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PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

APPUI À LA VALORISATION DU POTENTIEL AGRICOLE DU NORD
POUR LA SÉCURITÉ ÉCONOMIQUE ET ENVIRONNEMENTALE

(AVANSE)



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(AVANSE)

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ACRONYMS

22-CFR-216	Title 22 of the U.S. Code of Federal Regulations, Part 216, Environmental Procedures [for USAID]
AAA	Agro-Action Allemande
AVANSE	Appui à la Valorisation du potentiel Agricole du Nord, pour la Sécurité Économique et environnementale
CBO	Community-based Organization
CEPF	Critical Ecosystem Partnership Fund
CIAT	Comité Interministériel d'Aménagement du Territoire
CITES	Convention on the International Trade in Endangered Species
CSSR	Citadelle / Sans Souci / Ramier
DEED	Développement Economique pour un Environnement Durable
DINEPA	Direction Nationale de l'Eau Potable et de l'Assainissement
EC	Environmental Compliance
EMPR	Environmental Management Plans and Reports
FAO	Food and Agricultural Organization of the United Nations
FECCANO	Federation Des Cooperatives Cacaoyeres Du Nord
FFS	Farmer Field School
FoProBiM	Fondation pour la Protection de la Biodiversité Marine
FTF	Feed the Future
FY	Fiscal Year
GAP	Good Agricultural Practice
GCM	Global Circulation Model
GIS	Geographic Information Systems
GOH	Government of Haiti
IAEC	Information, Analysis, and Environmental Compliance unit
IDB	InterAmerican Development Bank
IBA	Important Bird Area
IEE	Initial Environmental Examination
IHSI	Institut Haitien de Statistique et d'Informatique
IP	Implementing Partner

IPM	Integrated Pest Management
IR	Intermediate Result
ISPAN	Institut de Sauvegarde du Patrimoine National
IUCN	International Union for the Conservation of Nature
LANDSAT	Land Satellite
LOP	Life of Project
MARNDR	Ministry of Agriculture, Natural Resources and Rural Development (in French)
MDE	Ministry of the Environment (in French)
MPA	Marine Protected Area
MTPTC	Ministry of Public Works, Transportation and Communications
NGO	Non-governmental Organization
NRM	Natural Resource Management
OTI	Office of Transition Initiative
PEA	Programmatic Environmental Assessment
PERSUAP	Pesticide Evaluation Report & Safer Used Action Plan
PIF	Plants Issued from Fragments
PISA	Produits des Iles, S.A.
PN3B	Parc National des Trois Baies
PO	Producer Organization
RFP	Request for Proposal
RoW	Right of Way
SIBA	Système d'Incitation via les Bons d'Achat, AVANSE voucher program
SME	Small- and Medium-sized Enterprise
STD	Sexually Transmitted Disease
SWMB	Sub-Watershed Management Body
SWMP	Sub-Watershed Management Plan
USAID	U.S. Agency for International Development
WIDECAST	Wider Caribbean Sea Turtle Network
WUA	Water User Associations

UNITS OF MEASUREMENT

Gds	Gourdes
-----	---------

ha	hectare
km	kilometer
m	meter
MT	metric ton
USD	US Dollars

1. SUMMARY

This Programmatic Environmental Assessment (PEA) has been prepared by Feed the Future North (AVANSE) for all of its activities in accordance with the Environmental Threshold Decision Amendment 1 (LAC-IEE-14-17) to the original Initial Environmental Examination for USAID/Haiti Pillar B activities (LAC-IEE-11-14).

The amended IEE put most of AVANSE's activities out of compliance with 22-CFR-216, in that it shifted many activities that had previously been given a Negative Determination with conditions into a Positive Determination. Those activities had been functioning under the Environmental Mitigation Plan and Report (EMPR) (DAI 2013b) developed in response to the original IEE and approved by USAID in October 2013. However, the amended IEE made that EMPR "no longer valid" (Knight 2015b).

PURPOSE

AVANSE

As envisioned in the original scope of work, AVANSE is a five-year, multi-sectoral, USAID-funded project aimed at improving agricultural production in the Northern region of Haiti. The purpose of AVANSE is to increase agricultural incomes in Haiti's Northern Corridor, with the original objective to benefit 63,500 rural households, including 43,500 households with doubled agricultural income due to AVANSE assistance. AVANSE strives to fulfil its purpose and achieve its objective through key investments in, and technical assistance for farm productivity, natural resource management, marketing systems, agribusinesses, and agricultural infrastructure.

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

In accordance with the requirements of 22-CFR-216.6 and the IEE for AVANSE, the purpose of this PEA is to provide USAID decision makers with the following:

1. Assessment of the potential environmental impacts of all AVANSE activities (except those that were issued a Categorical Exclusion) and reasonable alternatives that could meet the purposes of AVANSE.
2. Assessment of the cumulative environmental effects, on a watershed level, of the large number of smaller interventions that AVANSE is promoting.
3. Based on those assessments, threshold recommendations for all AVANSE activities.
4. A recommended programmatic alternative for AVANSE.
5. Where applicable, provision of umbrella EMPRs for specific classes of AVANSE activities.

In addition, due to the specific context of the AVANSE project and the timing of the PEA, the PEA team and AVANSE staff developed multiple site-specific screening forms and several site-specific EMPRs which can be found in Annexes H-J.

Once this PEA is approved by USAID, AVANSE will once again be in compliance with 22-CFR-216.

ALTERNATIVES

This PEA assesses the Original Proposed Action, one action alternative and the No-Action Alternative. The action alternative was based on the Original Proposed Action as well as AVANSE's modified statement of work, allowing the project to address critical environmental issues while also meeting its program objectives.

ORIGINAL PROPOSED ACTION

The original proposed action corresponds to the project's original scope of work as presented in the FY15 work plan as well as additional activities identified by AVANSE staff¹ as likely to be undertaken during the remaining years of the project. The activities are as follows:

Intermediate Result 1: Agricultural Productivity Increased

- Promotion of Good Agricultural Practices through Farmer Field Schools for 4 target crops: rice, beans and corn (as a single cropping system), banana/plantain, and cacao
- Institutional collaboration to promote Good Agricultural Practices
- Support to nurseries and grafting
- Creation and capacitation of Water Users Associations for the management of irrigation systems
- Establishment of small-scale irrigation projects

Intermediate Result 2: Watershed Stability Improved

- Promotion of hillside stabilization through the use of agroforestry
- Support for sub-watershed management and governance
- Reforestation and land reclamation
- Support to nurseries and grafting
- Development of a Pigeon Pea value chain
- Protection of critical coastal zones
- Development of community cisterns for home gardens
- Pilot small-scale greenhouses
- Procurement of materials for civil protection authorities for emergency response to natural disasters
- Environmental education
- Health insurance for collaborating ir2 farmers

Intermediate Result 3: Agricultural Markets Strengthened

- Provide value chain and agro-enterprise analysis
- Improve business skills training and performance
- Improve private sector-small producer linkages and partnerships
- Facilitate market linkages
- Facilitate improved post-harvest handling, storage and processing

¹ Additional activities were identified during the first iteration of the PEA in February and March of 2015 and prior to the partial termination notice and modified statement of work.

- Promote the use of vouchers as a market-oriented subsidy mechanism
- Increase access to financial products
- Improve market information systems

Intermediate Result 4: Capacity Building Support to Implementing Partners

- Work with local IPs and beneficiaries to improve internal management procedures, financial systems and controls, human resources, strategic planning, and overall operations
- Prepare partners for direct awards from USAID under the FORWARD initiative
- Provides training to beneficiaries and partners to strengthen their general implementation capacity

Infrastructure

- Undertake all AVANSE infrastructure activities
 - o Irrigation projects
 - o Road rehabilitation
 - o Ravine stabilization
 - o Large-scale drainage construction

FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Based on a June 2015 partial termination notice and subsequent modified Statement of Work, AVANSE was instructed to stop implementation on a number of activities, including the maize and bean value chains and road rehabilitation and ravine stabilization work. The new focus of the project became three crop value chains (cacao, rice and plantain/banana), irrigation, some agroforestry/hillside stabilization (linked to irrigation), and some private sector market strengthening and post-harvest and processing support activities. The PEA team considered the new scaled-down project activities together as the focused activity package alternative.

NO-ACTION ALTERNATIVE

The No-Action Alternative for this PEA is different than for most PEAs, in that it does not assume no-action, but rather, no further action. AVANSE has been implemented for nearly two years, so it has taken many actions. The No-Action Alternative is, therefore, the termination of all future AVANSE activities.

COMPARISON OF ALTERNATIVES

The following table shows a relative comparison of the Original Proposed Action and the Focused Activity Package Alternative, using the No-Action Alternative as a baseline.

TABLE 1: COMPARISON OF ALTERNATIVES ACTIONS

Impact	Proposed Action	Focused Activity Package	No-Action
PHYSICAL ENVIRONMENT			
Soil Erosion	+1	+2	0
Effects of Agricultural Chemicals	+1	+2	0
Water Quantity	-1	-1	0
Water Quality	+1	+2	0
BIOLOGICAL ENVIRONMENT			
Natural Vegetation	-1	0	0
Effects on Aquatic Species	+1	+2	0
Three Bays Marine Protected Area	+1	+2	0
SOCIO-ECONOMIC ENVIRONMENT			
Increased Income	+2	+2	0
Increased Access to Markets	+2	+2	0
Historical and Cultural Resources	0	0	0

Rankings: -2 Strong adverse effect
 -1 Adverse effect
 0 Neutral or no change
 +1 Positive effect/benefit
 +2 Strong positive effect/benefit

PREFERRED ALTERNATIVE

The PEA recommends that the Focused Activity Package Alternative be the Preferred Alternative because it has the least environmental impact, will allow AVANSE to achieve its purpose, and can be implemented with relatively minor programmatic changes.

MITIGATION MEASURES

AVANSE is a large and complex program, so the PEA developed several umbrella EMPRs, as well as numerous site-specific screening forms, site-specific EMPRs, and associated mitigation measures to address the potential impacts of all of its activities. The PEA proposes three general levels of environmental review with associated mitigation measures: 1) no site-specific environmental review, but application of mitigation measures as required in umbrella EMPRs, 2) in-house site specific environmental review by AVANSE, and 3) site-specific EMPR review as per established LAC procedures. The first two categories will be covered by umbrella EMPRs included in this PEA as Annexes and approved by USAID at the time of approval of this PEA. A sub-set of category 3 (Grison Garde, Dubré and Bas Maribahoux irrigation systems and the Bas Limbé drainage site) will also be covered by site-specific EMPRs included as Annexes and approved by USAID at the time of approval of this PEA.

The activities recommended for no site-specific environmental review are:

- Non-infrastructure IR1 activities
- IR2 watershed stabilization activities

The activities recommended for in-house environmental review not requiring individual USAID approval are:

- IR3 processing facility grants for construction of less than 1,000 m² or for equipment installation
- Voucher program for fertilizer and other inputs and services
- Irrigation projects for less than 25 hectares reliant upon wells tapping the unconfined alluvial aquifer in the northern plain

The activities that will require site-specific EMPRs as per established USAID/LAC procedures are:

- Additional irrigation system rehabilitation (i.e., other sites beyond Grison Garde, Dubré and Bas Maribahoux) that does not increase surface water diversions
- Any IR3 processing facility grants for construction greater than 1,000 m²
- The following types of activities if they occur within the boundaries of the Three Bays Marine Protected Area:
 - Irrigation projects
 - IR3 production and processing facility grants

THRESHOLD RECOMMENDATIONS

As required by the amended IEE for AVANSE (LAC-IEE-14-17), the PEA provides recommended threshold decisions for all program activities (USAID 2014a, pp. 42-43) based on the analysis of environmental consequences.

CATEGORICAL EXCLUSION

- Intermediate Result 1: Agricultural Productivity Increased:
 - Institutional Collaboration
 - Capacitation and Creation of Water Users Associations
- Intermediate Result 2: Watershed Stability Improved:
 - Protection of Critical Coastal Zones (Planning and Governance support)
 - Environmental Education
 - Health Insurance for Collaborating IR2 Farmers
- Intermediate Result 3: Agricultural Markets Strengthened:
 - Provide Value Chain and Agro-Enterprise Analysis
 - Improve Business Skills Training and Performance
 - Improve Private Sector-Small Producer Linkages and Partnerships
 - Facilitate Market Linkages
 - Increase Access to Financial Products
 - Improve Market Information Systems
- All activities of Intermediate Result 4: Capacity Building Support to Implementing Partners.
- Information, Analysis, and Environmental Compliance Unit
 - All activities except Weather Stations

NEGATIVE DETERMINATION

- Intermediate Result 2: Watershed Stability Improved
 - Procurement of Materials for Civil Protection Authorities

- Information, Analysis, and Environmental Compliance Unit
 - o Weather Stations

NEGATIVE DETERMINATION WITH CONDITIONS

- Intermediate Result 1: Agricultural Productivity Increased
 - o Promoting Good Agricultural Practices through Farmer Field Schools
 - o Nursery and Grafting Support
 - o Establish small-scale irrigation projects
- Intermediate Result 2: Watershed Stability Improved
 - o Promoting Hillside Stabilization through Agroforestry
 - o Sub-Watershed Management and Governance
 - o Reforestation and Land Reclamation
 - o Nursery and Grafting Support
 - o Development of Pigeon Pea Value Chain
 - o Protection of Critical Coastal Zones (Mangrove Planting)
 - o Community Cisterns for Home Gardens
 - o Pilot Small-Scale Greenhouses
- Intermediate Result 3: Agricultural Markets Strengthened
 - o Facilitate Improved Post-Harvest Handling, Storage and Processing
 - o Promote the Use of Vouchers as a Market-Oriented Subsidy Mechanism
- Infrastructure
 - o Irrigation Projects not requiring increased surface water withdrawals
 - o Road Rehabilitation
 - o Ravine Stabilization

POSITIVE DETERMINATION

Two types of infrastructure activities were assessed in this PEA and found to have potentially substantial or significant adverse environmental effects that could not be mitigated with generic mitigation measures. These activities require further analysis and assessment of alternatives before a conclusion can be formed on the significance of their impacts; therefore they are recommended for Positive Determination.

- Irrigation projects requiring increased surface water withdrawals
- Major drainage construction

MAJOR CONCLUSIONS

The major conclusions of this PEA are as follows:

- By-in-large the environmental consequences of AVANSE are positive. IR1 activities with Farmer Field Schools and the IR2 activities with agroforestry, watershed planning and reforestation are the primary mechanism for the original target of benefiting 63,500 rural households. Both of these activities have introduced practices which have less impact on the environment than the pre-AVANSE farm practices. This has resulted in the use of less fertilizer; fewer, less toxic and less persistent pesticides; and less water per hectare for irrigation by IR1 beneficiaries. It has led to the adoption of soil conservation

practices by upland project beneficiaries, which will reduce runoff and erosion from their fields. As these practices spread via AVANSE's activities and lateral diffusion, there will be a net environmental benefit as well as economic benefit for northern Haiti.

- AVANSE activities will take place on areas already heavily altered by humans (crop land, existing roads, and eroding ravines and hillsides where the activities are aimed at stopping erosion). So AVANSE will have minimal impact on the few remaining natural areas or the cultural resources in northern Haiti.
- IR3 activities have the potential for negative environmental consequences, but all of the activities that have been identified so far are small-scale and the environmental impacts can be easily mitigated.
- The infrastructure projects (as envisioned based on the project's original scope) have the greatest potential to create negative environmental consequences. All of them involve large-scale construction, which can greatly impact the environment.
- Surface water availability associated with irrigation system construction or rehabilitation that increases the withdrawal of surface water is a major environmental concern. There are no water gauges on any of the rivers in northern Haiti, which means there is virtually no information on flow levels, but all indications are that although the rivers have extremely high flows during annual floods, the extremely low flows are common in the drier seasons, when irrigation water demand is at its highest. There are already examples of donor-funded irrigation projects taking water away from downstream users. Serious study of drier season flow at the diversion and downstream uses is critical before making any decision to support an irrigation system that proposes to increase withdrawals of surface water. Downstream environmental flow is also important, particularly on those rivers that flow into the Three Bays Marine Protected Area.
- With respect to the seven irrigation sites that were assessed, the following conclusions can be drawn:
 - o Grison Garde: The rehabilitation of the irrigation system at Grison Garde shows no significant potential impact on the hydrology. The Mornet River has sufficient water to sustain this irrigation system. The system won't withdraw more water from the river beyond the original capacity of its intake canal. Additionally, its environmental impact will be minimal with the application of SRI for rice production.
 - o Dubré: The Anba Lanba River has insufficient water to irrigate all of the extended irrigated area. The system should be designed to withdraw less water during the base flow season and more during wet months. There will be minimal environmental impact with the application of SRI.
 - o La Suisse: Similar to Dubré but the Mamanet River has insufficient water to irrigate the extended irrigated area. Implementing this construction will withdraw more water and may create conflict among upstream and downstream users. Therefore, the construction of this system should not be implemented.

- o Chalopin: There is insufficient water in the Marion River during base flow. Implementing the planned construction will withdraw more water and may create conflict among upstream and downstream users. Therefore, the construction of this system should not be implemented.
- o Garde Saline: The system, being on the lower end of the watershed, depends on the outflow from the upper watershed irrigation systems. During base flow, there is insufficient water to reach this area. Therefore, the construction of this system should not be implemented.
- o Robino: This system, which functioned in the past, was terminated in 2007 due to the construction of the Makimara intake by Agro Action Allemande. There is insufficient base flow in the Jassa River to irrigate more land without causing strains on other users. Therefore, the construction of this system should not be implemented.
- o Ferrier/Bas Maribahoux: The cleaning of the Trop Plein Canal will help carry flood water back to Jassa River downstream of the Ferrier/Bas Maribahoux rice fields. However, it will not bring more water for irrigation. Moreover, it must be cleaned over the entire length.

2. PURPOSE

As required by USAID's Environmental Procedures in 22-CFR-216.6(c)(2), this section specifies the underlying purpose and need to which USAID is responding in proposing the Proposed Action and its alternatives.

This Programmatic Environmental Assessment (PEA) has been prepared by Feed the Future North (AVANSE²) for all of its activities. AVANSE is a five year, multi-sectoral, USAID-funded project aimed at improving agricultural production in the Northern region of Haiti.

The Haitian agricultural sector plays an important role in the country's economy by providing economic and social support to the majority of people living in rural areas. Approximately 145,000 farm households depend on agriculture in the North and Northeast. Yet, the sector faces many challenges including low production and productivity for the main crops, lack of investments, and land degradation.

Agricultural productivity in Haiti has systematically declined in the last three decades. A shift to annual cropping on steep slopes has caused erosion and exacerbated flooding that affects the slopes, as well as the productive plain areas. The magnitude of flooding has increased, water supplies have become much more erratic, and both lives and livelihoods are under threat.

PURPOSE OF AVANSE

The purpose of AVANSE is to increase agricultural incomes in Haiti's Northern Corridor, with the objective to benefit 63,500 rural households, including 43,500 households with doubled agricultural income due to AVANSE assistance. AVANSE strives to fulfil its purpose and achieve its objective through key investments in and technical assistance for farm productivity, natural resource management, marketing systems, agribusinesses, and agricultural infrastructure.

LOCATION AND ACTIVITIES

AVANSE works across six watersheds in the Nord and Nord-Est departments on Haiti – Jassa, Marion, Trou du Nord, Grande Rivière du Nord, Haut du Cap and Limbé – plus two areas of cacao production, Borgne and Port Margot (see Figure 1). AVANSE focusses on five main crops that predominate in the low lying plains (rice, plantains/bananas, cacao, and maize and beans as a single cropping system). AVANSE also seeks to promote sustainable natural resource management practices in the upper watersheds through improved approaches to watershed management and investments in sustainable cropping systems that conserve soil and vegetation cover. AVANSE adopts a market oriented approach to stimulate micro, small and larger agro-enterprises. AVANSE also seeks to build the capacity of Haitian support institutions over the life of the project, so they can gradually replace direct project interventions and receive direct funding from USAID.

² The French name of Feed the Future North is Appui à la Valorisation du potentiel Agricole du Nord, pour la Sécurité Économique et Environnementale (AVANSE).

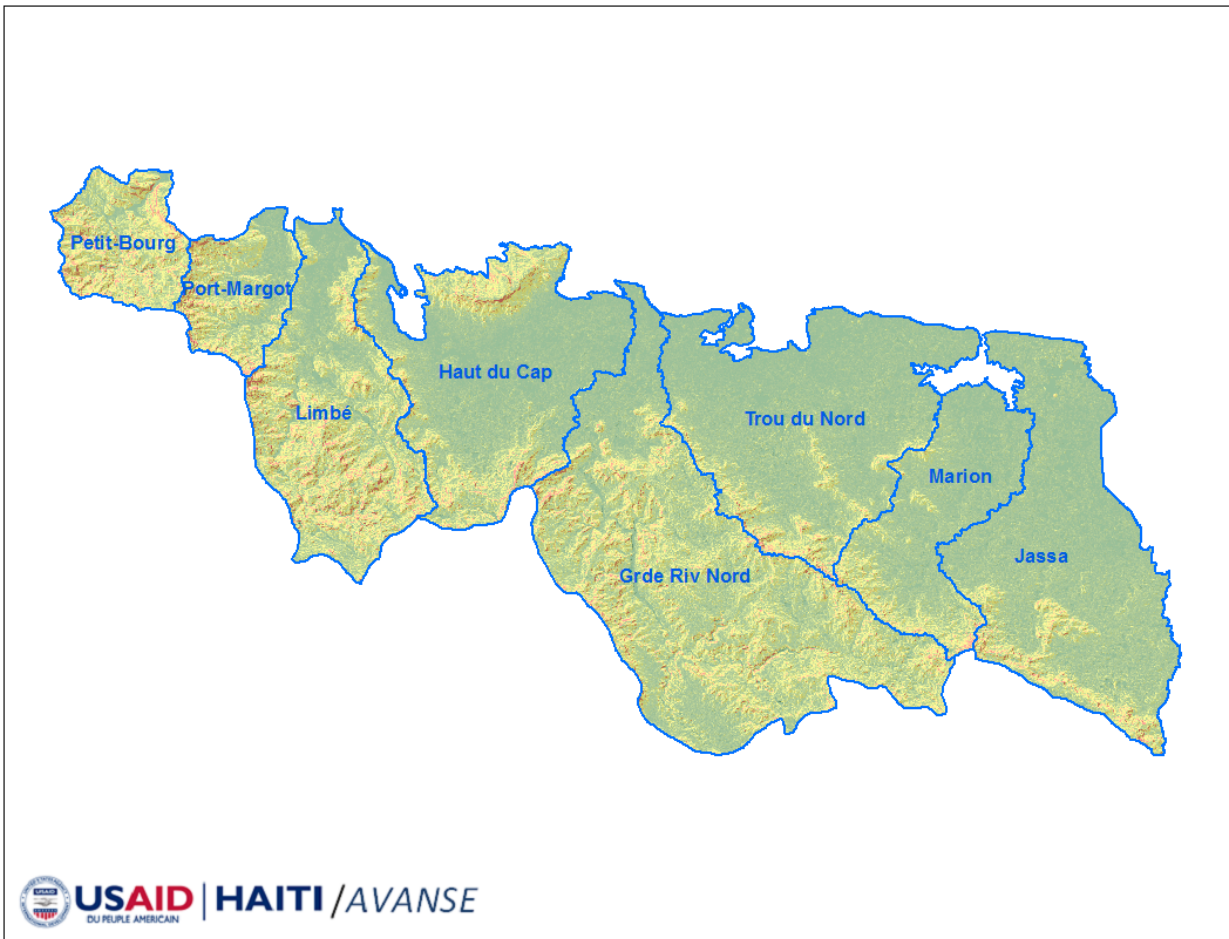


FIGURE 1: AVANSE PROJECT AREA WITH WATERSHED DELINEATION

AVANSE implements its activities through four Intermediate Results (IR):

IR1: Agricultural Productivity Increased introduces farmers to improved agricultural production technologies, strengthens agricultural extension and increases access to inputs. It also rehabilitates irrigation systems and increases the management capacity of the water user associations that manage the irrigation systems. The development hypothesis for this IR is that increased agricultural production and productivity will increase the quantity and diversity of available foods, contributing directly to higher nutrition outcomes. It will also boost incomes through sales and farm jobs, enabling households to increase consumption of nutritious foods and reduce income poverty.

