aldea Suyapa de Lean or Matarras village. The Mangungo I is another small run-of-river hydro power plant with an installed capacity of 1.15 MW that uses water from the Matarras River to generate the power connecting to the national Honduran Electricity Grid. Operations began in 2011.

1.6.1.2 MEZAPA Project

The MEZAPA Hydroelectric Project is located at Aldea Mezapita, Municipality of Arizona, Department of Atlántida, to the west of Jilamito. The technology employed by the project consists of a small run-of-river hydro power plant supplying electricity to the grid. The 9.4 MW hydroelectric plant consists of two identical 4.7 MW turbines that use the water flow of the Mezapa River to generate electricity without producing GHG emissions. The MEZAPA project started operations in 2015 and it is supervised by the same group of engineers in charge of Jilamito.

Photos of the MEZAPA Project taken by ERM during the site visit in August 2016:




1.7 *SELECTION AND DESCRIPTION OF VECS*

VECs are environmental and social components that reflect public concerns about social, cultural, economic, or aesthetic values, considered as the end receptors of cumulative impacts. A preliminary list of VECs was prepared based on the environmental and social receptors identified during the site visit and interviews. The stakeholder groups interviewed are included in Table 3.1.

Based on the definition of VECs and the available information, components with the greatest importance or value were selected. The list of VECs identified covers environmental, social, and cultural components:

- Water resources,
- Sediments, and
- Vegetation.

1.7.1 VECs Not Selected for Assessment

Several environmental and social receptors or components were not selected for assessment given they were not considered to be of significance or value by stakeholders or they are not reasonably expected to be affected by both the Project and some combination of Other Projects and External Drivers. Below are some of the components that were not selected for the Cumulative IA, including a brief description of the reason for which they were not selected.

- **Air Quality:** Air emissions during construction activities of the projects are related to dust generation from earth movement and vehicle traffic and exhaust emission (gases) from vehicle engines and other equipment. Emissions would be short term, localized, and small in magnitude. Once the construction activities that generate emission stop, impacts to air quality cease. Due to the type of emissions and their dispersion, they do not accumulate. During the interviews, stakeholders did not mention air quality as a problem or a concern during the construction of MEZAPA; therefore it is not likely that this would be a cumulative problem. For these reasons, air quality was not selected for assessment.

- **Auditory environment**: As in the case of air quality, noise produced by the project will be mostly produced during construction activities. It should be localized and short term, and therefore not cumulative. Additionally, the communities did not identify this as a concern during the stakeholder interviews.

1.8 *CUMULATIVE IMPACTS MANAGEMENT FRAMEWORK*

IFC establishes the following good practices for managing cumulative impacts by the private sector:

- Effective application of the mitigation hierarchy (anticipate and avoid, minimize, manage, and compensate/offset) in the environmental and social management of the specific contributions of a project to expected cumulative impacts, and

- Undertake best efforts to engage, leverage, and/or contribute to a multi-stakeholder collaborative approach in the implementation of the management measures that are beyond the capacity and responsibility of the private project developer (IFC 2013).

The management measures proposed by INGELSA in the provided documents as well as the management procedures established at the MEZAPA Project were assessed to identify measures that are useful to mitigate impacts, including the cumulative impacts.

1.8.1 Limitations

IFC's rapid cumulative impact assessment methodology takes into consideration the limitations that a private developer or private sector financial institution may face carrying out this type of analysis, including: (i) limitations of the institutional capacity of the national and regional government; (ii) incomplete information about other projects and activities (for example, the information is not available in the public domain); (iii) uncertainty with respect

to the implementation of future projects; (iv) lack of national or regional strategic plans or use of resources; (v) limited baseline information on VECs; and (vi) biased or incomplete stakeholder information due to lack of a formal census and/or household survey data.

1.9 *ASSESSMENT OF CUMULATIVE IMPACTS ON VECS*

Water Resources

Water resources considered as VECs in the area of study are those identified by the communities because of their use for drinking water or for fishing activities. During the interviews, members of the community mentioned that fishing activities are mostly carried out as a recreational and not as means of subsistence.
All communities interviewed indicated they use water from streams for water consumption, none of these communities mentioned the Jilamito river as a source. The communities of Jilamito Viejo reported their water source is El Naciente, which is located outside the Jilamito sub-basin; the community reported their water source is the stream of *El Eden*.

Water for recreational uses includes an area of natural pools in the Jilamito River, *Balneario Los Cocos*, located in the community of Jilamito. Communities interviewed did not report problems with the drinking water or issues with the Mezapa river, where the MEZAPA plant operates.

In summary, no cumulative impacts have been identified for water resources at the moment and it is unlikely that there will be if the project promotor continues monitoring the MEZAPA project as they have, and also implements the same environmental measures in the Jilamito project. Important monitoring programs to be implemented for Jilamito include monitoring water temperature, sediment discharges into the rivers and aquatic species monitoring.

Vegetation Cover and Biodiversity

Vegetation cover is considered a VEC in the area mostly because of the TEXIGUAT reserve which is located upstream of the hydroelectric projects Jilamito and MEZAPA. The catch basins of both projects are located inside the TEXIGUAT. It is important that the project promotor works with the local municipality (Municipio de Arizona) and local NGO PROLANSATE, which are both co-managers of the TEXIGUAT.