IR2: Watershed Stability Improved responds to the fragility and environmental degradation of the upper watershed hillsides in the project area. It works with farmers and local governments to form sub-watershed management bodies and introduce key physical and biological measures to stabilize hillsides and combat erosion through farmer-level investments. This IR also works with local governments to increase their capacity for crisis management. The development hypothesis for IR2 is that stabilizing hillsides will both protect crops grown on the plains and

boost production of mango, cashew, avocado, cocoa and other crops. This will increase incomes and therefore enable households to increase consumption of nutritious foods and reduce income poverty; mango production spillovers to local consumption will also increase nutrition outcomes directly (vitamin A).

IR3: Agricultural Markets Strengthened aims to strengthen agricultural markets by improving transportation infrastructure and storage and processing facilities. It also increases access to financial products and market information systems. A substantial number of small- and medium-sized enterprises (SME) will require improvements to storage, processing and export facilities to support growth in agricultural production. Through this IR, AVANSE provides technical assistance and grants to SMEs involved in these market activities. The development hypothesis for IR3 is that strengthening agricultural markets will create additional sales channels for farmers and agribusinesses and create new off-farm jobs along the agricultural value chain. This will increase incomes and therefore enable households to increase consumption of nutritious foods and reduce income poverty.

IR4 Capacity Building and Use of Sub-awards entails working with and through local partners to further AVANSE's goal of strengthening Haitian organizations. AVANSE has engaged sub-awardees to implement the vast majority of project activities directly or indirectly. Not only are strong implementing partners (IPs) a means to achieving development goals, they are also in themselves some of the targets of AVANSE's development activities.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section presents the policy, legal and administrative framework under which this PEA is being prepared, both as required by USAID and by the Government of Haiti (GOH).

USAID

This PEA is being prepared in accordance with USAID's environmental regulations (22-CFR-216). Those regulations require that nearly all projects be subject to an Initial Environmental Examination (IEE). The IEE determines if an Environmental Assessment is required.

INITIAL ENVIRONMENTAL EXAMINATION

The activities of AVANSE were originally covered by an IEE that was approved in 2011 (LAC-IEE-11-14, in the bibliography as USAID 2011a). That IEE was amended in 2014 (LAC-IEE-14-17, in the bibliography as USAID 2014a). The amendment issued the following Categorical Exclusions:

- “(i) Education, technical assistance, or training programs except to the extent such programs include activities directly affecting the environment (such as construction of facilities, etc.)
- (v) Document and information transfers;
- (x) Support for intermediate credit institutions when the objective is to assist in the capitalization of the institution or part thereof and when such support does not involve reservation of the right to review and approve individual loans made by the institution.
- (xiv) Studies, projects, or programs intended to develop the capability of recipient countries to engage in development planning, except to the extent designed to result in activities directly affecting the environment (such as construction of facilities).

Capacity building of programs for Water User Associations (WUA).

Activities focusing on detailed physical/agricultural inventory of selected sub-watersheds.”

(USAID 2014a, pp. 41 and 42)

The amendment also made the following threshold recommendations:

“**Positive Determinations** are recommended for all Feed the Future North ... programs. Geographic based Programmatic Environmental Assessments (PEAs), generally at the watershed level, are recommended and will determine the threshold decision of all program activities. Within each watershed or select geographic zone, activities that normally require site specific EAs beyond the PEA would include:

- All agricultural work;
- Road and bridge construction, including select, larger scale rehabilitation work;

- Watershed conservation and management work;
- River re-channeling, dredging and stabilization;
- Pesticide Evaluation Report & Safer Used Action Plan (PERSUAP). An amendment to LAC-IEE-11-29, the Mission-wide PERSUAP is approved. It provides clear guidance on how, when and where to apply pesticides and any other chemicals for both livestock and crops.
- Construction of irrigation infrastructure;
- Construction of facilities.(including structures of more than 1,000 sq. meters);
- Bridge construction.

Because of the potential cumulative impacts from many small activities concentrated in a particular area, the PEAs of Feed the Future North and Feed the Future West follow on programs will analyze all of the following activities (that would usually be recommended for **Negative Determination with Conditions** threshold decision):

- Small agricultural infrastructures, such as feeder roads, small scale irrigation systems;
- Post-harvest processing facilities (storage warehouses, sorting, packaging and processing facilities);
- Small scaled agriculture production including livestock;
- Watershed revegetation/restoration
- Installation of soil erosion control measures;
- Repair of secondary bridges;
- Repair or installation of small scale water/sanitation systems;
- Rehabilitation of public buildings;
- Construction of small scale outdoor market facilities (less than 10,000 sq. ft footprint)
- Support to micro, small and medium size enterprises;
- Micro loans;
- River bank stabilization (i.e. gabion or revegetation) work;
- Rebuilding farmer assets through improving and/or diversifying their coping strategies.”

(USAID 2014a, pp. 42-43)

The amended IEE put most of AVANSE’s activities out of compliance with 22-CFR-216, in that it shifted many activities that had previously been given a Negative Determination with conditions into a Positive Determination. Those activities had been functioning under the Environmental Mitigation Plan and Report (EMPR) (DAI 2013b) developed in response to the original IEE and approved by USAID in October 2013 (Knight 2015b). However, the amended IEE made that EMPR “no longer valid” (Knight 2015b).

This PEA is being conducted in response to the Positive Determination made in the IEE as well as the direction in the IEE that the PEA “determine the threshold decision of all program activities.” In response to the latter need, this PEA has a section on “Threshold Recommendations” and includes the development of umbrella EMPRs for several classes of AVANSE’s activities.

The PEA also includes several examples of site-specific EMPRs. These EMPRs were developed with the engineering and environmental compliance staff of AVANSE, so that the PEA activity also provided some training in the preparation of EMPRs.

PURPOSE OF THE PEA

22-CFR-216 states that, “Program Assessments may be appropriate in order to assess the environmental effects of a number of individual actions and their cumulative environmental impact in a given country or geographic area, or the environmental impacts that are generic or common to a class of agency actions” (22-CFR-216.6(d)). AVANSE’s activities fall into both of these categories.

In accordance with the requirements of 22-CFR-216.6 and the IEE for AVANSE, the purpose of this PEA is to provide USAID decision makers with the following:

1. Assessment of the potential environmental impacts of all AVANSE activities (except those that were issued a Categorical Exclusion) and reasonable alternatives that could meet the purposes of AVANSE.
2. Assessment of the cumulative environmental effects, on a watershed level, of the large number of smaller interventions that AVANSE is promoting.
3. Based on those assessments, threshold recommendations for all AVANSE activities.
4. A recommended programmatic alternative for AVANSE.
5. Where applicable, provision of umbrella EMPRs for specific classes of AVANSE activities.

Once this PEA is approved by USAID, AVANSE will once again be in compliance with 22-CFR-216.

PEA METHODOLOGY

This PEA was conducted by the team presented in Annex A during an 8-week period in February through March, 2015. During that time the team reviewed an extensive collection of project materials and relevant literature (Annex B); held meetings with AVANSE staff, partners, stakeholders and beneficiaries; and conducted site visits at numerous AVANSE activity locations (Annex C). Data and information from the site visits (> 80 visits) were used to complete numerous site-specific screening forms as presented in Annexes H-J. The team reviewed the PEA for the WINNER project (Chemonics International 2011) which assessed similar activities in central Haiti and the original EMPR for AVANSE (DAI 2013b), and various site-specific EMPRs that have been developed for AVANSE activities under the original IEE (USAID 2011a). The team also reviewed the trip report generated by a visit to the AVANSE project area by USAID’s Regional Environmental Advisor for the Caribbean region (REA/Caribbean) in October 2014 (Schmidtke 2014). Subsequent to the initial PEA, a smaller, 3-person team conducted additional field visits and analysis in July 2015.

To assist the team in better understanding the socio-economic impact of AVANSE, the team Sociologist oversaw the implementation of a field survey. The field survey solicited information from focus groups on the impact of AVANSE activities on the physical and socio economic environment in the watersheds and the extension zones by using thirteen research guides developed during the Scoping phase (2). Members of the PEA team added questions to the guides according to their interest. The forms were all translated into Creole as they were going

to be used with farmers in the field. The survey was conducted by the AVANSE team of 24 surveyors, who were trained in the use of the guides by the team Sociologist. The results were prepared by the surveyors each day in French, for use by the PEA Team. Unfortunately, the survey was interrupted by other pressing AVANSE project needs, so that only 57 of the planned 60 focus group sessions were conducted, but still 284 beneficiaries were included in the survey.

TABLE 2: NUMBER OF FOCUS GROUPS TO WHICH QUESTIONNAIRES WERE ADMINISTERED

Survey Topic	Watershed					Cacao Areas			Total
	Jassa	Marion	Trou du Nord	Grande Rivière du Nord	Haut du Cap	Limbé	Borgne	Port Margot	
Rice	1	1			1				3
Rice Processing	1	1			1				3
Corn & Beans	1	1	1	1	1	1			6
Cacao	0	1			1	1	1	1	5
Cacao Processing					1	1	1	1	4
Plantain				1	1	1			3
Agroforestry	1	1	1	1	1	1			6
Forests	1	1	1			1	1	1	6
Wetlands	1					1			2
Mangroves	1	1	1	1	1	1			6
Coastal Resources	1	1	1	1	1	1			6
Infrastructure	1	1	1	1	1	1			6
Greenhouses			0	0	1				1
Total Groups	9	9	6	6	11	10	3	3	57
Total Individuals	45	45	25	25	64	50	30		284

The team benefited from the fact that AVANSE had been operating for 23 months at the time of the assessment and has already substantially designed and implemented its activities and generated project level and regional data and information. The team used the AVANSE FY15 work plan (DAI 2014c) as a basis for identifying project activities, and interviewed IR Team Leaders and the Team Leader for Infrastructure to identify potential future activities that were not generically included in the FY15 work plan.

Sites for PEA Team field visits were chosen to help Team members evaluate the range of possible activities, environmental conditions and potential environmental impacts in the AVANSE project area. Key objectives of field visits were to clarify and gather details on the potentially significant issues identified in the Scoping Statement (DAI 2014a); identify additional issues not described in the Scoping Statement or not previously encountered; and develop practicable mitigation measures, including measures not yet identified in previously developed EMPRs. Subsequent to the field visits, the team worked with knowledgeable AVANSE staff to

gather additional information and data and to analyze specific sites. This step resulted in the development of over 25 site-specific screening forms as presented in Annexes H-J. Additional field visits were also conducted by a smaller PEA team in July 2015 in order to finalize the PEA in accordance with a technical direction memo issued by USAID on June 24th, 2015.

GOVERNMENT OF HAITI

Several Government of Haiti laws, regulations and policies are relevant for this PEA. The two most important, however, are the Haitian Environmental Action Plan and the 2006 Framework Decree on Environment.

HAITIAN ENVIRONMENTAL ACTION PLAN

The Plan d'Action pour l'Environnement was part of Haiti's response to the 1972 United Nations Conference on the Human Environment in Stockholm and the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. It integrates environmental protection with economic and social development policies and activities and established a 25-year (1999-2024) Environmental Action Plan specifying policies for environmental protection.

2006 FRAMEWORK DECREE ON ENVIRONMENT

The Framework Decree on Environment, Décret Cadre sur l'Environnement was promulgated on January 26, 2006. It represents a major step in terms of prospects to solve jurisdictional conflicts in environmental management, and provides a legal foundation for a national policy on the environment and for environmental management in Haiti. Article 56, Chapter IV of the decree states that "Policies, plans, programs, projects or activities likely to have impact on the environment must be subjected to an environmental assessment...." Implementation of the decree, however, poses major challenges, and to date no regulations for environmental impact assessment have been promulgated.

OTHER LAWS, REGULATIONS AND POLICIES

There are many other Haitian laws that deal with the environment. These include:

- The Haitian Constitution (Chapter II, Title IX);
- Ministerial decree of July 10, 2013 prohibiting the exploitation of mangroves;
- Decree of October 8, 1992 proclaiming public utility 15 water points;
- Decree of March 3, 1981 creating framework law governing waste management and elimination;
- Decree of October 27, 1978 on fishing; water pollution, natural resource conservation, protected areas, and species protection;
- Decree of November 20, 1972 proclaiming reforestation activities of general interest and public utility;
- Decree of March 18, 1968 naming National Parks, National Sites, Natural Sites: all forested areas or parks on which historical or natural monuments will be established;
- Haitian Rural Code of 1962;
- Law of September 19, 1958 protecting soil erosion determining area extent and regulating forest management;
- Decree of March 17, 1950 proclaiming public utility big irrigation, drainage and land improvement works;

- Decree-law of June 27, 1945 submitting to an existing authorization the cutting, debarking, and incision of pine, mahogany, oak, gaiac, bayahonde, logwood, cedar;
- Decree of August 29, 1944 protecting the creation or the extent of swampy areas;
- Decree of July 24, 1937 on phytosanitary conditions required for seed introduction, plants or part of the plant;
- Decree of August 5, 1937 establishing special rules related to habitation and city and communal section management;
- Law of August 2, 1934 concerning flora and fauna protection against entry in the country insects, and disease transmitter agents;
- Decree of January 10, 1933 prescribing forest protection and conservation for public and private domains;
- Law of February 3, 1926 on reserved forests; and
- Several decrees ratifying international environmental conventions.

Government documents relevant to agricultural development include: 1) Le Plan National d'Investissement Agricole, 2) La politique de MARNDR en matière de gestion des bassins versants, 1999, 3) La politique de transfert de la gestion des systèmes d'irrigation aux irrigants, 4) Le draft de politique agricole and 5) Le draft de politique nationale pour la gestion des bassins versants

Application of existing laws and regulations, however, is an issue. Laws relating to the environment and natural resources are rarely acknowledged and applied by local government officials. Laws are not enacted at the local level for several reasons: 1) little knowledge of law among local officials and communities; 2) insufficient political or administrative skills to “dialogue” and apply the law; 3) inadequate resources to apply the law, in terms of equipment, human resources, access to legal services and budgets; and 4) lack of organization, ownership and flexible approaches among the local residents to defend, manage and conserve common property resources. (DAI 2013b)

4. AFFECTED ENVIRONMENT

AVANSE works across six watersheds in the Nord and Nord-Est departments on Haiti – Jassa, Marion, Trou du Nord, Grande Rivière du Nord, Haut du Cap and Limbé – plus two areas of cacao production, Borgne and Port Margot (see Figure 1). This section of the PEA describes the environment to be affected by the alternatives under consideration. The description focuses on general characteristics that are common across the eight watersheds and extension zones. Additional information on the specific watershed and extension zone characteristics can be found in chapter 6 below.

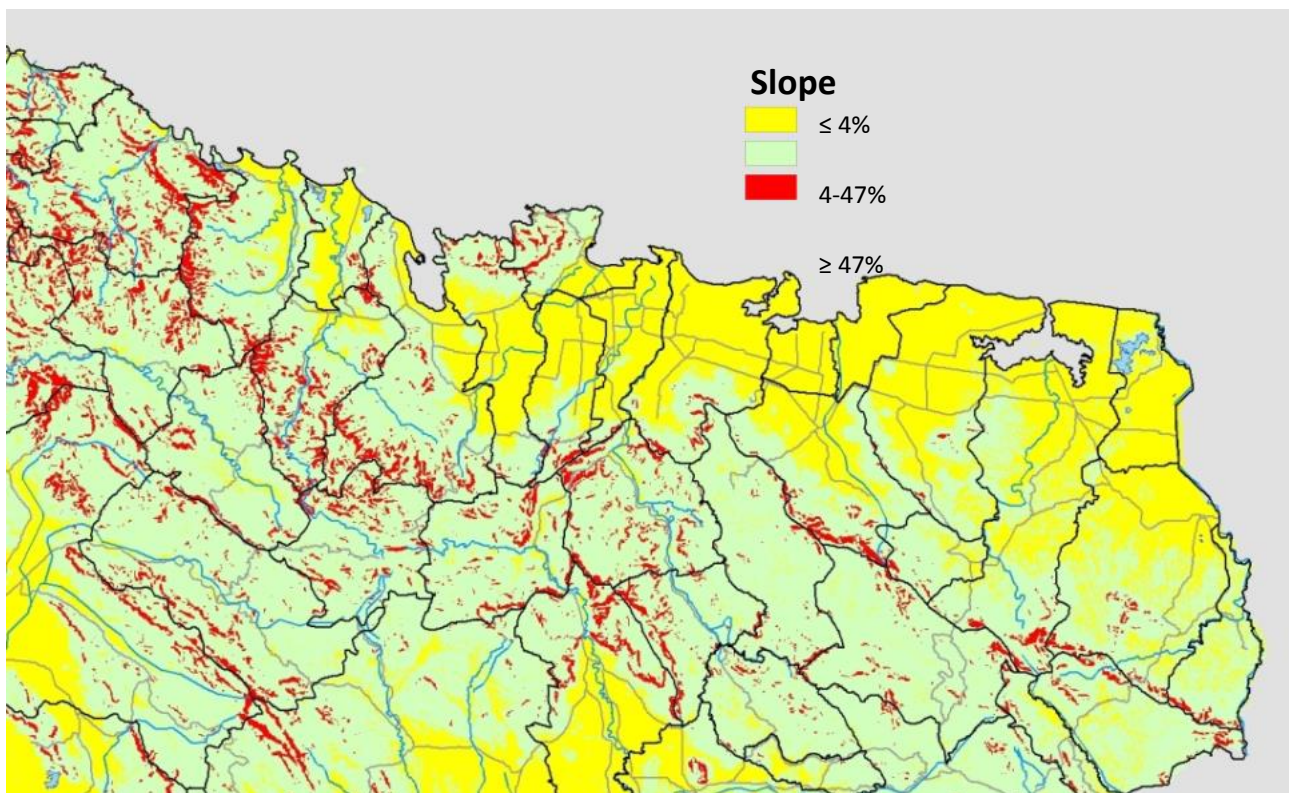
PHYSICAL ENVIRONMENT

TOPOGRAPHY

As one follows a north to south axis, the AVANSE watersheds and extension zones move from a flat coastal plain to hilly and mountainous terrain. The extent of the plain and the upland areas varies by watershed. Figure 2 divides the watersheds into three broad elevation classes. Grande Rivière du Nord, followed by Limbé, possesses the most upland area, while Trou du Nord, followed by Jassa and Haut du Cap, has the largest coastal plain area.

Slopes in the coastal plain are generally flat. Slopes in the upland areas can generally be divided into three categories: gentle (5-12%), moderate (13-30%), and steep (31-60%). Valleys are not uncommon in the hilly and mountainous regions; most valleys are found at an elevation of less than 300 m (Oxfam Québec and CATIE, 2011).

FIGURE 2: SLOPES IN AVANSE PROJECT AREA



Source: Adapted from ReliefWeb, <http://reliefweb.int/map/haiti/haiti-slope-17-feb-2009>

GEOLOGY AND SOILS

The underlying geology of the project zone is divided fairly evenly between sedimentary and igneous formations. About 60% of the geologic material is sedimentary with a limestone or alluvial base, while the remaining 40% of the material is igneous.

Again, following the division of the two main land types in the AVANSE intervention zone, soils can be divided into two broad categories: those found in the lowland coastal plain and those found in the upland areas. In general, soils in the coastal plains are alluvial, often with significant organic matter, and are considered to be good to excellent. In the uplands, the soils are derived from igneous rock (basalt, andesite, etc.) or sedimentary limestone and tend to be eroded and poor.

CLIMATIC CONDITIONS

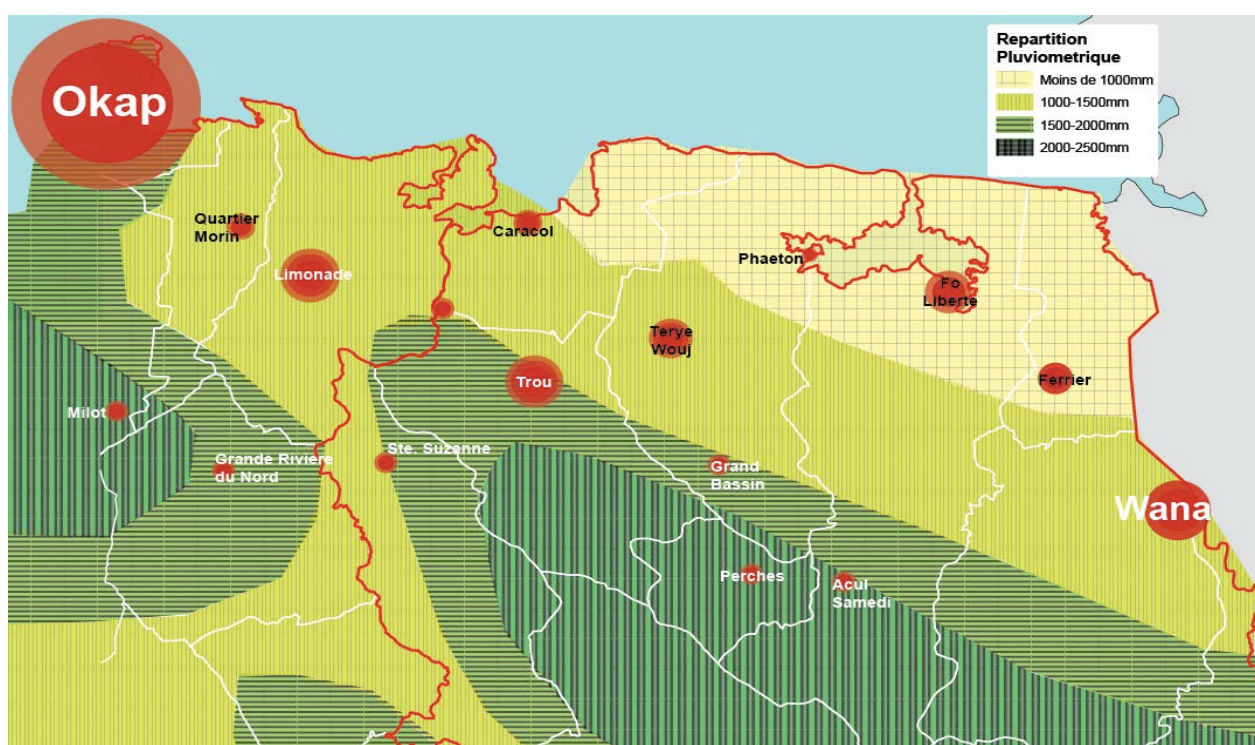
Current Climate

The average annual rainfall in the AVANSE project area is about 1,200 mm in the plains and 1,780 mm in the high mountains (Bayard, 2014). Annual average rainfall increases as one moves from north to south and from east to west. Annual rainfall varies from 800 mm to 1,900 mm in the plains of the Northeast and from 1,500 to over 2,000 mm in the North Department. Generally, precipitation in the region is bi-modal with the two rainy seasons occurring from September to January and April to June and drier periods from December to March and from

July to August, but all months receive some precipitation. The area can be divided into three rainfall zones:

- a drier sector in the northeast from Terrier Rouge to Ferrier where annual rainfall averages less than 1,000 mm and where there are two distinct dry seasons;
- a semi-humid sector from Trou-du-Nord to Ouanaminthe with average rainfall varying from 1,000 mm to 1,300 mm per year, with one less distinct dry season in the summer; and
- a humid sector comprising the Massif du Nord and the western part of the plain with average rainfall varying from 1,400 to over 2,500, depending on the altitude. In these areas, there are two distinct dry seasons (Bayard, 2014).