Both projects could have positive cumulative impacts on the vegetation cover if they are managed according to the existing agreements with the communities and cooperatives (CALIJINUL) and continues monitoring the extraction activities. These agreements are described in detail in the Social Consultations chapter.

1.10 *CUMULATIVE IMPACTS MANAGEMENT FRAMEWORK*

Effective application of the mitigation hierarchy (anticipate and avoid, minimize, manage, and compensate/offset) in the environmental and social management of the specific contributions of a project to expected cumulative impacts is recommended as best practice.

The actions and measures described in this Section should be addressed by the project developers (INGELSA as well as SEMSA) to properly manage their contributions to cumulative impacts at a project level.

Water Resources

The current Water use permit, *Contrata de Agua*, has been obtained and water use volumes monitored to estimate the project's water usage by source throughout construction and operation phases.

Potential impacts on surface drainages and seasonal watercourses should be monitored following international good practice, particularly where these provide water that supports communities, agriculture and livestock production.

It would be valuable for the project investors and project sponsors to have a robust baseline on water resources in order to be able to evaluate any future claims of reduced availability or degraded quality as a result of the projects.

Vegetation Cover and Biodiversity

In addition, the impacts of the construction and operation of the project and associated facilities should be monitored and the projects should be required to demonstrate how they work with local authorities and NGOs to achieve no net loss of natural habitat and how they compensate for losses.

1.11 *REGIONAL STRATEGIES*

While the individual actions recommended in minimize an individual development's contribution to cumulative impacts, the overall management of cumulative impacts must be the responsibility of multiple projects and activities and requires a collective approach. If individual actions are not sufficient to mitigate cumulative impacts, collaborative efforts, usually at a regional level, are required (IFC 2013). The approach of the collaborative efforts depends on the complexity of the cumulative impacts and could range from information exchanges and networking to multi-stakeholder working groups and regional planning initiatives (Franks et al 2010).

Ideally, Cumulative IAs should be lead and developed by national or regional governments that have leverage over government agencies and private developers to obtain VEC or project-specific information and, afterwards, identify contributors and establish the mechanism to apply any proposed management strategies. Good practice includes support of cumulative impact strategies by private developers and financers.

The regional cumulative impacts management initiative could be defined and enacted through a regional working group which would operate under a Memorandum of Understanding. Stakeholders involved in the discussion and creation of the working group

should include government agencies, international organizations, Affected Communities, local industries, and project developers and financers present in the region.

Roles and responsibilities of each stakeholder should be clearly defined at the beginning of the planning process to establish and maintain a constructive relationship among involved stakeholders. The regional initiative should be engaging and communicate roles, strategies and actions to other stakeholders and interested parties.

A preliminary list of issues that could be covered by the working group includes:

- Establishing regional thresholds of VEC conditions in a collaborative process.
- Conducting a more detailed and thorough community-level surveys within the boundaries of each project in the region. Information which should be collected and analyzed includes: population, informal land demarcations (including for housing and agriculture), living cultural heritage locations, number of potential eligible workers, needs and expectations. This type of survey could also be conducted as a means to establish stakeholder baseline for community investment needs assessments, and it would allow the project proponents the opportunity to engage about project activities which could impact communities (including traffic safety, noise).
- Local recruitment and employment strategy and planning to coordinate local stakeholder employment, training and development, including for suppliers. Explore joint development initiatives.
- Community investment plans and potential for development of a Joint Community Investment Fund managed by a third-party and in partnership with the regional government which would allow for the coordinated planning and implementation of strategic community investments (e.g. water access, road improvements, new hospital, and education improvements.)
- Coordinate the location, construction schedules and mitigation of impacts for associated facilities such as access roads, transmission lines, and substations.
- Standardize practices and synergies of mitigation and monitoring measures such as a collective bird monitoring network in lieu of individual field monitoring efforts.
- Land use zoning in the region; including means to document existing land use patterns and informal ownership.
- Local water users and existing plans and needs of the local water authority.
- Coordination on security provision for project areas including appropriate training programs for local community members to enhance employment opportunities.

- Coordination between finance institutions in project monitoring and collaborative environmental and social management systems (ESMS).
- Exchange of environmental and social data between stakeholders.
- Coordination of a high level cultural heritage baseline assessment across the wider study area with proper government and community stakeholders.
- Reporting and disclosure of information to Affected Communities to better manage local expectations and foster a transparent process.
- Follow up and update the Cumulative IA as other projects are added, commissioned, or abandoned. It is important to note that Cumulative IAs are not static analysis. ERM recommends that the analysis be updated periodically (e.g. typically every 3 years).

The regional working group could also have several sub-committees which would allow for more timely and consistent interaction. For example, the Community Liaison Officers assigned by each of the developers and generally responsible for one project each could meet to discuss common themes and explore methods for consistent messaging across the area. Having a timely implementation of regional initiative would result in:

- A more direct line of communication between stakeholders: government agencies, project developers, finance institutions, international organization, and Affected Communities.
- Early identification of key issues in a collaborative manner and coordinated solutions.
- Provide opportunity for the exchange of information and individual actions that could result in synergistic measures and a more productive use of resources.
- Better mitigation of negative cumulative impacts and enhancement of positive cumulative impacts.
- Engagement of Affected Communities in a more transparent manner, providing them meaningful and more accurate information of projects and therefore managing expectations.