FIGURE 3: AVERAGE RAINFALL IN AVANSE PROJECT AREA



Source: AIA 2012

Average annual temperature in the coastal plain areas is 25.7° C and at higher altitude areas 22° C. At lower altitudes, average monthly temperatures range from 24° to 27.6° C while in the mountainous areas, they range from 21.1° to 24.9° C (Oxfam Québec and CATIE, 2011). Bayard (2014) reports an average annual temperature in the AVANSE zone of about 25° C; December and January are the coolest months, whereas July and August are the hottest ones.

Climate Change

Although rigorous scientific studies on climate change in Haiti are few in number and a high level of uncertainty remains, there does seem to be an emerging consensus on some impacts and effects.

- There is broad agreement on rising temperatures.
- Increased coastal flooding and salinization as a result of rising sea level is likely.
- It is likely that there will be changes in the seasons with the start and end of the rainy seasons being less predictable and the year-on-year variations in rainfall being even greater than they have been in past decades.

Projections with respect to quantity of rainfall are more difficult and are less certain; this is especially true for northern Haiti due to marked variations in topography that influence weather and climate over short distances.

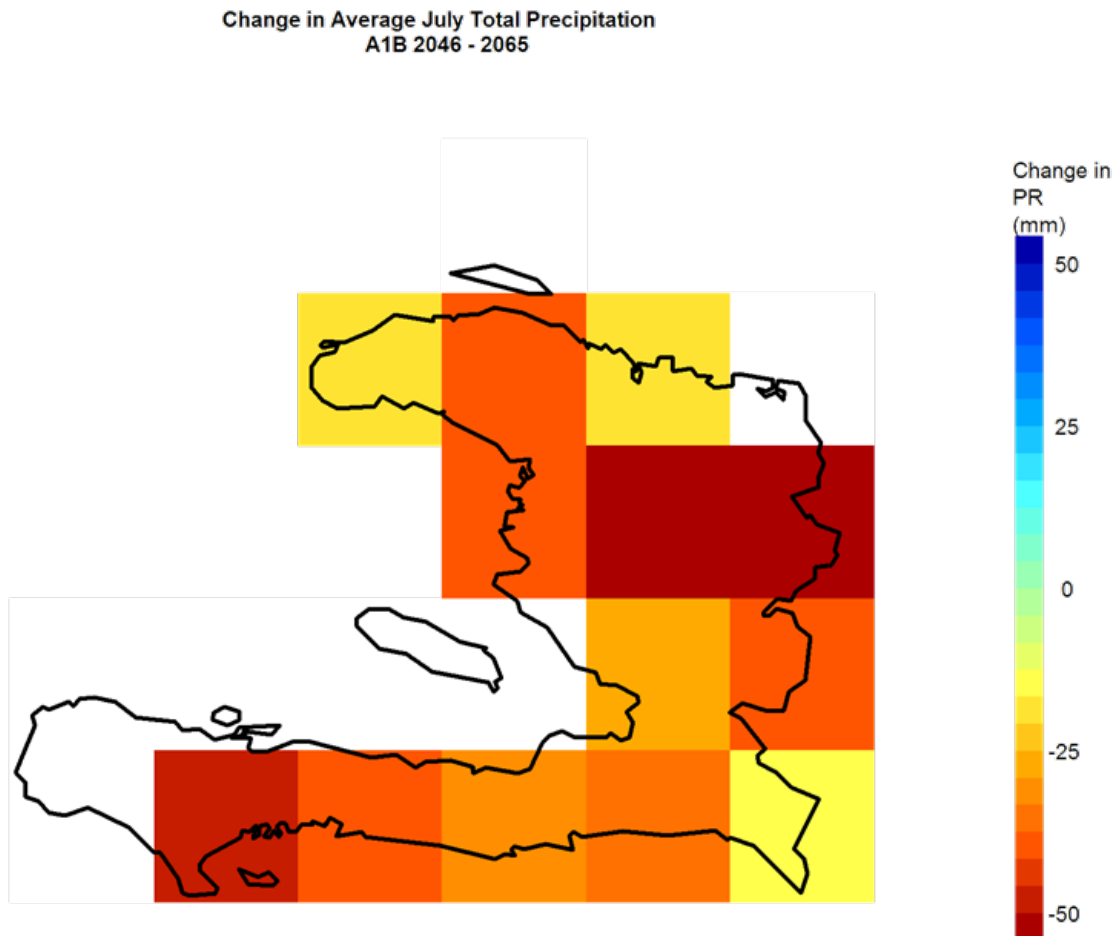
With respect to temperature, an average of 19 Global Circulation Models (GCM) projects an increase of 0.9° C by 2020 and 1.8° C by 2050 for Haiti (Eitzinger et al., 2013). In fact, increasing temperature is likely already occurring. A recent study on climate change in the neighboring Dominican Republic found an increase of 0.5 to 1° C during the past few decades. Projections for the Dominican Republic also show an increase of 1 to 2.5° C by 2050 (Tetra Tech, 2013). The World Bank (2011) reports temperature increases of 0.5 to 2.3° C by 2060.

In order to obtain localized data on climate change, we used the climate wizard tool (www.climatewizard.ciat.cgiar.org) for downscaled climate change projections for northern Haiti. This tool averaged 9 climate models together and produced annual and monthly projection results for the 2046-2065 period, based on a medium (A1B) emissions scenario. For the area covering approximately two thirds of the project zone, the tool yielded the following results:

- maximum average temperatures – increases of 1.5 to 2° C for yearly averages and the months of January and July;
- minimum average temperatures – increases of 1.5 to 2° C for yearly averages and the month of January and an increase of 2 to 2.5° C for the month of July; and
- average rainfall – a decrease of 0 to 33 mm for total annual rainfall, a decrease of 16 to 22 mm for July and an increase of 12 to 16 mm for January.

These trends are largely consistent with the studies cited above. An example of one of the maps generated by the climate wizard tool appears below in Figure 4.

FIGURE 4: PROJECTED CHANGE IN JULY PRECIPITATION, 2046-2065



Overall, GCMs predict a sea level rise of 6-8 cm by 2020 and 23-25 cm by 2050 (Tetra Tech, 2013). Some sources report more significant increases, with sea level rise for Haiti due to climate change predicted as 0.5 to 0.7 m in 2031; 0.7 to 0.9 m in 2051; and 0.8 to 1.1 m in 2071 (El Fouladi, 2012). Coupling these results with increased storm surge wave heights due to extreme meteorological phenomena could result in littoral losses of up to 10,370 ha (5% of total surface area) for the North Department and up to 11,294 ha (7% of total surface area) for the Northeast Department (El Fouladi, 2012). Projections with respect to sea surface temperature, based on data from the 1990s, showed increases of 0.8° C in 2031; 1.3° C in 2051; and 2° C in 2071 in the north of Haiti (El Fouladi, 2012). While there is still some debate on the effects of climate change on the number of hurricanes and storms that are likely to strike Hispaniola, there is widespread agreement that the intensity of these storms and accompanying rainfall will increase (Tetra Tech, 2013).

Most rainfall projections indicate a slight decrease in total annual rainfall for Haiti. Some studies indicate a significant decrease (up to 10%) during drier months (Eitzinger et al., 2013). This could be a limiting factor for crop production as it will increase soil water deficits and heat stress.

While overall rainfall projections for several locations in the Dominican Republic did not show a consistent trend, there was a decrease in rainfall in May and, for some locations, throughout the summer (Tetra Tech, 2013). Another source cites projected rainfall decreases in June-August (World Bank, 2011). Decreases in late summer, during one of the generally dry periods, will likely cause increased water stress for crops and decreased productivity.

Climate change effects on specific crops will likely be significant. The analysis by Eitzinger et al. (2013) shows a general decrease in areas suitable for coffee, especially at lower altitudes, and a substantial decrease in areas – up to 70% in some places – suitable for beans. Since there are many important ecosystem services associated with agroforestry systems, including coffee agroforests, switching to cacao agroforests will likely be a viable strategy to maintain these services in areas where coffee is no longer suitable (Eitzinger et al., 2013). Climate change in the region will not only strain agricultural systems but will have a negative impact on groundwater recharge due to increased evapotranspiration (Tetra Tech, 2013). Increases in temperature and drought, as well as increased rainfall variability, point to the need for more efficient water management (World Bank, 2011).

WATER RESOURCES

The AVANSE project area spans across 6 watersheds and two extension zones. Moving from east to west the watersheds are: Jassa, Marion, Trou du Nord, Grande Rivière du Nord, Haut du Cap, Limbé, Port-Margot and Borgne (Figure 1). Each of these watersheds is drained by a river of the same name.

One of the major constraints preventing proper assessment of the hydrology and the climate in the region is the lack of current flow and climate information. Inferences are made based on historical data and the estimated land use changes in the watersheds. Hydrometric information is fundamental in agriculture and for flood defense. It is essential to establish a network of automated meteorological and hydrological stations as has been recommended by the IDB and other development organizations.

All of the rivers and their tributaries flow from the mountains in the southern region of the project area, down to the sea in the north. The flow in the rivers, like the precipitation in the project area, is bi-modal with high flows in the two rainy seasons occurring from September to January and April to June and low flows in drier periods from December to March and from July to August. Due to deforestation and soil degradation, floods that were once rare, are now annual events and the flows in the dry season have become significantly lower (Haggerty 1991, Smucker et al. 2007, Posner et al 2010). With the overall reduction in sustained flow, many rivers may flow torrentially in the highlands, but dwindle to meandering streams in the lowlands due to evaporation and infiltration, and may not even reach the sea (USACE 1999), so that rivers that once flowed year round have become intermittent (Posner et al 2010). This has already had a significant impact on aquatic flora and fauna, an impact that may increase in the future as demand for water increases (Posner et al. 2010).

Many of the rivers in the project area used to have gauging stations, but all of these have long disappeared. The only period for which there seems to be measured flow data is from 1920 through 1940 (Ménanteau & Vanney 1997, Oxfam-Catie 2011). Very little flow data is reported in the literature, and much of that is contradictory.

All report, however a significant difference between average annual flow and minimum daily flow (drier season). The USACE data presented in Table 3 demonstrates this relationship. As can be seen in the table, the minimum flows that occur in the drier seasons range from less than 1% to 7% of the average flows.

TABLE 3: AVERAGE AND MINIMUM FLOWS ON PROJECT AREA RIVERS

River	Drainage Area (km ²)	Mean Daily Flow (m ³ /s)	Minimum Daily Flow (m ³ /s)	Minimum as % of Mean
Les Trois Rivières+	897	13.13	0.30	2.3%
Rivière du Limbé	312	4.29	0.30	7.0%
Grande Rivière du Nord	663	7.66	0.02	0.3%

* Jassa, Marion and Trou du Nord Rivers combined.

Source: USACE 199, p.13

The literature reports only two field measurements made in recent years, and they seem to bear out the observation that drier period flows are very small.

In summary, the current flow conditions in the rivers in the AVANSE project area are not well documented, but all indications are that they are extreme low during the drier seasons, when irrigation water is in highest demand.

No water quality information was found for the surface waters in the AVANSE project area.

One major lake is in the project area (Lagon-aux-Boeufs).

The major source of groundwater in the project area is the unconfined alluvial aquifer which lies under the northern plain. This aquifer is composed primarily of sands and gravels that have washed down out of the mountains and onto the plains for millions of years³. The aquifer grows in thickness from south to north, reaching nearly 300 meters near the ocean. It also flows from south to north. It is recharged from rainfall in the mountains, but possibly even more so from the biannual floods when they spread out on the plain. The aquifer is quite productive. The estimated sustained yield of the aquifer has been estimated to be 684,932 m³/day (about 8 m³/s).

BIOLOGICAL ENVIRONMENT

The vast majority of the AVANSE target area is composed of land already converted to agricultural use. AVANSE does not plan to expand into non-agricultural land for agricultural or construction projects. Its reforestation activities will be undertaken on degraded hillsides, and not in areas with natural vegetation. There are some natural areas near or downstream from the AVANSE target areas. Information on these areas is presented below.

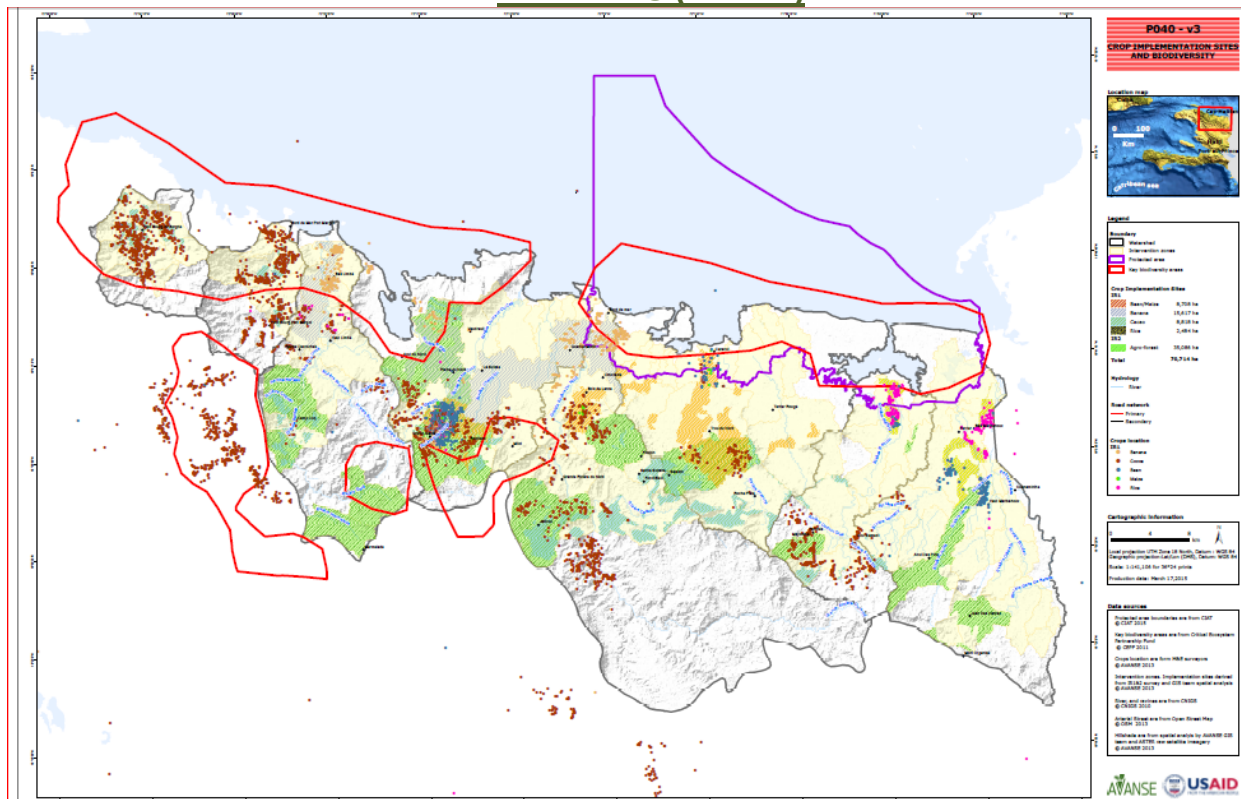
North and northeastern Haiti have a wide variety of ecosystems that provide critical habitats for numerous rare, threatened and endangered species including several endemics.

In northern Haiti some of the most important biological hotspots include the montane forests in the upper portions of the Jassa, Marion and Grande Rivière du Nord watersheds, the wetlands

³ The information on the aquifer comes from Evens et al. 2010 unless otherwise cited.

of the Lagon aux Boeufs in Jassa, and the mangrove, coral reef and seagrass marine ecosystems of the recently designated Parc National des Trois Baïes Marine Protected Area (PN3B).

FIGURE 5: AVANSE PROJECT AREA AND ACTIVITIES SHOWING PN3B (IN PURPLE) AND KBAS (IN RED)



Sources: CEPF 2011 for KBAs. CIAT 2013 for PN3B boundary

There are 26 threatened or endangered bird species in the northern region of Haiti. Nine of these are endemic to Hispaniola: one is critically endangered, three are endangered and five are threatened. Of the 17 threatened or endangered non-endemic species, 15 are breeding residents – of these, one is critically endangered, two are endangered and 12 are threatened; there is also one threatened breeding visitor and one threatened non-breeding visitor. Of the 26 species, 11 are found exclusively in upland forested areas, six are found in any forested habitat, six are associated with wetlands and coastal areas and three are restricted to lowland areas of scrub and open woodland. By any measure, these levels of endemism and degree of threat in such a limited geographical area are of international significance (DAI, 2014b).

The data available of the reptilian and amphibian fauna of northern Haiti is less comprehensive than that for birds. Nevertheless, there are several species that have been reported from the AVANSE area and some are extremely rare and potentially threatened.

Two native land mammals are known to still survive in Haiti: of the two, the Haitian Solenodon, Nez long (*Solenodon paradoxus*) is still believed to be found in northeastern Haiti (IUCN 2014). It is considered endangered with a dwindling range.

Key Biodiversity Areas (KBAs) are internationally important areas that are essential for conserving biodiversity. KBAs can comprise protected and unprotected areas of varying scales and are based primarily on internationally recognized databases and criteria for various taxa. The criteria generally include: 1) One or more globally threatened species; 2) One or more endemic species which are globally restricted to the site or surrounding region; 3) Significant concentrations of a species; and 4) Globally significant examples of unique habitat types and species assemblages (Langhammer et al. 2007, CEPF 2010). Haiti currently has 31 KBAs (CEPF 2011). Five KBAs are located in areas where AVANSE has activities:

1. Lagon du Nord-est, which encompasses PN3B;
2. Côtes du Nord with portions of the lower Haut du Cap and Limbé watersheds, as well as the Port Margot and au Borgne extension areas;
3. Citadelle/Grottes Dondon located in the upper reaches of the Grande Rivière du Nord and Haut du Cap watersheds;
4. Morne Baily located in the upper reaches of the Limbé watershed; and
5. Plaisance, southwest of the project area, but in an area where IR1 has significant cacao activities.

Please refer to Annex D for details on the IUCN red list of critically endangered, endangered and vulnerable species found in the 5 KBAs.

COTES DU NORD, LAGONS DU NORD-EST KBAS

The marine and wetland areas of the north and northeast includes coral reefs, seagrass beds, and mangroves (Figure 6) that are critical habitats for rare and endangered species ranging from corals and mollusks to fish, birds, reptiles and marine mammals. Several species are globally endangered and some of their last footholds are in this KBA.

FIGURE 6: MANGROVE (GREEN) AND CORAL REEF (RED) SYSTEMS OF NORTH AND NORTHEASTERN HAITI



Source: FoProBiM files

Area coral reefs also remain relatively healthy particularly in the area east of Cap Haitien despite the mass die-off of two of its primary builders, the IUCN Red Listed Elkhorn Coral and Staghorn Coral (*Acropora palmata*, and *A.cervicornis*), both critically endangered.

AVANSE area mangroves, although exploited for charcoal and fuel wood, remain relatively healthy. Various mangrove species are found throughout the coastal zones of the project area including Buttonwood mangrove (*Conocarpus erectus*), White mangrove (*Laguncularia racemosa*), Black mangrove (*Avicennia germinans*) and the most prevalent species, the Red mangrove (*Rhizophora mangle*). In a few rare areas the canopy cover can be very dense and some trees can reach 15 m in height. Mangroves provide numerous ecosystem services including carbon sequestration, protecting coastlines from erosion, temperature regulation, protecting human lives and livelihoods from extreme weather and oceanic events, and serving as nurseries and habitat for all types of marine, terrestrial, and avian life. See Table 4 overleaf.

Mangrove conservation and rehabilitation activities are taking place at several locations in the AVANSE project area. These are directly implemented by Community-based Organizations (CBOs) or in collaboration with NGOs. The activities have primarily targeted reforestation and controlling open access to mangrove resources – particularly cutting trees for poles and for making charcoal. Community policing has had a positive impact and the ecosystem's health appears to be improving, although charcoal production remains rampant in many areas. The motivation for most CBOs to undertake these activities was the realization that coastal flood and salt water intrusion was resulting in salinization of agricultural land and local aquifers, the

destruction of important fisheries habitat was occurring and local populations were being placed at increased risk of damage to property during storms.

TABLE 4: EXTENT OF MANGROVE FORESTS BY WATERSHED OR EXTENSION

ZONE		
Watershed or extension zone	Total areal extent of mangroves (ha)*	Located within PN3B MPA
Jassa	130	✓
Marion	171	✓
Trou du Nord	5,133	✓
Grande Rivière du Nord	139	✓
Haut du Cap	936	-
Limbé	178	-
Port Margot	22	-
Borgne	0	-
TOTAL	6,709	-

*Does not include linear mangroves (littoral mangroves zones less than 10 m in width)

Source: FoProBiM files

Interviews with fishing communities in Bas Limbé, Caracol, and Ft. Liberté underscored that marine resources are accessible to anyone – even outsiders. Despite the fact that there are fishing laws few fishers are aware of them, and even less currently willing to comply (DAI, 2014b). The lack of enforcement of these laws has created a situation where overfishing using inappropriate and often damaging methods year-long has caused a continuing downward spiral of catch quantity and sizes. Some local groups of fishers along with NGOs are trying to promote the use of fisheries methods which catch only larger mature fish.

Marine mammal diversity includes the Sperm (*Physeter macrocephalus*) and Humpback (*Megaptera novaeangliae*) whales, and various other cetaceans. The West Indian Manatee/Lamentin (*Trichechus manatus*) is an occasional visitor (IUCN listing: vulnerable). Manatees are observed sporadically and an average of around one per year is killed for consumption by local fishermen within the north and north-east departments. Another species of conservation relevance includes the Queen Conch/Lambi (*Strombus gigas*) which is Convention on the International Trade of Endangered Species (CITES) listed.

PLAISANCE, MORNE BAILLY, CITADELLE/GROTTE DONDON KBAS

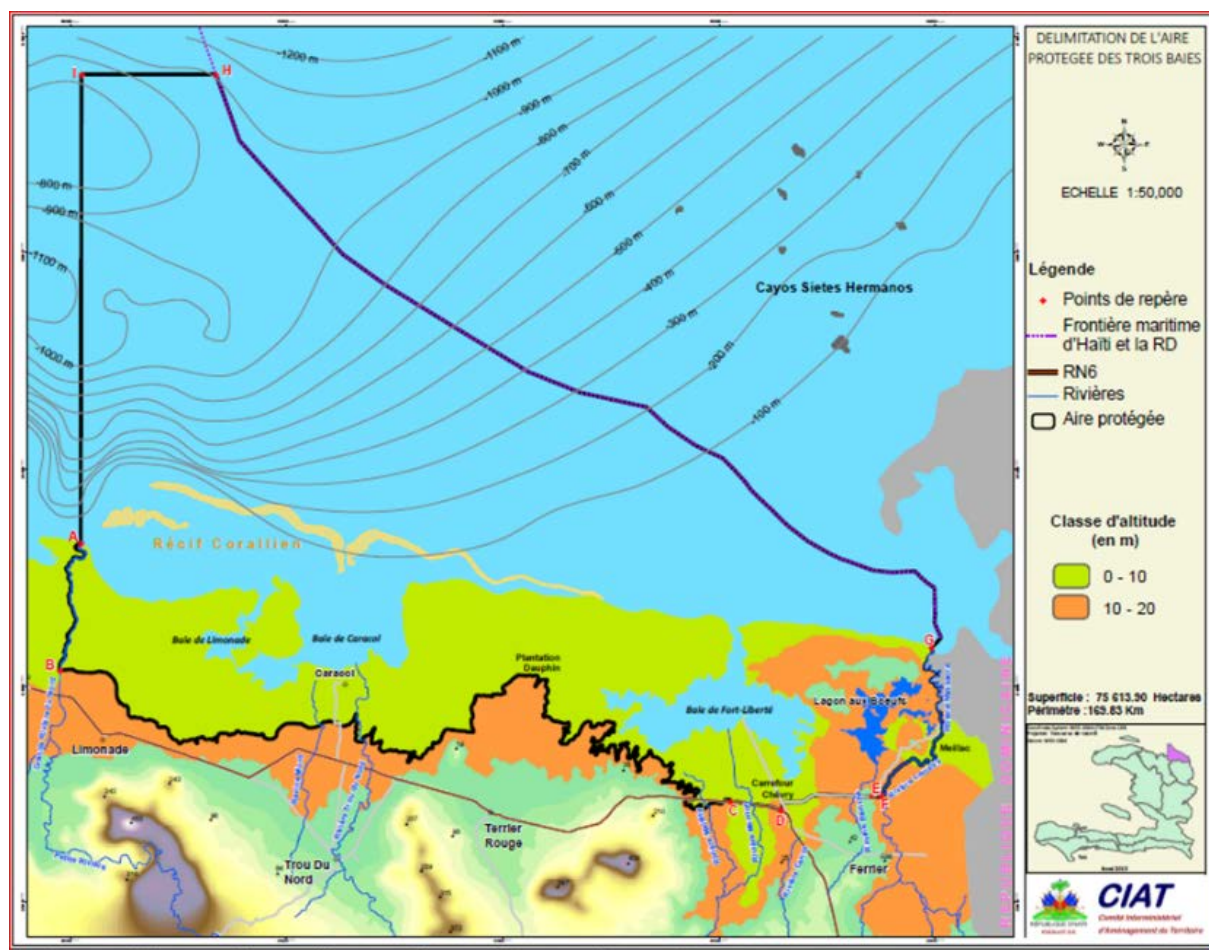
The Plaisance, Morne Bailly, and Citadelle/Grottes Dondon KBAs are located in the Massif du Nord mountain range which is a geological extension of Hispaniola's Cordillera Central. Rising from the coastal plain are karst limestone hills and outcroppings, some of which still support xerophytic broadleaf forest and wet broadleaf forest at higher elevations. These patches of forest (represented by the three key biodiversity areas) are poorly known, but support remnants of a unique assemblage of species including 11 globally threatened species. The integrity and long-term viability of these key biodiversity areas need to be ensured by increasing the biological connectivity, including through the agricultural landscapes. The vestige forests provide significant ecosystem services for the downstream agricultural communities, both in terms of forest products and freshwater provision and landslide/flood prevention. However,

these services could be improved through forest restoration and reforestation initiatives (CEPF, 2010).

PROTECTED AREAS

There are only two Protected Areas within the AVANSE project zone: the National History Park of Citadelle/Sans Souci/Ramier (CSSR) and the newly created PN3B. The PN3B was designated as an MPA by the Haitian government due to its recognition as an area of very high ecological importance. It was originally gazetted in December, 2013; this was subsequently revoked (and revised) by a corrected arrêté in March, 2014. With an often perfect combination of mangroves, coral reefs, and seagrass beds the PN3B is considered to be Haiti's most productive coastal and marine ecosystem. Mangrove and coral reef resources alone in this area are estimated to provide more than three billion dollars' worth of ecosystem services to the country. The park contains Haiti's second largest mangrove stand with more than 5,200 hectares, its second longest fringing reef at over 30 km, and thousands of hectares of seagrass beds (Wiener/OAS, 2013).

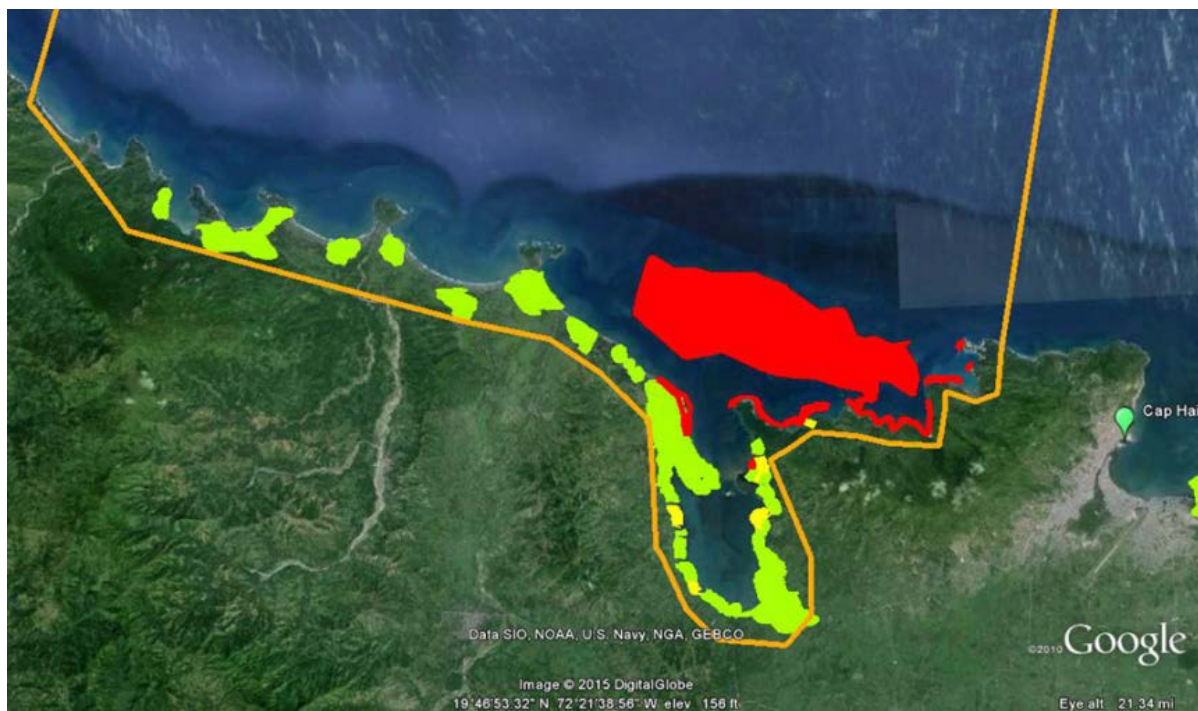
FIGURE 7: BOUNDARIES OF THE PARC NATIONAL DES TROIS BAIES



Source: Comité Interministériel d'Aménagement du Territoire (CIAT) 2013

The Acul /Côte du Nord site, also in the AVANSE target area, has been proposed by the Haitian Government, and the Fondation pour la Protection de la Biodiversité Marine (FoProBiM) as a marine managed area. The site encompasses the Côte du Nord KBA, and includes the area to the west of Cap Haitien extending from Cormier Beach to au Borgne. This area could be impacted by AVANSE activities in the Haut du Cap, and Limbé watersheds, as well as from the Port Margot and au Borgne extension zones. Current or planned activities may have downstream effects in this area. Overall, all six of the AVANSE targeted watershed as well as the two extension zones will either impact an already established marine protected area (the PN3B) or the proposed Acul/Côte du Nord MPA, and may have impacts on two upper watershed KBAs (Citadelle and Bailly).

FIGURE 8: PROPOSED ACUL / CÔTE DU NORD MARINE MANAGED AREA



Source: FoProBiM files

ADDITIONAL NOTES ON VEGETATION

The local flora in the AVANSE target area is a mix of native and introduced species. To the east of Cap Haitien dry Caribbean forest dominates the lower watershed areas; this area is now primarily occupied by smallholder farmers with some of the area left fallow and undergoing old field succession. What used to be Caribbean moist forest occupies most of the upper watershed regions in this area as well as areas west of Cap Haitien.

The upper Jassa watershed with adjacent parts of the upper Marion, and Grande Rivière du Nord watersheds, the far northwestern corner of the Port Margot and northeastern corner and eastern portions of the Borgne extension zones, and mangrove areas are the only zones of the AVANSE target area that have any remaining natural forest cover.

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

In Haiti, internal rural to urban migration has been steadily on the rise, and as a result rural areas have become depopulated in favor of urban areas. In 2005, about 58% of the Haitian population lived in rural areas as compared to 80% in the 1970s (IHSI 2009 and IHSI 1973). Table 4 presents the rural/urban distribution of population in the Northern Corridor by commune as well as the population density per square kilometer. Almost half of the Northern Corridor population is rural, but the percentage varies among communes. In Terrier Rouge, Fort-Liberté and Ouanaminthe, 27 to 40% of the population is rural. Caracol and Limonade have rural populations of 62% and 68% respectively and 86% of the population in Quartier Morin is rural.

TABLE 5: DISTRIBUTION OF POPULATION IN THE NORTHERN CORRIDOR

Communes	Population					Area (km ²)	Density (Pop/km ²)
	Rural	%	Urban	%	Total		
Quartier Morin	21,381	86	3,500	14	24,881	132	188
Limonade	34,145	68	16,004	32	50,150	60	836
Caracol	4,325	62	2,690	38	7,015	75	94
Terrier Rouge	7,486	27	20,091	73	27,577	171	161
Fort-Liberté	9,192	29	22,123	71	31,315	240	130
Ouanaminthe	38,265	40	58,250	60	96,515	199	485
Total North	114,795	48	122,658	52	237,433	877	271

Source: IHSI 2009

The mean size of the household in the AVANSE project area is 4.9 members (Table 5), which is consistent with other household surveys in Haiti. The number of people living in a household varies from 1 to 12. About 10% of households have less than 3 members. A majority of households (55%) in the study area have between 3 and 5 people.

TABLE 6: DISTRIBUTION OF FARM HOUSEHOLDS BY SIZE

Size	Number of households	Percentage
Less than 3 people	448	9.92
3 to 5 people	2,485	55.03
Above 5 people	1,583	35.05
Total	4,516	100%
Mean size of households	4.9 people	

Source: DAI 2014b

The distribution of population by gender in the Northern Corridor is 50% men and 50% women. There is little variance across communes, with Caracol having the highest percentage of men (53%) and Fort-Liberté and Ouanaminthe having the highest percentage of women (51%). (IHSI 2009)

LAND TENURE

Haiti has a domestic agricultural economy characterized by low level of landlessness and a low incidence of large, absentee-owned land concentrations (Murray 1977). A recent survey of project beneficiaries carried out by AVANSE shows that fifty-five percent of the farms participating in the project are between 1 and 3 hectares, with an average size of 1.87 ha (DAI 2014b). Farms under 1 ha represent 28%. Farms larger than 3 ha represent only 16% of the

total farms participating in the project. Farmers who operate more than 3 ha can be found in all watersheds covered by the project. Farmers in the study area cultivate on from one to more than 5 plots. About 64% of the participating farmers cultivate at least 2 plots.

TABLE 7: DISTRIBUTION OF FARM SIZE BY WATERSHED, IN PERCENT

Watershed	< 1 ha	1 to 3 ha	> 3 ha	Total
Jassa	12	73	14	100
Marion	13	62	26	100
Trou-du-Nord	15	61	24	100
Grande-Rivière	25	58	17	100
Haut-du-Cap	38	51	11	100
Limbé	51	40	9	100
Other (Borgne, Pilate, Port-Margot)	39	47	15	100
All sample	28	55	16	100

Source: DAI 2014b

Various land tenure patterns are depicted among the farmers in the AVANSE programs. They include ownership by purchase or inheritance, rental arrangements and sharecropping. Direct ownership is the most land tenure, with 82% of the plots cultivated by farmers being owned via purchase or inheritance.

TABLE 8: ACCESS TO LAND IN PERCENT

Watershed	Ownership by Purchase	Ownership by Inheritance	Rented Land	Sharecropped Land	Other	Total
Limbé	63	19	7	8	3	100
Haut-du-Cap	60	22	8	5	5	100
Grande-Rivière-du Nord	57	23	9	5	7	100
Trou-du-Nord	69	8	4	7	12	100
Marion	71	14	7	6	3	100
Jassa	70	14	8	7	1	100
Borgne & Port-Margot	70	16	9	2	2	100
Total	65	17	8	6	5	100

Source: DAI 2014b

LAND USE

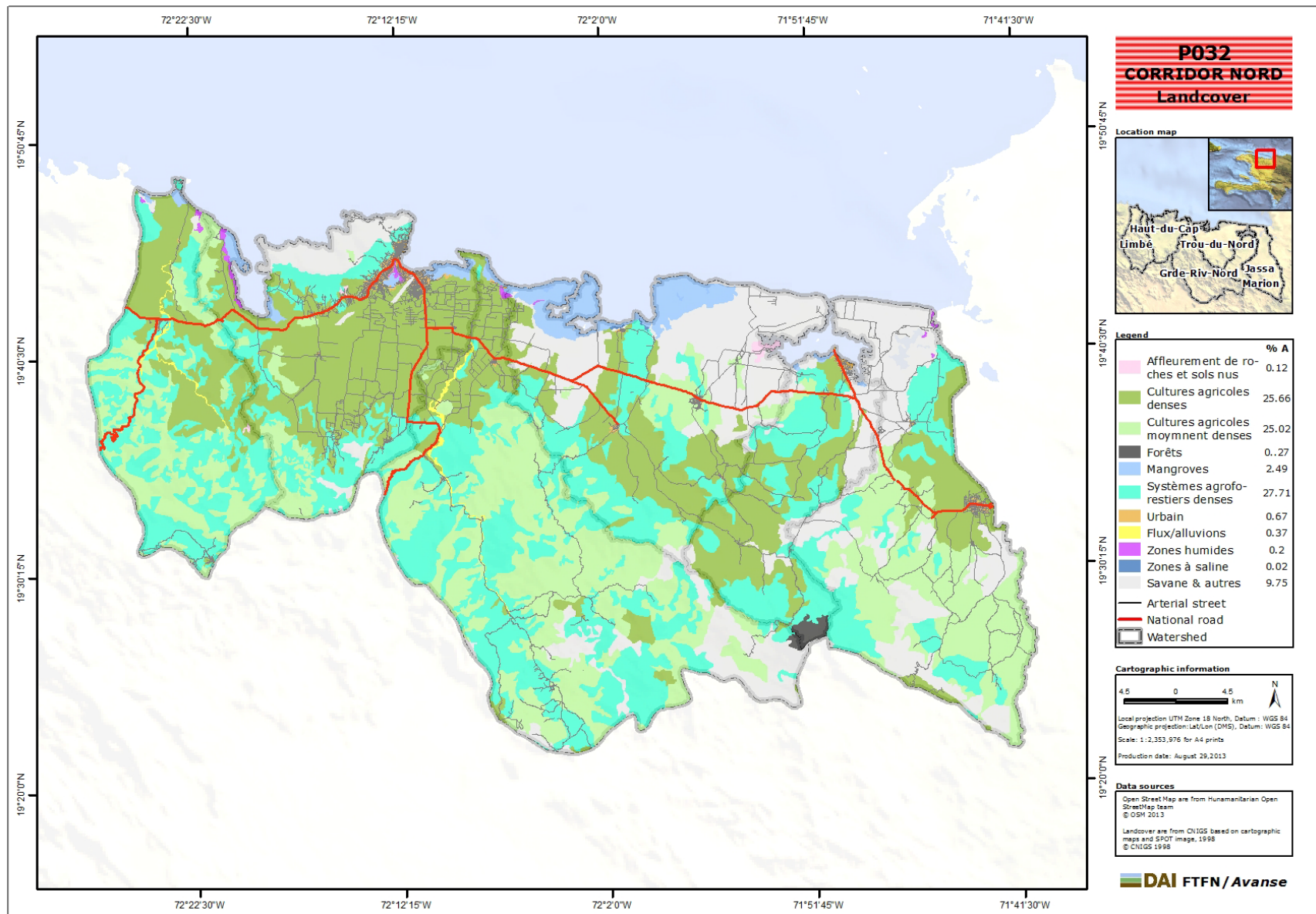
Agriculture is the primary land use in the Northern Corridor and all of AVANSE's activities are on agricultural land. Farmers produce food for their own consumption, but also generally sell at least a portion of their harvest as a cash crop. Agriculture in the region is generally practiced using traditional instruments such as hoes, machetes and axes by local residential families. Large scale industrial agriculture such as the Dauphin company in the 1970s and the old plantations located between Caracol and Fort-Liberté before the 1950s is largely no longer existent in the region.

TABLE 9: SUMMARY OF LAND USE AND LAND COVER IN AVANSE WATERSHEDS

Watersheds	Land Use & Land Cover (km ²)						Land area (km ²)
	Agro-forestry	Agri-culture	Pasture & Grassland	Forest	Mangrove	Wetlands	
Jassa	72	215	134			4	427
Marion	78	97	32	5	1		216
Trou du Nord	83	147	134		45	<1	424
Grande Rivière du Nord	224	335	63	1	2	<1	633
Haut du Cap	80	204	38		9	3	380
Limbé	127	181			2	2	316
Borgne	96	10	1	10			118
Port Margot	79	23	3	<1	<1		110
Total	839	1,212	405	16	60	11	2,624

Source: DAI 2014a

FIGURE 9: LAND COVER/USE IN THE AVANSE WATERSHEDS



Given the population pressure on agricultural land, soil fertility has been declining not only because of erosion but also because of the lack of fallow land, used by farmers for animal products, such as cows, goats, pigs, mules, and others.

ECONOMIC ACTIVITIES

Unemployment rates in the Northern Corridor are high: 34% for the Northern Department and 30% for the Northeast Department (IHSI 2009). Table 9 shows the occupational distribution of the work force in the Northern Corridor, with agriculture accounting for 54% of all economic activities. Agriculture is the principal occupation of 68% of the men and 30% of the women. Low level technology and the lack of capital hinder the growth or development of agriculture. Commerce is the second largest occupation, and largest occupation of women, employing 53% of the women. The other sectors are relatively small compared to these two sectors.

Total agricultural income of farm households in a recently conducted survey of AVANSE beneficiaries found an average household's net income of 443 USD per year (DAI 2014b). Seasonal crops that provide incomes to farmers in the region include pulses (beans, cowpea, pigeon pea and lima beans), cereals (maize, rice), roots and tubers (yams, cassava, sweet potato and malanga), bananas, plantains, peanuts, vegetables and sugar cane. Income from perennial crops includes cacao, coffee and numerous fruits (mango, citrus, avocado, coconut, cashew and breadfruit). However, income from fruits was not considered in the calculation of agricultural income.

**TABLE 10: OCCUPATIONAL DISTRIBUTION OF WORK FORCE IN THE
NORTHERN CORRIDOR BY GENDER**

Occupation	Total Work Force			% of Total Work Force		
	Men	Women	Total	Men	Women	Total
Agriculture	100,103	27,611	127,714	68.3	30.3	53.7
Fishing	1,701	104	1,805	1.2	0.1	0.8
Extractive Industry	301	62	363	0.2	0.1	0.2
Fabrication Industry	10,141	5,219	15,360	6.9	5.7	6.5
Electricity	369	7	376	0.3	0.0	0.2
Construction	7,665	84	7,749	5.2	0.1	3.3
Commerce	10,834	48,642	59,476	7.4	53.4	25.0
Lodging Industry	109	569	678	0.1	0.6	0.3
Transportation	4,342	138	4,480	3.0	0.2	1.9
Finance	775	108	883	0.5	0.1	0.4
Housing Industry	637	245	882	0.4	0.3	0.4
Public Administration	,774	633	2,407	1.2	0.7	1.0
Education	4,474	3,068	7,542	3.1	3.4	3.2
Health	1,156	1,130	2,286	0.8	1.2	1.0
Domesticity	507	2,922	3,429	0.3	3.2	1.4
Other	1,626	592	2,218	1.1	0.6	0.9
TOTAL	146,514	91,134	237,648	100.0	100.0	100.0

Source: MPCE 2007

HISTORICAL AND CULTURAL RESOURCES

The AVANSE project area is renowned for its historical resources, notably the World Heritage Site that includes the Citadelle Henry, the Site des Ramiers, and the Palais San-Souci in Haut du Cap. In addition, however, there are numerous other sites, some dating from the colonial era (pre-1804) and the early years of Haitian independence. Notable examples include the colonial forts at Fort Liberté and around the adjacent bay as well as religious sites from the colonial era at Caracol and elsewhere. Christopher Columbus' flagship, the Santa Maria, is reputed to have run aground off the coast of northern Haiti in the 16th Century and several wreck sites – one in the Baïe de Caracol – are claimed to be the remains of the ship. In addition to the historical sites, there are several cultural sites associated with religious activities.

HEALTH AND EDUCATIONAL FACILITIES

Table 10 shows the distribution of educational and health institutions in the Northern Corridor. The presence of these educational institutions does not guarantee residents' access to them because most of those schools are usually private.

TABLE 11: DISTRIBUTION OF INSTITUTIONS IN THE NORTHERN CORRIDOR

Institutions	Quartier Morin	Limonade	Caracol	Fort-Liberté	Ouanaminthe	Terrier Rouge	Total
EDUCATION							
Primary Schools	25	48	13	47	89	31	253
Secondary	3	13	1	11	19	6	53
University/superior	0	0		3	2	0	5
Vocational	1	11	1	2	19	6	40
HEALTH							
Hospital	0	0	0	1	0	0	1
Health Center	7	9	3	3	16	0	38

Source : IHSI 2009

Comparing the number of hospitals and health centers in Table 10 to commune population, one can observe the scarcity of health facilities for the residents of the Northern Corridor. A great majority of the residents do not have access to health facilities. Most Haitians rely on traditional medicine to quell sickness. Therefore, traditional healers occupy a rather prestigious place in Haitian society, particularly in the provinces.

WATER, SANITATION AND SOLID WASTE MANAGEMENT

In the Northern Corridor, piped water distribution systems exist for the cities of Caracol, Trou du Nord, Limonade, Terrier Rouge, Cap Haitien, and Ouanaminthe. The sources of water for these systems are both groundwater and surface water. These systems have deteriorated over time and lack sufficient of maintenance. However, a new project financed by the European Union has the objective to rehabilitate several of the existing water systems.

The rural areas are not served by piped water distribution systems. Rural residents get their water either directly from springs, rivers, hand-dug wells (using buckets on rope to extract water) or drilled wells with hand pumps. Most of the wells are in the unconfined alluvial aquifer underlying the northern plain.

There are no sewage systems in the AVANSE target areas. At best, pit latrines are used for human waste disposal, however, many families do not have access to pit latrines, so open defecation in the rural areas is common.

In general, waste is accumulated at certain locations in all communities throughout the commune and then burned after being collected at times by the mayor's office. There generally are no solid waste dumps. Local and Departmental authorities are considering a solid waste collection system and possibly a landfill for some areas, but no plan currently exists for solid waste collection.

TRANSPORT

The road network is very limited in the Northern Corridor. The Northern Corridor is crossed by RN 6 (Route 121) which goes from Cap-Haitien to Ouanaminthe. This road is brand new, however, most of the other roads are unpaved, rarely maintained and in poor condition. Transportation over short distances is generally managed on foot or by donkey, horse, or bicycle. Motorcycle taxis and minivans are utilized for longer distances. Cap-Haitien, the capital of the North region, has both air and port services that service the Northern Corridor.

GOVERNMENTAL SERVICES

There are very few Government services that are currently available at communal and even departmental levels. Most services are only available in Port-au-Prince in spite of 1987 Constitution's call for decentralization. Most of the laws regarding decentralization have not yet passed Parliament. As a result, local authorities, especially the mayors, cannot meet the requirements of their mandates. It is only recently that certain key services have been decentralized to the Departmental level. Hence in the Northern Corridor, most decentralized government services would be available in Cap-Haitian or in Fort-Liberté. Each commune has a town hall, a courthouse and a police station, but little else.

5. ORIGINAL PROPOSED ACTION, ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

As required in 22 CFR 216.6(c)(3), this section presents the Original Proposed Action (based on the original scope of work for AVANSE) and reasonable alternatives that meet the purpose and need of the Original Proposed Action, as well as the No-Action Alternative. This section also includes a brief description of the reasons for eliminating those alternatives that were not included in the detailed analysis. For the Original Proposed Action, this section presents general mitigation measures. Specific mitigation measures are presented in Annexes F-J of this PEA. It concludes with a comparative analysis of the environmental impacts of the Proposed Action and each alternative as well as a summary of the Preferred Alternative.

Also as required by 22 CFR 216.6(c)(3), this section provides the analytic basis for the comparison of consequences for the original proposed action and the alternatives. Consequently, it describes the environmental and social impacts of the Original Proposed Action and its alternatives, including the No-Action alternative. The consequences of the Focused Activity Package Alternative are described in detail on a watershed-by-watershed basis in Chapter 6 below.

RESULTS OF SCOPING AND SUBSEQUENT CONSULTATION

In compliance with USAID regulations, a Scoping Statement was prepared for this PEA (DAI, 2014a). The scoping statement identified the following potentially significant issues that should be addressed in the PEA:

- Land tenure
- Water availability
- Deforestation
- Pesticide use
- Wetlands
- Coastal and marine resources
- Pollution from agro-processing
- Cultural sites—including pre-colonial sites
- Gender equity (access to land and other assets)

During the preparation of the PEA, the team hosted a consultation attended by stakeholders from throughout the project areas (Annex E). The participants at the consultation added the following issues to the list of potentially significant issues:

- Soil erosion
- Soil quality
- Soil compaction
- Water quality
- Noise from road construction

The participants at the consultation also identified several positive benefits of AVANSE activities including increased agricultural incomes, reduced erosion and enhanced biodiversity associated with agroforestry and reforestation and reduced pollution from agricultural activities associated with introduction of good agricultural practices.

ORIGINAL PROPOSED ACTION

This PEA is unique in that it is assessing a project that has already been implemented since March, 2013. Therefore, the Proposed Action is based on the FY15 AVANSE work plan (DAI, 2014a) with the addition of activities identified by AVANSE staff as not being in the work plan but likely to be undertaken by AVANSE during the 5-year life of project (LOP).

INTERMEDIATE RESULT 1: AGRICULTURAL PRODUCTIVITY INCREASED

Under IR1, AVANSE focuses on increasing agricultural production of the five targeted value-chain crops: banana/plantain, cacao, maize and beans, and rice. AVANSE expects to have extended improved agricultural practices to approximately 30,000 farmers by the end of FY 2015, and to 43,500 farmers by end of project in 2016. The following description of AVANSE's activities under IR1 is derived from the project's FY 2015 work plan (DAI 2014c), with some modifications from discussions with IR1 staff and field observations.

Promoting Good Agricultural Practices through Farmer Field Schools

AVANSE uses the proven approach of farmer field schools (see text box) to introduce improved technologies, practices and inputs tailored to each crop to increase both the productivity and profitability of small-farmer agriculture. AVANSE's support to farmer field school (FFS) producers is for two years for long cycle crops of cacao and banana, and two crop cycles for short-cycle annual crops of maize, beans, and rice. After this period, farmers are expected to continue applying the technical packages, with diminishing technical assistance from AVANSE.

Farmer Field Schools

The Farmer Field School (FFS) model developed by the Food and Agricultural Organization of the United Nations (FAO) is based on the concepts and principles of people centered learning. It is a proven methodology to roll out improved technologies, practices, and inputs with small-holder farmers. FFSs are established in consultation with local Producer Organizations to identify a relatively small number of high-potential farmers (20 to 30 in most cases) who are committed to adopting improved technical practices for the target crops and who will serve as a bridgehead for the diffusion of these practices. In AVANSE, the participants of each FFS agree to rigorously apply AVANSE's technical crop packages on one of their own plots. These plots serve as training sites for farmers in the FFS as well as demonstration plots for the other producers in the community as a whole.

The AVANSE FFS program is not intended as a permanent mechanism for technology transfer. Once farmer participants in the FFS have tested the introduced practices on their own parcels under the guidance of the AVANSE field technician and have recognized the advantages, the practices will spread by lateral diffusion, from farmer to farmer. This process seems to be already occurring, as reported by farmers who indicated that neighbors had asked them to help apply the improved practices they have learned in the FFS.

The AVANSE technical packages for the five target crops focus on the appropriate use of good agricultural practices (GAPs). The practices are not inflexible and are intended to evolve in response to small-farmer acceptance, market availability and performance. A brief summary of the current technical packages for each targeted crop appears in Table 11. Location of the

activities is shown in Figure 10. In general, application of GAPs is an integral component of AVANSE's environmental management system; many of these GAPs represent measures that mitigate adverse environmental impacts as compared to standard agricultural techniques found in the project's intervention zone. For more information on mitigation measures related to IR 1 activities (including GAPs), please refer to Annex F.

TABLE 12: GOOD AGRICULTURAL PRACTICES

CROPS	TECHNOLOGY INTRODUCED	GOOD AGRICULTURAL PRACTICES
CACAO	Trimming of cover trees and pruning of cacao trees to achieve proper balance of shade and sunlight	Trimming of shade trees to increase incident sunlight and stimulate cacao tree growth. Pruning of cacao trees to stimulate growth, increase aeration, reduce humidity and damage by fungal disease and pests and to increase flowering and cacao pod production.
	Grafting	Progressive regeneration of old cacao plantations via propagation of more productive cacao by grafting budwood from 45 clonal gardens of introduced superior varieties and identified on-farm super trees to mature trees and seedlings to improve productivity. Grafts and cuttings taken from healthy, vigorous trees.
	Improved plantation techniques and planting densities	Combination of cacao seedlings with temporary shade crops like plantain/banana, and spacing of seedlings 3 x 4 m where possible to increase cacao tree population density. Plant fruit and forest trees for shade and source of revenue.
	Organic pest control	Neem oil, liquid soap and garlic solutions used to control insect pests. Organic artisanal bait used as rodenticide, non-toxic to poultry, humans. Rodent control using internationally-tested, non-chemical control products and methods.
	Fertilization	Use of composted manure, bagasse, pruned branches and leaves, kitchen ash, etc., when transplanting new seedlings. Promote animal waste and cacao pod (after seed extraction) collection for composting for eventual organic fertilizer use.
BANANA	Production of healthy suckers via Plants Issued from Fragments (PIF)	Training and vulgarization of PIF methods to produce disease free planting material, multiply number of possible plants from suckers and reduce cost. Sets of good practices, before planting, notably trimming suckers, soaking in hot water for nematode control.
	Improved varieties	Introduction of improved varieties to be multiplied by PIF in nurseries to disseminate. Use improved, selected varieties already present in Haiti (e.g., Sigatoka resistant varieties from DR).

CROPS	TECHNOLOGY INTRODUCED	GOOD AGRICULTURAL PRACTICES
	Plantation and management techniques	Promotion of optimal plant densities for better humidity management. Associate other crops with bananas/plantains.
	Integrated Pest Management (IPM) for the control of Sigatoka disease	Set of good practices, notably the elimination of affected leaves and/or parts of leaves.
	Safer Nematode control	Utilization of biological nematicide integrating <i>bacillus firmus</i> . Cut plants attacked by nematodes flush with soil.
	Pesticide use	Promotion of glyphosate use for weed control.
	Irrigation and drainage	Banana is both rainfed and irrigated. Supplementary pump irrigation of rainfed banana when possible; deep drainage ditches between raised bed rows of banana in areas subject to flooding. Improve drainage in areas prone to flooding by cleaning or reconstructing drainage canals.
	Fertilization	Use of manure, compost and chemical fertilizer. Before any inorganic fertilizer application, conduct basic soil tests to ensure need for inorganic fertilizer.
RICE System of Rice Intensification (SRI) and Système de Riziculture Amélioré (SRA) where SRI water management is not possible	Improved nursery techniques and land preparation	Use of pure varietal selected seeds. Pre-germination. Dry nurseries. Utilization of less seed in nursery. No drainage or conversion of wetlands or mangrove areas; no expansion into mangrove areas.
	Better performing rice varieties and use of quality seed	Utilization of Jaragua and Jouma varieties. Purchase of better quality rice seed from other Haitian regions specializing in seed production. Use improved rice varieties already present in Haiti. Better rice farmers will be identified and assisted to specialize in seed production. Multiply seeds with small farmers or small farmer organizations.
	Transplanting techniques and density	Transplanting of young plants 10 to 12 days after sowing for SRI as opposed to 20-30 days for traditional system. 2 plants per hole, spaced 25 cm x 25 cm, contrasted with 5 per hole spaced 15 cm x 15 cm in traditional rice model
	Optimal weed control	Utilization of mechanical conic-weeder; utilization of herbicides glyphosate for land preparation, and 2-4-D for broad leaf weed control in paddy.
	Integrated Pest Management	IPM practices promoted such as reduction in pesticide use and addition of organic matter to paddy to increase generalist predatory beneficial insect population.

CROPS	TECHNOLOGY INTRODUCED	GOOD AGRICULTURAL PRACTICES
	More efficient use of water	For SRI: alternating wet and dry paddy rice, resulting in significant reduction in water requirement. For SRA, where water control is difficult: same cultural practices as SRI rice, but same water regime as traditional rice. SRA as an intermediate step to SRI rice technology adoption. WUAs develop and apply canal maintenance and water management plans.
	Fertilization	Use of compost in nursery; reduction of amount of chemical fertilizer used (with a goal of elimination), application at correct development stage of rice plant. Before any inorganic fertilizer application, conduct basic soil tests to ensure need for inorganic fertilizer.
BEANS AND MAIZE	Short-cycle high quality seeds	Chicken corn maize variety, Icta Ligero common beans, California #5 for black eyed peas and Ford Hook and Bese-ba for lima beans.
	Seed production	FFS farmers are being trained in maize seed selection.
	Introduction/spreading of new bean varieties resistant to drought and heat	Introducing Lima beans (local variety and Ford Hook).
	Pest control	Utilization of pesticide Actara to control white fly on beans. Utilization of Sevin for caterpillar control on maize. Utilization of pesticide to control the beetles in black eyed pea seed.
	Fertilization	Utilization of appropriate amount of chemical fertilizer at the correct development stage. Urea for the corn, and NPK for the common beans. Before any inorganic fertilizer application, conduct basic soil tests to ensure need for inorganic fertilizer.

Varying with the target crop, AVANSE provides FFSs with tools, planting materials, fertilizers and PERSUAP approved pesticides (cacao production is entirely organic) for demonstration plots in the first season. After the first season, farmers are expected to purchase their own inputs, some of which may be subsidized via AVANSE's voucher program, described in more detail in the IR3 discussion.

AVANSE will contract the services of local IPs to expand project crop extension capacity for maize/beans and bananas so that AVANSE staff can concentrate on the other two focus crops. Involving IPs is the first step in the withdrawal of AVANSE's direct management of field activities. This strategy is also consistent with the extension strategy of the Haitian Ministry of Agriculture (MARNDR), which emphasizes the involvement of Haitian service providers as suppliers of extension training to farmers instead of Ministry staff.

Although IR1 will continue to emphasize technology transfer through the FFS strategy, AVANSE will also work with some larger-scale farmers who, because of other commitments, are unable to participate in FFSs. These farmers have resources which will permit them to apply the target crop technical package on a larger scale, particularly in Banana/Plantain which requires a larger investment than other focus crops. It is expected that their demonstrated success will influence smaller neighboring farmers to adopt the technical package.

Institutional Collaboration

Lasting adoption by smallholder farmers of improved cropping practices will be reinforced through collaboration with institutions that will continue to serve farmers in the North after the end of AVANSE. The most important of these institutions is MARNDR. AVANSE will work with the regional Directions Départementales Agricoles to strengthen the capacity of MARNDR regional units through both material support and staff training for the Bureaux Agricoles Communaux inside of and near project target zones to enhance technical skills so they can support FFS implementation. This cooperation extends both ways as AVANSE sometimes calls upon MARNDR for assistance in training project technical staff in specialized fields in which MARNDR has expertise, rather than rely only on contracted private entities.

AVANSE is also working with Auburn University and universities and institutions of higher learning in the Northern Corridor to reinforce local agricultural training and field extension capacity. Activities will include agronomic results monitoring of FFS field results, soil testing to facilitate increased precision in fertilization; elaboration of a fertility map of AVANSE's targeted zones; inoculation of legumes for improved productivity; micro- and macro-propagation of high quality banana suckers, plant cuttings and yam mini-sets for tolerant high producing varieties; and eventually, implementation of a tissue culture lab. Auburn University will promote access to the latest database on agriculture and agronomy research as well as promote a culture of applied research and learning across the Northern Corridor to promote agricultural production and development.

Nursery and Grafting Support

AVANSE plans to establish PIF plantain propagation nurseries to make healthy, disease free banana plantlets available to farmers. Training of farmers and banana nursery owners in the PIF technology has begun. PIF nurseries will be started when demand is created for plantlets through the banana FFS program.

The Cacao FFS program will need 1,100,000 cacao seedlings for FY2015. The seedlings will be purchased by AVANSE from several sources. With support from AVANSE the cacao exporter, Novella, will assist 100 small entrepreneurs in the cacao production zones to establish nurseries

which will produce 3000 local unimproved variety seedlings each. The fermented cacao exporter PISA, also with support from AVANSE, will establish nurseries in the Plain du Nord and Acul du Nord area. They will distribute 300,000 superior quality grafted cacao seedlings to FFS farmers and other small holders in the vicinity of their cacao processing plant. IR1 will purchase 500,000 seedlings from the 38 legally registered nurseries receiving support from IR2.

In collaboration with MARNDR, IR1 has begun a series of 5-day training programs for 20 cacao farmers from each of the cacao production zones as Master Grafters. These Master Grafters will work with the cacao FFSs training farmers in grafting budwood from superior trees identified in cacao FFS farmers' cacao plantations and from introduced superior varieties propagated in clonal gardens, to seedlings and low-production older trees. It is anticipated that these Master Grafters will become service providers, grafting cacao and fruit trees for a fee.

AVANSE has established 13 clonal gardens on portions of FFS members' cacao plantations. When the trees in these gardens are mature, they will supply budwood for grafting to seedlings and mature trees on farmers' cacao plantations. AVANSE plans to establish a total of 45 clonal gardens by the end of the project. A survey of FFS farmers' cacao gardens by AVANSE field staff is underway to identify super-trees.

Capacitation and Creation of Water Users Associations

AVANSE proposes to rehabilitate/extend the Grison-Garde, La Suisse, and Dubré irrigation systems, and construct another three at Chalopin, Garde Saline, Robino and Bas Maribahoux by the end of project. The irrigation systems are described in the infrastructure component of this PEA. Management of the irrigation systems will be the responsibility of the Water User Associations (WUAs). Three WUAs currently exist in the Grison Garde, Dubré, and La Suisse systems. Others will have to be established. AVANSE provides and will continue to provide technical assistance from its staff and through IPs to establish WUAs where necessary and to train WUAs in management of irrigation systems. In addition, AVANSE is coordinating with MARNDR to create new WUAs and train farmers on two non-AVANSE systems, Dumas and Croi Cou that are being built by MARNDR.

Establish Small-Scale Irrigation Projects

As a mitigating response to the disastrous impact on dry land maize and bean focus crops of the FY14 drought in the plains of the Northern Corridor, AVANSE planned to support groups of small farmers on the plain to establish small-scale groundwater irrigation systems for supplementary irrigation of maize and beans, and banana/plantain, and for small-scale drip irrigation vegetable production.

The farmers would be organized into WUAs to manage the systems. AVANSE planned to eventually establish 40 such systems, but planned to begin with five pilot projects south of Caracol. The design of the five projects is described in the infrastructure component of this PEA. The activity would be initiated with a pilot project of five pumps in the vicinity of the Caracol Industrial Park. The five pump systems would each irrigate from 12 to 15 ha with submersible electric pumps. They would be managed and maintained by WUA groups of 20 farmers organized and trained by the IR1 Water User Specialist. If the pilot projects were successful, the other 35 systems would be developed. The exact location of the other 35 systems is not yet established.

AVANSE also planned to implement in FY16 a drip irrigation pilot project for vegetable production on 1,000 m² plots in the dryland plains near Caracol and Terrier Rouge. The project would target women. It would replicate the successful drip irrigation model of the

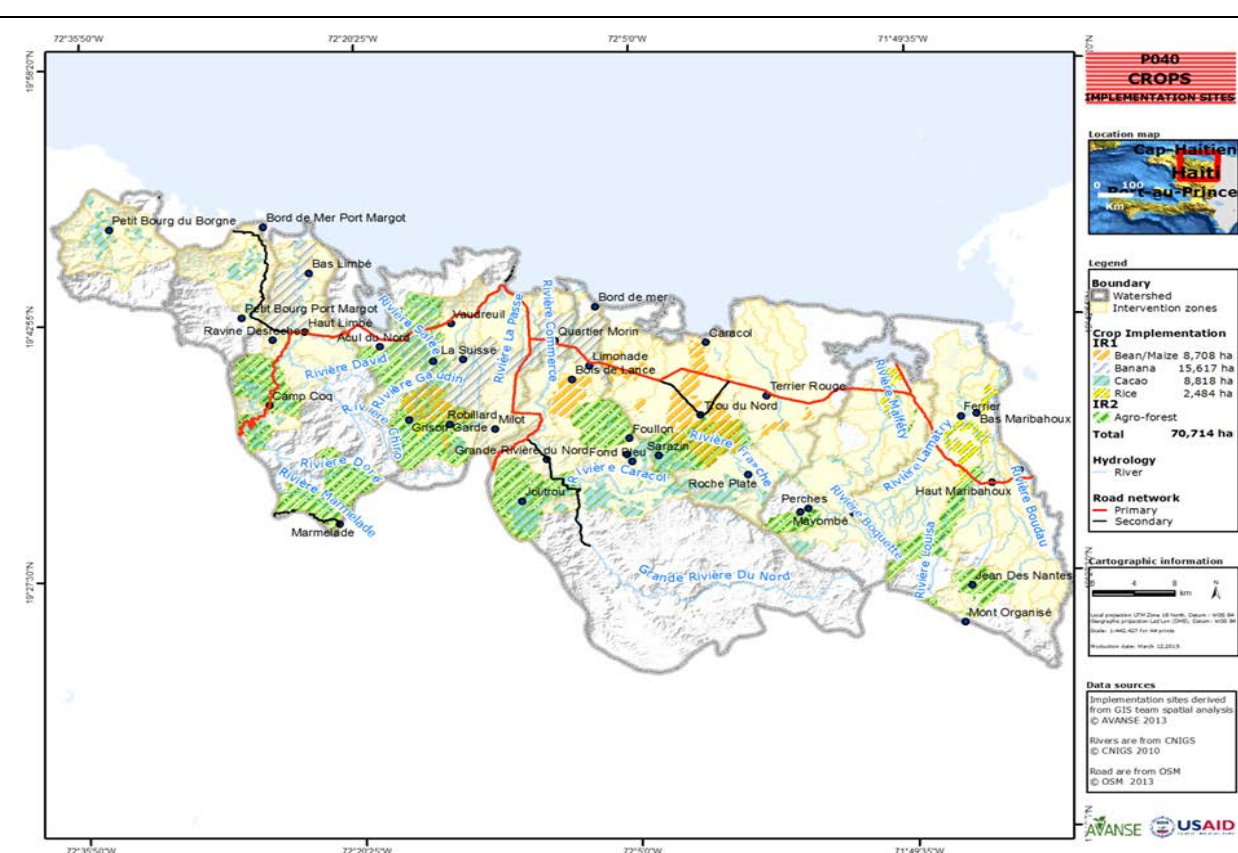
IFAD/MARNDR project in Paulette, Ferrier Commune. When possible, existing hand-dug cement ring wells would be used. These wells are common in the area. They tap the unconfined alluvial aquifer. The wells would be fitted with pumps (possibly solar pumps) that would pump water into 500 liter plastic containers on elevated platforms. The plan was to implement the initiative in 2016.

INTERMEDIATE RESULT 2: WATERSHED STABILITY IMPROVED

Activities under IR2 have focused on establishing and expanding soil conservation and agroforestry demonstrations in the piedmont and upland mountainous areas of AVANSE's six watersheds. The LOP target for area under improved natural resource management (NRM) is 23,000 ha.

Figure 10 depicts the location of the LOP target zones that IR2 planned to reach with soil conservation and agroforestry actions.

FIGURE10: LOCATION OF IR1 AND IR2 ACTIVITIES



Promoting Hillside Stabilization through Agroforestry

AVANSE initiated IR2 field work by planting agroforestry crops and constructing physical protection structures along contours in sloped areas in 18 demonstration blocks located in zones classified as sensitive by AVANSE's initial Geographic Information Systems (GIS) analysis. Demonstration blocks were sited across the six watersheds upstream from IR1 crop production sites. These initial demonstration blocks were designed to constitute core repositories of planting material and serve as examples to encourage diffusion of the agroforestry and soil conservation techniques. Blocks were established with groups of 25

farmers and, to the extent possible, on contiguous fields or plots. AVANSE planned a LOP total area of 879 ha for the soil conservation and agroforestry blocks. These areas would serve as demonstration sites for sub-watershed management bodies (SWMBs) to familiarize their members with the benefits of improved soil conservation and agroforestry systems.

Within the blocks, shallow infiltration ditches and bunds are constructed along contours and reinforced with plant debris (e.g., twigs, sticks, stalks). Vegetative material such as vetiver, elephant grass, pineapple and castor bean are planted along the bunds to provide additional stability and erosion control (Figure 11). A mix of agroforestry species or woody perennials is planted throughout the plot. These consist of fruit trees (e.g., avocado, citrus, mango and coconut) and timber species (e.g., Haitian Oak and Mahogany). Bananas, plantains and yam are also often planted in the demonstration. In addition, IR2 has installed some small ravine stabilization demonstrations in areas adjacent to these blocks. These consist of gully plugs made from stacked, earth-filled nylon bags, planted with vetiver grass on top and with additional planting of bananas or other tree crops behind the gully plugs once sediment has accumulated.

In order to expand the area under improved soil conservation and agroforestry systems, AVANSE planned to award 18 grants to producer organizations (POs) who would oversee activities in each of the demonstration blocks while also replicating these systems. The grants would provide support for the production and acquisition of planting material, funding of direct costs of collective work groups to construct needed soil retention structures, and basic materials and equipment for each PO. AVANSE planned a total of 2,430 ha to be protected through this activity in FY 2015. IR2 staff would provide continued technical assistance, but the work would be managed by the POs themselves. The blocks and the extension areas would also be integrated into the sub-watershed management plans being developed by the SWMBs as described below. In addition, building on the demonstration blocks and PO extension areas, IR2 planned on hiring six IPs – one per watershed – who would further expand the areas under improved soil conservation and agroforestry systems. These IPs will work to extend the soil conservation and agroforestry area in order to reach the LOP target of 23,000 ha.



**FIGURE 11: VETIVER PLANTED
ALONG CONTOUR IN
AGROFORESTRY
DEMONSTRATION PLOT**

Sub-Watershed Management and Governance

AVANSE established 13 SWMBs in FY 2014 and continued to work with the 5 SWMBs established previously in the Limbé watershed under the DEED project. AVANSE IR2 staff planned to guide the 18 SWMBs through a step-by step capacity-building process to produce sub-watershed management plans (SWMPs). SWMPs would be created through a participatory process that takes roughly seven to nine months. AVANSE would conduct open meetings with the use of GIS-based land-use map presentations to engage the SWMBs in the consideration of the advantages and disadvantages of different agricultural practices and other uses on lands in

their immediate area. Customarily, these plans identify hillside stabilization and protection sites, as well as promote the use of agroforestry and non-erosive practices to improve soil fertility as well as increase production and income. These plans would be based, to a certain extent, on the community soil and water conservation plans established under DEED in the Limbé watershed (Pierre-Louis and Renaud, 2010). AVANSE planned to issue requests for proposals (RFPs) to select several IPs to provide continued support to the 18 SWMBs.

Reforestation and Land Reclamation

IR2 will use the same IPs to support watershed protection needs on a larger-scale that can be done with farmer interventions and which do not require intensive engineering works. These activities will be consistent with the SWMPs and will mainly consist of biological protection measures on degraded hillsides, such as large-scale plantings of forage and cover crops (grasses and legumes), and reforestation with rapid growth tree species and ground cover preparation using vetiver grass. AVANSE is targeting 6,000 ha to be protected in this manner in FY 2015.

Nursery and Grafting Support

The IR2 team is planning to provide in-kind grants to 38 local nurseries, supplying inputs such as super tree cacao seedlings, fruit tree seedlings, and other agroforestry plants. AVANSE also plans to hire an IP to provide continued technical assistance and quality assurance to the 38 nurseries. This activity should ensure the availability of critical high-quality agroforestry and vegetative inputs, as well as sustainable capacity to produce this material into the future. IR2 staff will provide oversight for the overall implementation of this activity while IR3 will provide business training for the selected nurseries. In the future, AVANSE will procure agroforestry and vegetative material on a limited competition basis from the 38 nurseries.

In FY 2014, AVANSE trained 150 grafters in specialized techniques including cacao and fruit tree grafting, yam mini-set production, and forage multiplication. These 150 master grafters are in the process of training 5 peer producers each to replicate these methodologies. After the initial training, and in collaboration with MARNDR, AVANSE will review the uptake of the techniques by peer-producers and will purchase successful grafts for AVANSE activities. AVANSE is also collaborating with MARNDR to roll out a grafting certification program. AVANSE will hire from the pool of certified grafters to conduct future grafting campaigns.

Development of Pigeon Pea Value Chain

This is a new activity that IR2 planned to introduce in the FY 2016 work plan. Pigeon Pea is a woody, perennial shrub that is well adapted to the mountainous and dry areas of the AVANSE intervention zone. Its promotion in the IR2 across the six watersheds as either a monoculture or part of an intercropping system would be beneficial for food security and would also increase the revenue of participating households (Pigeon Pea is already a cash crop in many areas of the AVANSE intervention zone). It would also have a positive impact on soil conservation and soil fertility. The LOP target was planned be 5,000 ha planted in agroforestry demonstrations as well as in other critical, degraded zones identified by the project and SWMBs. An associated objective, to be pursued in collaboration with IR3, would be to develop small transformation enterprises, improve marketing, and eventually target an export market.

Protection of Critical Coastal Zones

Since AVANSE has activities underway and planned in all four of the watersheds (Jassa, Marion, Trou du Nord, Grande Rivière du Nord) that impact the newly designated Parc National des Trois Baies (PN3B), AVANSE plans to initiate 2-3 grants for NGOs to work with local

communities which will build local environmental governance and promote economic activities that reinforce good environmental management in order to complete its environmental compliance work. These grants are to focus on environmental governance and strategic planning, local capacity building and public education, food security, environmental resource management and rehabilitation, and environmental monitoring. Grantee activities will leverage local economic interests and stakeholder activities to promote sustainability (for example: beekeeping in Bas Limbé; sweet potato farming in Acul; and sea salt production and improved fishing techniques in Caracol). Another activity proposed to assist with environmental rehabilitation and protection is the initiation of mangrove reforestation at selected sites.

AVANSE intends to analyze and monitor the use and effects of chemicals (including pesticides and fertilizers) on the marine environment. This activity will also include the effects of waste, garbage, sediment, landfill, and cross-border contamination due to used irrigation water from the Dominican Republic. This activity directly contributes to AVANSE's targets for watershed management and complements the waste management plan that Cap Haïtien is developing for three communes with a landfill development plan already funded by the IDB and the French development agency.

Community Cisterns for Home Gardens

This is also a new activity that IR2 planned to introduce in the FY 2016 work plan. The goal would be to capture store water during abundant rainfall periods for use during the dry season or drought periods. Plastic cisterns with a 1,200 gallon capacity would be connected to roofs of public or private buildings in order to capture rainfall. IR2 planned the installation of 150 of these cisterns – 25 per watershed. The water would be used by the community in a number of ways, including watering women's vegetable gardens. Management of the water would be realized by a committee composed of women leaders in participating communities.

Pilot Small-Scale Greenhouses

IR2, in collaboration with IR3, planned to assess and identify potential agribusinesses and producer groups for partnerships to test the use and profitability of small greenhouses (91 m²). AVANSE would engage selected agro-enterprises and producer groups to participate in a 6-month test to produce higher-value crops (e.g., vegetables) using greenhouse technology. At the time of this report, 3 pilot greenhouses are planned: 1 near Cap Haïtien and one each in the Trou du Nord and Limbé watersheds.

Procurement of Materials for Civil Protection Authorities

AVANSE meets regularly with the *Délégués* and Directors from the two Departmental Civil Protection Authorities in the North and the Northeast. The top, identified priority for support was procurement of key goods to mitigate and improve responses to natural disasters. AVANSE is prioritizing items from an established list provided by the Civil Protection Authorities. Illustrative items include: shovels, pick axes, and handsaws to help with mitigation and early response efforts.

Environmental Education

Environmental education is an activity that is slated to begin in earnest during FY 2016. Given the alarming level of environmental degradation in Haiti, environmental education for all social classes and demographics is urgently needed to for behavior change. Improved environmental behavior can start by introducing an environmental curriculum in schools. IR2 will establish a partnership with Department-level education offices to provide practical training sessions on environmental protection and reforestation in participating schools.

Health Insurance for Collaborating IR2 Farmers

Access to health insurance is a potential future activity that may be implemented starting in FY16. Health insurance will help households in IR2 target zones overcome economic hurdles caused by health issues. IR2 staff will facilitate signing of health insurance contracts as well as training in preventative health practices.

INTERMEDIATE RESULT 3: AGRICULTURAL MARKETS STRENGTHENED

IR3 is responsible for promoting successful businesses at all levels of the value chain, from input supply and production to post-harvest handling and continuing through storage and processing to include trade and export. IR3 delivers support through the activities described in the following subsections.

Provide Value Chain and Agro-Enterprise Analysis

AVANSE has, and will continue to develop detailed value chain analysis for key agro-enterprises in the project's target zones. These analyses inform the design of IR3 activities. The analyses include:

- Value-chain analysis for IR1 and IR2 crops;
- Analysis of barriers and enablers for women-entrepreneurs in target zones;
- Deeper analysis of key value chains to identify and address bottle-necks; and
- Feasibility studies for potential new market activities.

Improve Business Skills Training and Performance

IR3 improves the business-skills of Haitian entities by offering them improved training materials, pedagogical approaches and methodologies developed by DAI's international consortium partner, Making Cents. Making Cents has three separate tracks for training: (1) a track for Producer Organizations and Micro/Small-Enterprises; (2) a track for Medium Enterprises; and (3) a track specific to women entrepreneurs at both the micro- and small-enterprise levels.

In addition, IR3 provides mentoring and training to medium-enterprises, through a local implementing partner, Sofitraining. The training moves individual enterprises through a three-phase process including a self-assessment, development of a performance improvement work plan and delivery of tailored coaching services for implementation of the work plan.

IR3 works with micro- and small-enterprises to help them become formalized and plans to develop a curriculum for training and mentoring of micro- and small-enterprises to be implemented in coordination with the Ministry of Commerce, MARNDR and the Chamber of Commerce. Through this process AVANSE plans to develop "Business Agents" who will be available for on-going business and technical training and support to micro- and small-enterprises.

Improve Private Sector-Small Producer Linkages and Partnerships

Through this activity, IR3 works with large private-sector concerns to help small farmers improve linkages to private-sector players either through direct sales relationships or through specialized intermediaries. AVANSE pursues this activity through Collaboration Agreements and Market Linkage Partnerships with large private-sector concerns.

Through Collaboration Agreements, AVANSE commits some of its resources to work with small and medium producers through IR1 and IR2 activities to help them understand the needs of the large concerns and the participating concerns commit their resources to reach out to these

producers. Through Market Linkage Partnerships, AVANSE has simply helped firms by providing market linkage information – mainly linking them to producers in the project zone.

AVANSE's agreements with Produits des Iles, S.A. (PISA), Federation Des Cooperatives Cacaoyeres Du Nord (FECCANO), and Novella include organic certification support for cacao producers. Under these agreements, AVANSE will provide technical assistance to help with organic certification.

Facilitate Market Linkages

Some facilitation of market linkages is also pursued through Collaboration Agreements. An example of this is seen with AVANSE piggy-backing on the IR1 FFS organizations to set up new, formal direct-buying windows with Novella.

IR3 also facilitates market linkages through more opportunistic interventions to link producers with specific market buyers or provide technical assistance to producers, exporters and processors to help them access new market. An example of this is linking corn and rice producers to local World Food Program procurements as AVANSE did successfully in FY 2014 for the corn miller CALI.

Facilitate Improved Post-Harvest Handling, Storage and Processing

This activity involves investments in improved processing, storage and post-harvest handling. These investments will be in the form of in-kind, cost-share grants for construction and equipment. Activities that would be eligible for grants could include:

- Small-scale construction of less than 1,000 m² for processing or storage;
- Existing structure rehabilitation for processing or storage;
- Processing equipment procurement and installation within structures (e.g., rice and corn milling equipment, cacao fermenting and sorting equipment, artisanal chocolate milling equipment, equipment for washing and packing bananas, and packaging labelling equipment);
- Equipment and material (e.g., seed, fertilizer, and pesticides) for nurseries and grafting operations that support IR1 and IR2 activities (as presented above in the IR1 and IR2 descriptions);
- Equipment for agro-production service providers;
- On-site (preliminary) processing equipment for producers (e.g., cacao drying tables for cacao farmers); and
- Fertilizer storage improvements at voucher partner facilities.

This activity will also involve providing technical assistance to provide advice and training on production improvements.

Promote the Use of Vouchers as a Market-Oriented Subsidy Mechanism

The voucher program builds markets for agricultural inputs by subsidizing demand and developing input dealers' capacity to supply necessary inputs. The voucher program is known by its French acronym, SIBA (Système d'Incitation via les Bons d'Achat). Under SIBA a participating farmer can purchase a voucher for an input product or service supported by SIBA and exchange that voucher with an AVANSE approved input supplier to receive the input. The voucher has a face value which is paid to the supplier, but the farmer pays a price less than the face value, with the difference between the price of the voucher and the face value of the voucher being paid (subsidized) by AVANSE. The size of the subsidy is determined for each

type of input, and is scheduled to be reduced overtime. The vouchers are sold and redeemed by microcredit institutions which have been competitively selected by AVANSE.

The pilot SIBA program was for fertilizer and one herbicide (2, 4, D for rice), but pesticides were subsequently removed from the program due to the difficulty of assuring full compliance at partner agricultural input stores (boutiques) with the USAID/Haiti mission-wide PERSUAP (USAID 2011b⁴) and its amendments (USAID 2014b and USAID 2015⁵). All of the boutiques stock pesticides that are “not recommended” by the PERSUAPs, so that although AVANSE could and did work with the boutiques to improve their management and storage of pesticides, it could not segregate its assistance for the PERSUAPs’ “recommended” pesticides from that of overall management of pesticides, including “not recommended” pesticides. However, if AVANSE includes only fertilizer in SIBA, USAID/Haiti informed it that it would have no responsibility for the storage or management of pesticides in the boutiques:

AVANSE is not subject to limiting its involvement with SIBA-affiliated stores or boutiques that sell pesticides that do not comply with the Mission-wide PERSUAP as long as those boutiques do not receive vouchers for the purchase of pesticides and AVANSE does not provide any other support for the procurement or use of pesticides, aside from training in pesticide management that does not result in the actual application or use of pesticides.⁶

Currently SIBA only has vouchers for dry formulation fertilizer, but it is considering having vouchers for other, non-pesticide production inputs such as seed and mechanical plowing. In some cases, the seed available for planting has been treated to prevent pest damage while the seed is in storage. We address this issue in Chapter 6.

Increase Access to Financial Products

IR3 increases access to financial products through the grants program (described above), technical assistance to producers to complete loan-applications and produce business plans, and through a joint program with DIGICEL to promote the penetration of mobile money in the project area.

Improve Market Information Systems

IR3 improves market information systems through a joint effort with Novella (through a Collaboration Agreement) to re-launch its SMS, factory-gate price information system, called Kout Lambi. It is also working with PISA (through a Collaboration Agreement) to implement a similar system.

INTERMEDIATE RESULT 4: CAPACITY BUILDING SUPPORT TO IMPLEMENTING PARTNERS

AVANSE has capacity building incorporated into all of its technical support and training undertaken in IR1, IR2 and IR3. IR4 focuses on working with local IPs and beneficiaries to improve internal management procedures, financial systems and controls, human resources, strategic planning, and overall operations to prepare partners for consideration for direct awards from USAID under the FORWARD initiative. This activity includes training in: financial

⁴ LAC-IEE-11-29

⁵ LAC-IEE-14-16 and LAC-IEE-15-05 respectively.

⁶ Memorandum from Ryan D. Knight, Mission Environmental Officer to James Woolley, Contracting Officer's Representative, January 30, 2015, Subject: AVANSE DIBA Voucher Program's Environmental Compliance with Obligations Under LAC-IEE-14-17. pg 2.

management, administrative management, project management, proposal writing, organizational governance, ethics, and strategic planning.

IR4 also provides training to beneficiaries and partners to strengthen their general implementation capacity. This activity currently provides technical assistance and training in registration as a legal organization. AVANSE plans to provide other capacity building for these organizations once they become legally recognized.

INFRASTRUCTURE

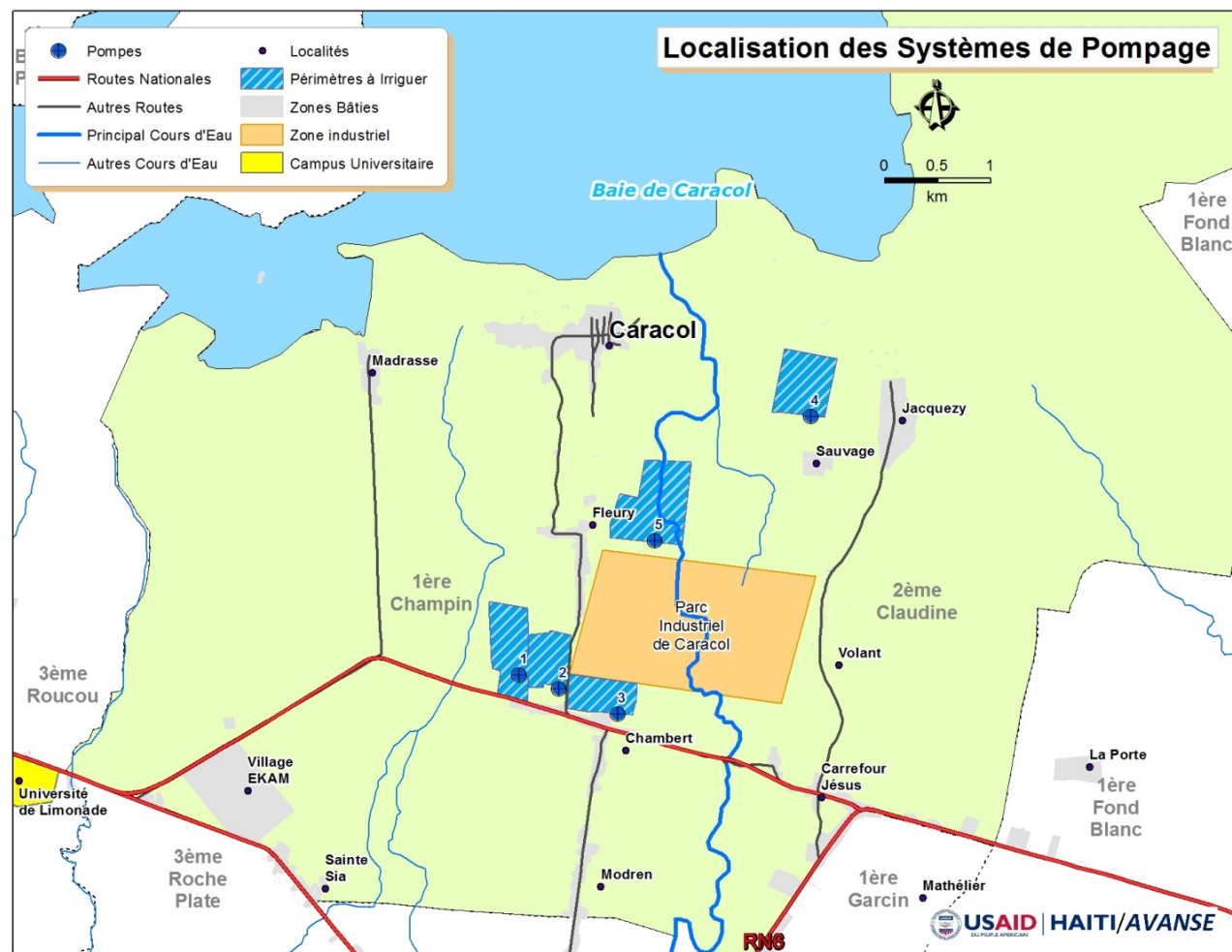
The infrastructure component of AVANSE is a cross-cutting component with the purpose to undertake all infrastructure activities. The Government of Haiti along with USAID had selected a list of infrastructure projects that AVANSE could undertake. The list included irrigation systems to be rehabilitated, ravines to be stabilized and rural roads to be rehabilitated. From that list of infrastructure projects, AVANSE selected seven irrigation systems to be rehabilitated or established, six ravines to stabilize and 16 rural roads to be rehabilitated. The infrastructure projects that AVANSE planned to undertake are presented in Table 13.

TABLE 13: INFRASTRUCTURE PROJECTS TO BE UNDERTAKEN BY AVANSE

Watershed	Activity	Activity Description
Jassa	Rehabilitation of the Robino/Maribahoux irrigation system	The Robino irrigation system currently is inoperable because its water was diverted by an upstream irrigation system constructed by Agro-Action Allemande (AAA). AVANSE plans to create a new diversion on the Jassa River. The new diversion will serve 300 ha. The project will also improve drainage in the fields in the Bas Maribahoux area, which has drainage problems related to the AAA-constructed system. No preliminary designs.
	Stabilization of one ravine	Project identification work on-going. Not completed at the time of the PEA.
	Rehabilitation of four rural roads (23.5 km)	RN-6 to La Garenne, 3.9 km
		La Garenne to Ferrier, 4.4 km
		La Garenne to Latasse, 9.2 km
Carrefour Mérande to Meillac, 6.0		
Marion	Rehabilitation two irrigation systems: Chalopin and Garde Saline	Chalopin operates below design capacity due to a deteriorated diversion. The proposal is to raise the level of the diversion, thus diverting more water into the system. The current system irrigates 170 ha. The rehabilitation will allow irrigation of an additional 230 ha. Garde Saline is a rustic system serving 41 ha. AVANSE plans to rehabilitate the system and create a new series of diversions via construction of a dam to serve an additional 28 ha in Romeo, an adjacent area. The drainage systems of both systems will also be rehabilitated.
	Stabilization of the La Gachette Ravine	Project design on-going. Not completed at the time of the PEA.
	Rehabilitation of 3 rural roads (20.8 km)	Carrefour Frache to Grand Basin, 8.5 km
		Carrefour Bergen to Haut Madeleine, 4.3 km FY15
		RN-6 to Coicou, 8.0 km FY15

Watershed	Activity	Activity Description
Trou du Nord	Establishment of 5 pumped water irrigation systems. If successful, 35 additional plots will be developed.	The 5 plots are located south of Caracol (see Figure 12). They range in size from 12 to 15 ha and involve multiple farmers at each site, requiring development of a WUA for system management. Each borehole will have an 8 inch diameter, a depth of 200 to 250 feet and be supplied with a submersible electric pump with a minimum capacity of 17 l/s. Electricity for pump operation will come from the Industrial Park power station. No storage will be built. Irrigation application will be flood via PVC piping from the pumps to the fields. (DAI 2015) The exact location of the other 35 systems is not yet determined.
	Stabilization of Ravine Jean Charles	Project design on-going. Not completed at the time of the PEA.
	Rehabilitation of one rural road (5.6 km)	Carrefour Juchereau to Roches Plates, 5.6 km FY15
Grande Rivière du Nord	Establishment of several pumped water irrigation systems	Some of the 35 pumped water irrigation systems being piloted in Trou du Nord will be installed in this watershed. The exact location of these systems is not yet determined.
	Stabilization of one ravine	Project Identification work on-going. Not completed at the time of the PEA.
	Rehabilitation of two rural roads (24.4 km)	Sainte Suzanne to Dupity, 18.8 km Limonade to Bois de Lance, 5.6 FY15
Haut du Cap	Rehabilitation of three irrigation systems: Dubré, Grison Garde and La Suisse	The diversions for all three systems will not be changed, but all three systems need to have the distribution system rehabilitated. Dubré currently irrigates 81 ha. AVANSE plans to add an additional 58 ha. (PLANCONSULT 2015) Grison Garde currently irrigates 220 ha. AVANSE plans to add an additional 350 ha. La Suisse currently irrigates 100 ha. AVANSE plans to add an additional 200 ha.
	Stabilization of Ravine Breda	Project preliminary design completed and ready for RFP.
	Rehabilitation of seven rural roads (29.2 km)	Grison Garde to Robillard, 6.8 km FY15
		Carrefour Lachaux to Barrage Grison Garde, 1.9 km
		Carrefour Lachaux to Route Touristique, 3.4 km
Limbé	Construct one drainage system	Drain banana plantation area in Bas Limbé to the sea.
	Stabilization of Ravine Blondeau	Project design on-going. Not completed at the time of the PEA.
	Rehabilitation of one rural road (3.0 km)	Carrefour Séminaire to Acul Jeannot, 3.0 km FY15

FIGURE 12: LOCATION OF FIVE PILOT WELL IRRIGATION PROJECTS



Source: DAI 2015

AVANSE will hire engineering firms or consultants to provide systems design services, which include a technical study, design services, and/or supervision (construction management) services. It also proposes to hire construction firms to implement the approved systems design.

Irrigation Projects

The construction activities for irrigation and will vary with the type of system and site-specific design. All of the systems will provide water for flood irrigation. All design and installation of open canal systems will include construction or rehabilitation of associated drainage. For open channel systems using surface water as a source, the construction may have the following components:

- Expansion of the protection walls in masonry (some systems)
- Consolidation of the bottom of river beds using gabion soles (some systems)
- Cleaning upstream of the intake (all systems)
- Repair equipment at intake (all existing irrigation systems)
- Build water intake (some systems)
- Build water diversion works (some systems)
- Install flow measurement device (some systems)
- Raise the height of canals where water overflows (some systems)

- Rehabilitate canals where walls are degraded (all systems)
- Retrofit earth canals (all systems)
- Rebuild earth canals in masonry (all systems)
- Repair gates (all systems)
- Retrofitting drains (all systems)
- Build new drains (some systems)
- Repair drain outlets (all systems)
- Build water intakes (some systems)
- Build canals (all systems)
- Widen and rehabilitate of internal perimeter irrigation systems (all systems)

Pumped systems may involve the following activities:

- Drill deep wells
- Provide wells with submerged electrical pumps
- Bring electricity either from the existing electrical network or use generators.
- Build pump houses
- Build a PVC piped distribution system to irrigate the fields

Road Rehabilitation

All road rehabilitation projects were planned to be done on existing roads. AVANSE would only rehabilitate existing roads for which local government can secure a cleared right of way of 5 meters. Five meters is actually less than the legal right of way for the existing roads, but it is the minimum width in which AVANSE believes it can operate.

There are temporary structures on several tertiary road surfaces in the AVANSE project area. These are generally simple commercial stands or community stages. Local authorities will have to arrange for these structures to be removed before construction can begin. These structures will most likely move back onto the roads after construction is completed.

Other, more permanent structures, such as trees, fences (living or otherwise), and possibly human built structures may have infringed on the road right of way over the years. Local government, and not AVANSE, will have to resolve these potential obstacles to securing the 5 meter right of way, without technical or financial support from AVANSE. AVANSE would not begin construction until the 5 meter right of way is secured.

Road rehabilitation would include the following general activities:

- Designing of road;
- Sourcing of building materials (including possible development of borrow areas and associated access roads);
- Clearing right of way (once it has been secured);
- Excavation/road cuts and fill;
- Digging, repairing and/or reinforcing road drainage (including installation of necessary culverts);
- Construct river and natural drainage crossings (some projects);
- Improving of sidewalks and pedestrian passes (where they exist);
- Road bed preparation and shaping;
- Road surfacing (all roads will be surfaced with gravel, no pavement or oiling);
- Establishing, with local government, maintenance committees;
- Training maintenance committees road; and
- Re-vegetating road sides.

Ravine Stabilization

Planned ravine stabilization would involve the following activities:

- Develop Community Awareness;
- Secure permission to attach stabilization structures to existing private structures (retaining wall, flood barricades, etc.), where necessary;
- Clean out the ravine;
- Build masonry walls to protect houses located on the sides of the ravines;
- Gabionnage works to stabilize flow and retain sediments;
- Build ravine bed protection;
- Biological stabilization of embankments; and
- Build water crossing structures for streets such as ford or culverts.

Drainage Construction

Drainage is a major issue in the plains of the North and North-East owing to slow drainage provoked by general low soil permeability and groundwater rising to levels where it blocks normal drainage routes. To address these issues the AVANSE infrastructure team planned to undertake a general study of drainage problems in both the North and North East plains. The study would:

- identify of zones affected by poor drainage;
- geo-spatially locate those zones;
- produce GIS maps of zones affected;
- calculate flows;
- prepare preliminary technical calculations for potential construction works;
- identify downstream routes and capacities; and
- assess associated environmental risks factors.

The study has not been undertaken, so at this time there are no concrete plans for major drainage activities. The PEA Team was taken to one potential site in a banana plantation in Bas Limbé. The Team was informed that the conceptual plan is to drain the area to the ocean, but it is not clear if that is physically possible (i.e., is there enough elevation difference to actually allow drainage? Is the water in the drains hydrologically connected to the river? If so, would the “drain” just become a new river course?). This issue is dealt with in Chapter 6.

INFORMATION, ANALYSIS, AND ENVIRONMENTAL COMPLIANCE UNIT

The Information, Analysis, and Environmental Compliance (IAEC) unit has three functions:

1. Monitoring and evaluation of implementation - tracking progress of project activities against the M&E plan, signaling significant positive or negative variance in achieving results, and providing information needed to make course corrections.
2. Environmental compliance – ensuring AVANSE activities create no significant adverse environmental effects and promote environmental stabilization and protection.
3. Gender analysis – tracking progress and ensuring AVANSE activities improve gender equity and women's empowerment.

Most of the activities conducted by IAEC are studies, surveys and monitoring and result in the preparation of various reports. However, some training is also involved. For instance, the Environmental Compliance team trains implementing partners in the requirements for environmental compliance.

In addition, the IAEC also plans to establish a network of weather stations to provide much-needed information for AVANSE's agricultural production and watershed management activities

as well as to monitor and report on climate variability. AVANSE will subcontract with a US or Haitian service provider to install and maintain up to 40 weather stations in selected target zones and key microclimate areas in collaboration with local private and public partners. Each station will have a minimal footprint and will require virtually no disturbance during installation.

IMPACTS OF THE PROPOSED ACTION

Several activities of the Proposed Action by their nature have no environmental consequences, so they are not included in the following analyses. These activities are as follows:

For Intermediate Result 1: Agricultural Productivity Increased:

- Institutional Collaboration
- Capacitation and Creation of Water Users Associations

For Intermediate Result 2: Watershed Stability Improved:

- Protection of Critical Coastal Zones (Planning and Governance support)
- Procurement of Materials for Civil Protection Authorities
- Environmental Education
- Health Insurance for Collaborating IR2 Farmers

Intermediate Result 3: Agricultural Markets Strengthened:

- Provide Value Chain and Agro-Enterprise Analysis
- Improve Business Skills Training and Performance
- Improve Private Sector-Small Producer Linkages and Partnerships
- Facilitate Market Linkages
- Increase Access to Financial Products
- Improve Market Information Systems

For Intermediate Result 4: Capacity Building Support to Implementing Partners: All activities.

Information, Analysis, and Environmental Compliance Unit: All activities.

INTERMEDIATE RESULT 1: AGRICULTURAL PRODUCTIVITY INCREASED

The IR1 activities that are assessed in this subsection are:

- Promoting Good Agricultural Practices through Farmer Field Schools
- Nursery and Grafting Support
- Establish small-scale irrigation projects

The larger-scale irrigation projects are assessed in the Infrastructure subsection below.

Positive Impacts

IR1 activities have several positive impacts.

Physical Environment

All of the focus crop technical packages promote the addition of organic matter to soil, by incorporation of weeds rather than burning during land preparation, and composting, which improves soil structure and fertility. These practices have a positive impact on soil quality. Overall, these positive impacts will be enhanced in the event of future climate change, when increased soil organic matter and water retention will benefit crops during drier or drought periods.

Erosion is generally not a problem on land where IR1 crops are promoted. With the exception of cacao, all IR1 FFS focus crops are in the plains and no recommended cultural practices would provoke erosion. Cacao FFSs in piedmont areas and on steep slopes in Port Margot and au Borgne Communes are on sloped land and could contribute to soil erosion, but the majority of IR1 Cacao FFS farmers are increasing the cacao population density of existing plantations. These mature cacao gardens consist of a mixture of banana and numerous fruit and timber species which create a multi-storied canopy with significant leaf litter and some shade tolerant vegetation covering the soil. Even on steep slopes there is negligible sheet, rill or gully erosion in mature cacao gardens, and none which results from IR1 Cacao FFS practices.

Integrated Pest Management (IPM) practices promoted in focus crop FFS technical packages entail timely and less frequent application of pesticides. The pesticides most frequently recommended in the focus crop FFS have a relatively short half-life and are much less toxic compared to several of those formerly used by farmers before project. Therefore, any run off from flooding or drainage from irrigated fields should carry less total amount of pesticide residuals than before the introduction of AVANSE practices and those residuals that are present will be less persistent and less toxic.

SRI, the rice irrigation practice promoted by AVANSE, entails periodic drying of the paddy which allows weeds to grow. AVANSE, however, promotes the use of the double cone mechanical weeder, rather than herbicide, to control weeds. As observed by and reported by farmers to the PEA Team, weed control in focus crops is almost entirely manual.

SRI also requires one-half the amount of fertilizer (Urea, DAP, and NPK) that farmers apply in traditional paddy rice production. This reduces the potential for nitrate contamination of groundwater and the eutrophication of waterways caused by nitrate and complex fertilizers carried into waterways by drainage of irrigated fields and flooding. The soil fertility survey and mapping program to be coordinated by Auburn University will facilitate a more accurate estimate of crop needs for specific soils and will result in more efficient use, which, because of the innate fertility of the alluvial soils in the plains, may frequently result in a reduction in the amount of fertilizer use.

The cacao FFS technical package is organic, eliminating potential use of synthetic fertilizer, pesticides and herbicides in established and new cacao plantations. Rodent control is accomplished with organic artisanal bait which is non-toxic to poultry and humans. Runoff from FFS cacao plantations will carry no chemical contaminants into waterways.

IR1 practices also have a positive impact on water quantity by reducing the use of water per hectare. The application of SRI reduces the quantity of water necessary for rice irrigation from 20 to 50%. In addition, all irrigated focus crop technical packages include training in better on-farm water management and improved efficiency of use. Reformation of existing WUAs and creation of new WUA's will also contribute to a more equitable distribution and more efficient use of water. This positive benefit, however, could be eroded if irrigation acreage is expanded beyond the sustainable level of available water.

Biological Environment

Because of the positive impact of AVANSE activities on soil and water quality resources described above, there will be negligible sediment load carried downstream in waterways from IR1 focus crop target zones and the amount of potential chemical contaminants will actually be reduced from pre-AVANSE levels. Therefore it can be said that IR1 activities should have a

positive impact on aquatic ecosystems, such as coastal mangrove forest, coral reefs and sea grass.

New cacao plantations in parcels formerly devoted to annual crop production will increase habitat for birds.

Socio-Economic Environment

All IR1 activities will increase the incomes of those who participate in the program or adopt AVANSE techniques via lateral diffusion. The increased incomes are associated with crop production as well as the production and sale of input products and services (as with nurseries and grafting). These economic benefits will stimulate further economic activity in the project area (the multiplier effect). The overall improvement of the environment associated with IR1 activities should also lead to an improved quality of life for those living in the areas where the activities are established.

IR1 promotes the use of pesticides with lower toxicity than those that were used before AVANSE began. FFS farmers are instructed in safe use of pesticides including: proper storage, mixing of pesticides with water, use of protective safety gear, proper use of back pack sprayers, cleaning of sprayers and proper disposal of wash water, and proper disposal of containers. These safe use measures are an improvement over the casual practices employed by farmers who have not been properly trained. This has a positive impact on water quality, solid waste management and health.

By targeting 20-25% women's participation in focus crop FFS and WUAs and 40% of the investment in undeveloped dry lands, including production of high value vegetable crops by drip irrigation, jobs for women will be created and income generated. With increased income women can better provide for their children, pay school fees, etc. AVANSE IR1 activities focused on women should have a positive impact on women and children.

Negative Impacts

IR1 also has some negative impacts, which are described below. All of these impacts can be reduced to insignificant levels via mitigation measures.

Physical Environment

Cacao conversion of parcels on sloped land formerly devoted to annual crop production can contribute to erosion in the first year of conversion when the ground is exposed, but conversion involves planting banana and woody species for shade, which as they grow protect the soil from raindrop impact both with their leaf cover and the litter layer they generate. So the increased erosion is a short-term impact.

There is the possibility that conversion to new cacao plantation of land formerly dedicated to annual crop production for consumption and sale will oblige smallholders to use other parcels more intensively, shortening fallow periods where practiced, thus affecting recovery of fertility and aggravating soil erosion when these parcels are on sloped land. This will be particularly true for farmers with limited holdings. For those farmers with larger holdings the negative impact could be negligible, easily remedied by including a cover crop in the rotation of fallowed parcels. For farmers with limited holdings, AVANSE staff should ensure that the farmers receive training on maintaining soil fertility and reducing erosion through the use of cover crops and no- or low-till practices on their other, often upslope fields.

There is the potential for increased herbicide use with SRI. Under traditional paddy rice production, the maintenance of standing water on the fields provides weed control. SRI's

practice of periodic drying of the paddy allows more weeds to grow than in traditional rice irrigation. Although the project is promoting the use of the double cone mechanical weeder, and many farmers are adopting its use, some farmers may choose to use herbicides for weeding instead. So there is some potential for increased use of herbicides, although this was not the situation found by the PEA Team.

Although pesticide use was included in the positive benefits of IR1 activities, it must be noted that this is largely due to the AVANSE's use of the Mission-Wide PERSUAPs in its training, promotion and procurement activities. It is imperative that AVANSE continue with this approach with the FFSs as well as with its new activities with nurseries to insure that the use of pesticides remains a positive impact, because improper use will lead to damage to human health and contamination of water and soil resources.

Biological Environment

Although all indications are that the adoption of AVANSE IR1 practices has led to a decrease in the use of agricultural chemicals, those chemicals are still used and there is the potential that they are finding their way into watercourses. The improvement of drainage on irrigated rice areas will increase the tail water coming off irrigated fields. AVANSE's practices on efficient fertilizer use and compliance with the PERSUAPs will mitigate this impact, but AVANSE should also conduct some monitoring downstream of the drainage outlets to test the hypothesis that there is little to no impact on watercourses and their aquatic flora and fauna from agricultural chemical use on AVANSE supported fields.

Socio-Economic Environment

One potential negative socio-economic impact associated with cacao conversion, in addition to the soil erosion issues described above, is availability of land to grow food crops and the associated issue of food security. This may become a problem in four to five years once trees have grown and begin to produce significant shade, thus making it difficult to grow annual crops that require full sun. In most cases, cacao farmers working with AVANSE possessed multiple plots or fields and could produce food crops elsewhere. In one or two cases, the PEA Team encountered farmers who did not appear to possess other land. When asked about this, even farmers with very small holdings said that there would not be a problem as they would be able to continue to grow annual crops in the new cacao plantation between the rows, and that as the cacao and shade trees matured they would still be able to grow shade tolerant yams. There will, however, be a period of several years when the shade of the maturing plantation will necessarily reduce food crop production before the cacao plantation begins to generate income. In these instances, AVANSE staff should ensure that the farmer either has a current, additional income source (with which s/he could buy food) or has a strategy in place to continue producing food crops on the agroforestry plot (e.g., heavily lopping trees in the plot to allow sun to reach the food crops).

INTERMEDIATE RESULT 2: WATERSHED STABILITY IMPROVED

The IR2 activities that are assessed in this subsection are:

- Promoting Hillside Stabilization through Agroforestry
- Sub-Watershed Management and Governance
- Reforestation and Land Reclamation
- Nursery Support
- Grafting Support
- Development of Pigeon Pea Value Chain
- Protection of Critical Coastal Zones (Mangrove planting)

- Community Cisterns for Home Gardens
- Pilot Small-Scale Greenhouses

Positive Impacts

The overwhelming majority of IR2 activity impacts are positive.

Physical Environment

Promotion of hillside stabilization, sub-watershed management and governance, reforestation, the Pigeon Pea pilot project and protection of coastal zone resources will have a positive impact on soil resources and water quality and quantity. In the long term, the mechanical structures – bunds reinforced with plant residues and bamboo stakes and gully plugs – and the roots of biological structures (grasses, pineapples, etc.) established on contours in sloping land will hold the soil in place and will slow and capture most sediment-laden runoff, thus reducing sediment loads in rivers.

In the short term, in many cases, the contour structures will begin to capture sediment and reduce erosion after only one rainy season. This is illustrated by the large amount of sediment captured after only one year through gully plugs. This positive impact is also evident when one compares the improved agroforestry plots to traditional plots which are tilled, planted and weeded with no protective contour structures in place. The presence of tree seedlings and bund vegetation will also reduce or eliminate slash and burn practices, as farmers will not destroy and burn their valuable plants.

Pigeon Pea planted as an intercrop with agroforestry will enhance these benefits, as would the use of other cover crops. Cover crops grow faster than most of the tree seedlings, providing a rapid, complementary soil anchor as the other species mature. Pigeon Pea or other cover crops planted in pure stands in degraded, steeply sloped areas or in agroforestry plots can also contribute to reducing erosion and sediment loads.

Agroforestry and reforestation will also have positive effects on water quantity. Infiltration ditches built behind the contour bunds will slow surface runoff and increase infiltration, ultimately contributing to groundwater recharge. As the agroforestry systems and reforested areas mature, their root systems and leaf litter will also increase infiltration.

Overall, these positive impacts will be enhanced in the event of future climate change, when increased soil organic matter and water retention will benefit crops and trees during drier or drought periods. In addition, erosion reduction will be enhanced during predicted torrential rain events (often associated with more intense hurricanes). In fact, agroforestry and reforestation for upper watersheds and slope stabilization has been identified as a key climate change adaptation measure in the region (Tetra Tech 2013, Eitzinger et al. 2013).

Biological Environment

Agroforestry, reforestation and mangrove planting will have positive impacts on native fauna once the trees mature, when they will serve as a refuge and habitat for birds, mammals and reptiles. This should contribute to the conservation of the 17 species of threatened birds that utilize forested areas (DAI, 2014b). The mature forests should also contribute to reducing pressure on any nearby vestiges of primary or secondary forests as timber trees (e.g., Mahogany, Haitian Oak) are slated to be harvested by plot owners in the future. If the reforested areas are correctly managed and protected, they can also serve as areas where native plant species can re-establish themselves.

When agroforestry and reforestation plots are established adjacent to or in the vicinity of remaining natural forest stands, pressure on these forests will be reduced. Once the trees have matured, farmers will have a ready source of timber and charcoal trees, thus obviating the need to cut trees for these needs in the remaining natural forest. This positive effect is most likely to occur in the upper Jassa watershed where IR2 expansion areas have been identified.

Positive biological environment impacts are also likely once sound sub-watershed management plans have been developed and implemented. These impacts may include protection of natural habitat and mature agroforestry blocks that act as refugia for biodiversity and increasing habitat through reforestation and establishment of new agroforestry areas.

Socio-Economic Environment

Nearly all of the IR2 activities will increase the incomes of those who participate in the program or adopt AVANSE techniques via lateral diffusion. The increased incomes are associated with crop production (food and timber) as well as the production and sale of input products and services (as with nurseries and grafting). Agroforestry, reforestation and the planting of Pigeon Pea and other cover crops will also improve the value of land. All of these economic benefits will stimulate further economic activity in the project area (the multiplier effect). The overall improvement of the environment associated with IR2 activities should also lead to an improved quality of life for those living in the areas where the activities are established.

Several positive socio-economic environment impacts are associated with enhancing the capacity of the Civil Protection Authorities. These include improving response times to natural disasters and/or mitigating their effects which in turn will have direct benefit to those in direct danger and indirect benefits such as reducing contamination of water resources which will, in turn, reduce the risk of sickness linked to water-borne diseases. Rapid responses will also re-establish transport and communications more quickly, benefitting affected populations.

Community cisterns are expected to store water to be used in irrigating small vegetable gardens managed by individual women or women's groups. Consequently, the activity should have positive socio-economic impacts by enabling vegetable production in the dry season and, in turn, sale of the harvested vegetables. This will increase the household revenue of participating women. Moreover, due to its relative simplicity and the materials used, this activity is likely to be sustained well beyond the LOP. Consequently, if the initial intervention is successful, AVANSE should consider scaling it up to benefit an increased number of women farmers.

Negative Impacts

Several potential negative impacts were identified for IR2 activities. These are described below. Most of the potential, negative impacts are related to erosion, sediment loads in water resources, and pesticide and fertilizer use. All of these can be reduced to insignificant levels via mitigation measures.

Physical Environment

In some cases, establishment of agroforestry blocks can increase soil erosion in the short term. This applies mainly to plots on the steepest slopes (> 30%) and on plots that were fallow or were used for pasture (covered with grass). Increased erosion can also occur if plots are tilled too thoroughly or too deeply. On the steepest slopes (Figure 13), care should be taken to disturb the soil as little as possible and to ensure that vetiver grass⁷ – the superior soil

⁷ Vetiver plantings must be monitored closely however. In some areas of Haiti, the roots are used to make an essential oil and plants are uprooted to reach the roots. AVANSE staff must ensure that this does not happen in project-supported plots.

conservation species – is planted along the bunds. Plots that appear to be in permanent or semi-permanent pasture and plots that have 2 or more years of fallow before resuming production should be avoided.

Potential negative impacts on the physical environment from sub-watershed management and governance activities are limited. There is a slight risk that watershed plans might misidentify a given zone for a given activity (e.g., agroforestry as opposed to reforestation on slopes > 60%) or improperly conceived and implemented small projects could be included in plans for sloped areas, both of which could increase erosion and sediment loads. But proper supervision and technical oversight of management plan development should eliminate these risks.

The only negative physical impact associated with reforestation is increased erosion and sediment due to soil disturbance during seedling planting. This can be mitigated by limiting the area disturbed during planting and shaping the disturbed area around each seedling so that water is harvested during rainfall. Impacts can further be reduced on steep, bare slopes by using mulch, and by incorporating vetiver contour hedges into the reforestation design.

Pigeon Pea planted in pure stands can increase soil erosion and sediment loads if fallow, grassy areas are plowed up to plant it or if it is all harvested at once by cutting down the plants. A pure stand of Pigeon Pea suppresses any understory growth and cutting a pure stand all at once will result in bare soil. In order to avoid this situation, it is preferable to either intercrop Pigeon Pea or to avoid harvesting all plants at the same time.

Using Pigeon Pea for re-vegetation of critical areas as an alternative to reforestation is also questionable. Its canopy is often light and feathery (i.e., not dense) and leaf litter production is minimal. Most tree species will eventually have denser crowns and more leaf litter thus making them superior choices for reforestation.

Grafting has no negative impacts on the physical environment, but pesticide and fertilizer use at nurseries, green houses and home gardens watered by cisterns can, if used improperly, result in damage to human health and contamination of water and soil resources. A build-up of pesticides in the soil and water can lead to toxic conditions and high levels of persistent chemicals in the environment. The small size of each of these individual activities makes these impacts minimal, even when cumulated (for instance, each nursery will be well under a hectare, so that the cumulative impact would come from 38 hectares spread over the entire project area). These negative impacts can be reduced or eliminated adhering to the guidance in the Mission-Wide PERSUAPs and using sound nutrient management procedures.



FIGURE 13: BARE SOIL ON STEEP SLOPE WITHIN NEW AGROFORESTRY DEMONSTRATION

The construction of roof-harvested water systems and small green houses could cause localized increases in erosion and sedimentation. These activities, however, will be well under USAID's definition of small-scale construction (10,000 square feet [930 m²] and less than \$200,000 total cost [USAID 2014]). As such, it is unlikely to cause significant adverse environmental impacts, and those impacts that do exist can be mitigated by using USAID guidelines for small-scale construction (USAID 2014c).

Biological Environment

In some cases, installation of agroforestry blocks may have small negative impacts on biodiversity. For instance, if an old fallow field is cleared, birds and other woodland niche wildlife may lose some habitat. In these cases, it may be preferable to talk to the farmer and see if s/he is interested in keeping the fallow vegetation intact and planting tree seedlings directly into the fallow. In this way, it may convert into a mature agroforest sooner than if one cleared the field and installed the standard AVANSE agroforestry plot.

Similarly, slight risks for negative impacts on flora, fauna and vestige natural ecosystems could occur due to sub-watershed activities. These could include inappropriate zoning and associated conversion of mature agroforestry blocks and/or vestiges of natural forest and increased pressure on these areas due to inappropriate, adjacent land uses. Again, these risks should be eliminated via a technically sound management plan development process as well as proper training and implementation of small projects.

Reforestation can result in negative biological impacts if non-native species are introduced, which then become invasive (and displace native flora). This will not be the case with AVANSE as no introduction of new, non-native species is being promoted.

Mangrove planting can result in negative biological impacts (or at least no benefits) if poor planting procedures are used. This can be mitigated by using proven methods promoted by the Mangrove Action Project (MAP-Indonesia, 2006).

As described above, pesticides and fertilizer use in nurseries, green houses and home gardens watered by cisterns can contamination of water and soil resources, which may in turn impact non-target insects and aquatic species. Elevated fertilizer use can cause excessive nutrient levels in the water, leading to eutrophication and an imbalance or disequilibrium of aquatic species and ecosystem functions. A build-up of pesticides in the soil and water can lead to toxic conditions and high levels of persistent chemicals in the environment. Training and proper application can reduce these effects.

There is one potential, small negative impact on the biological environment from grafting. Diseases can be introduced into grafted trees and seedlings (including trees that supply scion material). This can occur if grafting tools (knives, pruning shears, etc.) are not regularly cleaned and sanitized. However, this impact will be confined to individual trees; the assessment team is not aware of any diseases, introduced through grafting, that will spread to other trees. This risk can be minimized or eliminated via training and sterilizing grafting tools.

Socio-Economic Environment

As is the case with cacao conversion, discussed under negative socio-economic impacts for IR1, one potential negative socio-economic impact associated with the agroforestry blocks is availability of land to grow food crops and the associated issue of food security. This problem is the same as described for cacao conversion, and the mitigation measures are the same as well.

The principal negative socio-economic impact related to the sub-watershed management and governance is the food security issue cited above. This impact could occur if too much land is zoned for agroforestry and/or protection and not enough land is left for food crop production. Sound, technical development of sub-watershed management plans should eliminate this risk.

There are two potential, negative socio-economic impacts associated with reforestation. The first one is social conflict if tree tenure is not clearly established and documented before the trees are planted. Community members, landowners and, in some cases, charcoal producers must all be in agreement on who the trees belong to once they are mature and who has rights to harvest them. Another minor, negative impact could be wasted labor if tree species are mismatched to sites and perish after planting. On highly degraded sites, hardy species, such as *Acacia auriculiformis* should be planted. The PEA Team observed such a site in the St. Suzanne area that had been partially reforested with this species. Finally, it should be noted that this activity will occur on highly degraded lands that are not currently productive (i.e., not currently farmed) so there is no risk of agricultural land being taken out of production.

The main negative socio-economic impacts from nursery activities are linked to an unhealthy environment for nursery workers and neighbors. Standing water and high levels of fertilizer and pesticides can cause sickness among staff and those living next to nurseries. These effects can be reduced through proper training on the management of fertilizers and PERSUAP compliant training on pesticides.

The water collected in cisterns is to be used by individual women or women's groups to water small vegetable gardens. If the water management committee also decides to use it for drinking water then contaminants – most commonly microbiological contaminants (Ahmed et al., 2011) – must be considered. The level of contamination is strongly influenced by the season, the number of preceding dry days, animal activities in close proximity to the roof and rainwater tanks, system management, and system maintenance. The activity could increase gastro-intestinal disease if the systems are not designed, managed and monitored correctly. This impact, however, can be mitigated to the point that it is not significant by application of international guidelines for the design and management of roof-harvested rainwater systems and promotion of water treatment prior to use (such as UNEP/OAS 1998 and IRD 2013).

INTERMEDIATE RESULT 3: AGRICULTURAL MARKETS STRENGTHENED

The IR3 activities that are assessed in this subsection are:

- Facilitate Improved Post-Harvest Handling, Storage and Processing
- Promote the Use of Vouchers as a Market-Oriented Subsidy Mechanism

Positive Impacts

IR3's activities in and of themselves are not designed to have positive impact on the environment. However, in the case of the voucher program, its efforts to ensure that the boutiques in the program were compliant with the Mission-wide PERSUAPs heightened the SIBA Team's and the Environmental Compliance Team's awareness of the need to incorporate environmental issues into the SIBA program. So now, even though the pesticide component has been removed from the program, the heightened environmental awareness remains, and SIBA Team members are working with boutique owners to ensure that they are storing and handling fertilizers in an environmentally responsible manner. This has positive impact on the physical environment because it will reduce the possibility of accidental or careless releases of fertilizers from the boutiques into the environment. If this same environmental awareness is carried into IR3's grants for post-harvest handling, storage and processing, similar positive

impacts on the physical environment can be expected. This can be accomplished by incorporating input-output analysis of processing facilities and cleaner production concepts into the umbrella EMPR for these activities. NB: site-specific screening forms for six SIBA boutiques and 17 potential grant recipients can be found in Annexes I and H, respectively.

Socio-Economic Environment

IR3's activities to improve post-harvest handling, storage and processing will improve the facilities that receive grants, increasing their capacity, processing efficiency and profitability. It will also improve markets for farmers, which will increase their incomes. The voucher program reduces the costs of inputs to participating farmers, thus increasing their incomes. As with other income improvement activities of AVANSE, the increased incomes for farmers and processors will have multiplier economic improvements for the communities in which they live.

Negative Impacts

The negative impacts of IR3's activities are the "flip side" of the opportunity to incorporate input-output analysis and cleaner production concepts into IR3's activities. All of IR3's activities will be with facilities that fall well below the 1,000 m² limit for small-scale construction. For those grants involving construction, there may be negative impacts associated with construction such as erosion and runoff, contamination from chemicals used during construction and noise; however, these should be minor and easily mitigated with standard small-scale construction mitigation measures.

Physical Environment

Agricultural product processing facilities can contaminate water via their wastewater discharges. They may generate wastewater from processing (cleaning, sanitizing, peeling, cooling, and cooking), transport, and cleanup. Generally the wastewater from these activities has a high biological oxygen demand (BOD) and may contain relatively high levels of suspended solids, nutrients, and minerals. Only two of the types of processing that IR3 is currently considering supporting produce processing wastewater: cacao fermenting which produces small quantities of fermenting fluids and wastewater from facility washing; and banana processing, which will generate wastewater from cleaning the bananas before packaging for shipment. Sanitary facilities for employees also generate wastewater. The potential impacts of processing on water quality can be mitigated by providing appropriate wastewater treatment.

Fertilizer storage is another potential source of water contamination. If storage is not done in a rainproof facility, the fertilizer could come into contact with water, go into solution with the runoff from the area in which it is stored, and be released to the surrounding land and potentially enter downstream watercourses. This impact can be mitigated via the application of internationally recognized good practices for fertilizer storage.

Air emissions from processing facilities may be related to the production process or to equipment that supports the process such as generators and boilers. Air emission from processing (including odors) may come from dryers, smokers, stoves, ovens, and fermentation tanks. Air pollution from generators and boilers come from the exhaust emissions. Milling and mixing may also produce dust, which is another form of air emission. For the small-scale processing facilities that IR3 will support, these emissions will most likely be insignificant. Odor and dust, however, may need to be addressed inside if the facilities are located near dwellings or retail businesses.

Solid wastes from agricultural product processing include packaging material and containers that inputs come in, scraps or waste generated during the production process, and damaged or

unmarketable products. For the types of processing that IR3 envisions supporting, the processing wastes are organic, such as rice husks. Impacts from solid waste disposal can be mitigated by adopting “reduce, reuse, recycle” programs and developing and adhering to a waste management and disposal plan.

The only solid waste generated by the fertilizer voucher program are the large bags in which the fertilizer is sold, and that waste is generated at the point of use (on farms) rather than at the point of sale (boutiques).

Processing facilities can also be a source of noise, generally from the processing equipment, or support equipment, such as generators.

Biological Environment

All of the wastes identified in the physical environment discussion could, if they are not properly treated and disposed of, end up in the environment and impact flora, fauna and ecosystems.

The small quantities of waste that will be generated at the small-scale operations that IR3 anticipates supporting would not have a significant impact on the biological environment.

Some small operations, however, may use fuelwood or charcoal as a source of energy. If that fuel comes from mangroves or natural forests, its use would be contributing to the destruction of those resources. Mitigating this impact requires having processors acquire their fuel from sustainable sources or switch to a different fuel.

Socio-Economic Environment

The socio-economic negative impacts associated with the processing facilities and boutiques that IR3 supports or plans to support are primarily associated with worker health and safety. Odors and noxious fumes can be an issue at processing facilities and boutiques that store fertilizers. These can usually be adequately mitigated by ventilating the buildings.

Dust may be generated during milling operations. It can be mitigated by providing adequate ventilation and/or dust masks.

Some processes may produce heat or chemicals that can be harmful to workers. For instance, cacao fermenting produces heat and a mild acid, acetic acid (also called vinegar acid), in the fluid that is generated by the fermenting process. The impact of heat can be mitigated with adequate ventilation. Protective equipment (gloves and aprons) can minimize direct contact with the fermenting fluid, thus mitigating the potential health and safety hazard.

Finally, pest control can be an issue at agricultural processing facilities. If pesticides are used to control pests, they could pose health risks to workers as well as consumers of the product produced. This problem can be avoided or minimized by practicing IPM and carefully controlling any pesticide use in the facility.

INFRASTRUCTURE

All of AVANSE's infrastructure activities involve conventional large-scale construction, which has common environmental consequences. So this section begins with a presentation of the environmental consequences common to all construction activities. This is followed by a separate section for additional consequences that are specific to each type of infrastructure activity: irrigation, road rehabilitation, ravine stabilization and major drainage. NB: site-specific screening forms for seven (7) large-scale irrigation systems can be found in Annex J.

Large-Scale Construction

Positive Impacts

Socio-Economic Environment

During pre-construction and construction there will be job opportunities for skilled and unskilled people. According to locals, there are many trained skilled workers in the area that are currently idle. Women and youth who are skilled or unskilled will also benefit from employment particularly those who live in the project area. Special considerations will be given to hire women. This will lead to many more people having regular monthly income. Existing businesses in the area will benefit from the increase potential of selling their goods to workers such as toiletries, cooked food, groceries, clothing and accessories, medicines and telephone cards. Local people will have the opportunity to open new businesses due to increased demand for goods from workers. Women in particular will have the opportunity to open new businesses that are directly related to the construction work to be taking place in the area.

Negative Impacts

Physical Environment

Earthworks will contribute to a large amount of soil movement around construction sites and establishment of temporary material storage areas. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils can equally be washed away and eventually get deposited in rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.

Vehicles and equipment used during construction may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being move to and from a work site may pass through off-road areas and impact soil with oil and fuel spills. In addition, areas where fuels, lubricants and chemicals are stored or where vehicles and equipment are fueled or serviced can be sources of hazardous substance releases to the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.

If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:

- Washing vehicles or equipment in or nearby the river;
- Use of the rivers and canals for the maintenance of the personal hygiene of the population
- Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
- Surface run-off from on-site stockpiled sand and gravel; and
- Inadequate disposal of solid wastes and wastewater generated during construction from workers.

Construction activities may require that topsoil is removed. In these cases, the potential exists for the destruction of top soil.

Solid waste will be generated from site vegetation clearance and during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various other wastes generated during construction will need to be managed and disposed of properly. These will include solid waste from packaging materials, wood and steel crates, cardboard, wrapping materials, boxes, sacks, drums, cans and chemical containers and any other unused materials. Workers will also generate domestic solid waste.

Indiscriminate disposal of waste could breed flies, mice and other pests that can cause disease like diarrhea, cholera, malaria, dengue fever, chikungunya when mosquitoes breed in water collected in small containers. Littering also destroys the esthetic of the natural habitat. Plastics, especially plastic bottles are a major problem in Haiti. If plastics are not properly disposed of, they will aggravate the already bad situation. Styrofoam containers, although banned by Haitian law, are also a major problem in Haiti. Waste could also be carried by runoff into streams where it impedes flow and impacts on water quality.

Excavation, loading and emptying of dump trucks will generate dust. Uncovered trucks transporting cut and fill material to or from the site will also propagate dust. Excessive dust is known to cause upper respiratory diseases, aggravate allergies like Asthma and cause eye irritation. Dust also impedes visibility and increases the risk of accidents. Dust settles on foliage and disturbs plant growth. Dust is a nuisance to nearby residents.

Emissions from construction vehicles and equipment will cause fumes to be released in the atmosphere which can also be dangerous to workers and the general public. The open burning of garbage will also cause air pollution.

The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area, particularly because they are rural areas where noise is not generally a problem. The use of construction equipment will generate noise between 78 – 111dB. The impact of sustained noise on humans includes stress, headaches and in extreme cases, hearing impairment. Noise also affects wildlife as it drives animals away from their natural habitat.

Large-scale construction may require the exploitation of borrow pits to supply construction materials. This entails the use of available geological data to locate areas within economically reasonable distances where material whose geotechnical properties meet the specifications of its intended use. It requires establishing the area and depth of exploitation. It may also involve building short roads to access the materials, although generally borrow pits are located next to existing roads to reduce costs.

The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use, a borrow pit can become a hazard for children and animals and becomes breeding ground for disease vectors. With inadequate consultation with land owners, borrow pits can become a source of litigation.

There is the need for the Contractors to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for equipment, storage for materials to be used for the works, offices and possibly a workers' camp. This entails:

- Land acquisition/Lease

- Clearing
- Erection of structures
- Provision of Sanitary facilities

The establishment of workers camps and other work facility locations in the area may bring a number of negative impacts on the environment and the nearby communities, including: poor siting of facilities, solid waste disposal, taxing potable water supply, community conflicts, etc.

Biological Environment

The primary ecosystems that may be impacted by AVANSE construction activities are aquatic due to siltation of the rivers from erosion during construction and pollution from leaked/spilled lubricants, fuels and hazardous substances.

Socio-Economic Environment

During the construction phase, workers in the construction zone will be exposed to work-zone accidents such as, slips, falls and strain from repeated movements. Neglect to follow laid-down procedures for carrying out construction activity could also lead to work related accidents. Workers will also be exposed to increased levels of noise. Inhalation of dust could lead to increased incidence of upper respiratory diseases.

Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.

Workers may be exposed to unsafe water supply. Unless they have access to a safe supply of water for drinking and hygienic uses (bathing) they will be exposed to waterborne diseases. Workers also need to be provided with toilet facilities.

Sexually transmitted diseases (STDs) such as HIV/AIDS are of concern during the construction phase due to labor mobility. There is concern that the already high prevalence of HIV found in Haiti could be exacerbated through spread of the disease by the construction workers and sex workers attracted to workers' camps. An increase in untreated HIV/AIDS infected persons leads to the reduction in the pool of available labor. If a contractor has a significant number of people living with HIV/AIDS who are untreated and workers infected with STD it may result in the loss of man-hours. High incidence of HIV/AIDS may also result in a high turnover of staff, thus increasing the cost of training. An increase in STDs and diarrheic diseases in the area could also over burden the health facilities and destabilize family life.

Friction between workers and community members may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STDs and increased incidence in HIV/AIDS. Friction between workers and Contractors may be caused by poor labor relations. Finally, bad relations may exist between members of the community and the Contractors caused by community complaints not been properly addressed by the Contractors.

Finally, firms that are hired to design and construct the road may not be aware of their role and responsibilities in the expected management of environmental issues and impact mitigation if these are not included in their contract with AVANSE.

Irrigation

Positive Impacts

Physical Environment

Rehabilitation of irrigation schemes will help to ensure a reliable supply of irrigation water. Some farmers are reliant upon irregular delivery of water through semi-functional systems, with few operating control structures. Other farmers are reliant upon flood water and rain to produce their crops. The timing and quantity of water delivered via flooding and rainfall is unpredictable. Climate change is projected to decrease the unreliability of these sources of water by increasing uncertainty of the onset of rainfall and its regularity. Thus farmers will be facing increasing uncertainty regarding water availability.

The irrigation works will include provision for flow measurement in the main and secondary canals. It will also include controls (e.g., gates) in the canal system. These will enable the diversion into the system to be regulated and the water delivered to each secondary canal to be monitored and controlled thus improving overall conveyance effectiveness and water use efficiency.

Biological Environment

The IR1 pump irrigation projects on dry land on the northern plain will result in intensive use of land brought under irrigation, and potentially reduce the incidence of slash and burn agriculture practiced by some itinerate farmers in the Prosopis (Mesquite) forest.

Socio-Economic Environment

Experience has shown that the targeted crops by AVANSE will produce yields that could be two to three times higher than rain-fed systems and poorly operating irrigation systems. This is due to the ability to manage water, a critical factor in production. Increased crops production will lead to increased income for the farmers.

Although flood water is necessary for rain-fed crops production, too much flooding or flooding coming at the wrong time in the growing cycle can harm or destroy a crop. Some of the irrigation rehabilitation projects will include flood control.

Currently many fields in the project area are unleveled and have no or insufficient drains. This has resulted in water logging in some places in the project area, causing reductions in crop yields. The project will build secondary drains and train the farmers in construction of tertiary drains serving their plots. In addition, farmers participating in the project will receive training on field leveling. As farmers practice what they learn in these training sessions, they will improve overall drainage from their plots and reduce or eliminate places in their fields that have poor drainage. This will reduce or eliminate the water logging problems.

The IR1 dry land pumped irrigation program will regularize the relationship of itinerate smallholders with legal lease holders of tracts of State land. Currently these smallholders are illegally exploiting land abandoned or neglected by lease holders. IR1 will mediate contracts between smallholders and legal lease holders and provide pumps and technical assistance. This activity should have a positive impact on tenure and on land use.

Negative Impacts

Irrigation can have significant negative environmental impacts. Many irrigation projects over 100 ha cannot be adequately assessed using only an EMPR, and need to be assessed using Environmental Assessment techniques (including assessing alternatives). Furthermore, they cannot be assessed with insufficient data.

Physical Environment

The most significant impact of irrigation is its potential impact on downstream water availability. A system that is sustainable is one that withdraws the water needed to meet the irrigation water requirement while leaving enough water in the river or aquifer to supply downstream human and environmental users. If it does not do this, it will have significant impacts. The extremely low flow situations that the rivers in the project area are subject to during the drier seasons make water availability a critical concern.

This is not a hypothetical impact in northern Haiti. In the Jassa watershed, Agro-Action Allemande constructed an irrigation system in Haut Maribahoux, which diverted irrigation water away from downstream irrigators, who are now requesting that AVANSE help them divert water from another source to reestablish their irrigation system. In addition, the diversion by Agro-Action Allemande diverted water from two small lakes (Lac Won and Lagon Robino) causing the water levels in the lakes to drop and damaging the lake ecosystems.

To assess water availability and downstream impacts, one needs a minimum of three types of data: low flow at the point of diversion, irrigation requirement for the crop and area to be irrigated, and downstream water user requirements (human and environmental). Unfortunately, none of the studies conducted to date on the irrigation systems that AVANSE proposed to support have collected all three types of data. None of the studies have information on downstream water use, not even human use, which is much easier to determine than environmental needs. Only one study, that for Dubré, calculated low flow at the diversion (by taking a field measurement during January 2015) and irrigation requirement. In this case, however, the study determined that the low flow in the river was 150 liters per second (l/s). The study assigned 30 l/s of the flow for the environment (it did not present any information on the human demand downstream), leaving a flow of 120 l/s for irrigation use in the Dubré system. The water demand for the area currently being irrigated (81 ha), however, was determined to be 156.6 l/s. Nonetheless, the study proceeded to propose a design to irrigate the 81 ha plus an additional 58 ha, because that is what the RFP requested.

Dubré is a rice irrigation system. SRI is being promoted by AVANSE, and SRI can reduce irrigation requirement from 20 to 50% (Brouwer et al. 1989, IRRI 2013). The irrigation requirement of 156.6 was determined assuming traditional paddy rice irrigation. If one assumes a mid-point between of the reported reduction values for SRI, then the reduction could be 35%, which means the water demand for the 81 ha would be 102 l/s. But this reduction is only realized when the entire irrigated area is under SRI water management techniques. In reality, the adoption of SRI is progressive, so it may take some years to achieve the whole reduction.

In this case, a preliminary assessment of water availability would have indicated that at Dubré, no work should be allowed at the diversion that would increase the withdrawal of water and that only rehabilitation of the gates and canals in the system coupled with the introduction of SRI should be allowed. Over time, this would allow for full utilization of the existing 81 ha. Expansion, however, should not move forward at this time, as there is not sufficient water. After adoption of SRI water management by most of the irrigators, some expansion may be possible in the future. Situations such as that at Dubré can only be mitigated if adequate data are collected and assessed before system design is initiated.

Water availability for the small pumped irrigation systems proposed on the northern plain should not be a significant problem. The alluvial aquifer is quite productive, and the amounts proposed for pumping are small. However, placement of the wells will have to be made with consideration of their potential impact on water levels in neighboring wells. Some hydrogeological

assessment will be necessary to predict the size of the cone of depression associated with each well.

Salinity is often considered a negative impact associated with irrigation; however, increased soil salinity will not be an impact of the Proposed Action. Generally, traditional and SRI paddy rice irrigation does not increase soil salinity, as sufficient water is applied to wash salts below the root zone. The most common practice for addressing soil salinity in irrigated fields is to leach accumulated salts below the root zone by applying excess water. In paddy rice production, excess water is regularly applied as part of the irrigation regime to meet the needs of the plants. So, accumulations of salts in the soil will not be a problem.

The use of pesticides and fertilizer do pose a potential negative impact. This impact has already been addressed in the description of impacts for IR1.

Biological Environment

If downstream water flows are reduced, they may have an impact on the downstream aquatic and riparian ecosystems. The water needs for environmental use is commonly referred to as environmental flow. It is the amount of water that is necessary to maintain the in-stream aquatic ecosystem, support the riparian ecosystem on the banks of the river, and provide the fresh water necessary to the mangroves where the rivers flow into the ocean.

Rehabilitation of existing systems that does not increase the withdrawal of water from surface water will not impact environmental flow. However, if the rehabilitation will increase the withdrawal of water, then environmental flow must be accounted for. Adequately assessing environmental flow requires a multi-disciplinary, year-long assessment to be able to determine environmental flow requirements in the various flow regimes for the river.

Fertilizer and pesticide use poses potential impacts on aquatic ecosystems. This impact has already been addressed in the description of impacts for IR1.

Socio-Economic Environment

If water availability is not adequately addressed, then downstream water users can be adversely impacted by irrigation withdrawals. Rehabilitation of existing systems that does not increase the withdrawal of water from surface water will not impact downstream users; however, if the rehabilitation will increase the withdrawal of water, then downstream user requirements must be accounted for.

Vector borne diseases are endemic in Haiti. The disease vectors live near and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.

The use of irrigation water for drinking, bathing and clothing washing is common in the project areas. These practices can spread water borne diseases. AVANSE needs to discourage people from using reservoir, canal and drainage water for drinking and washing. This can be done by providing a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.

Construction activities can disrupt current farming practices in the project area. Building the required irrigation structures will disrupt the availability of irrigation in the irrigation system area. AVANSE will need to work with the WUAs and the Contractors to time the work so as to minimize such disruptions.

Irrigation system rehabilitation often requires that some land currently under cultivation to be converted to system components (canals, drains, roads, dikes, etc.). In smallholder systems, this “land taking” is generally not equitably distributed, because the land that is taken out of production is determined by the topography of the system. Some farmers, therefore, may lose crop land while others are not impacted at all. This inequity must be addressed, or it can cause social conflict. Mitigating this impact requires working with WUAs to develop mechanisms for addressing the issue during the design stage. Several WUA member interviewed by PEA Team members indicated that they had established procedures for dealing with these issues.

Community participation is often neglected in irrigation development. Involvement of the community can ensure that the design is compatible with the needs of the community, build local skills and keep management responsibilities in the hands of the community.

The role of women in irrigation management and irrigated cropping is often overlooked. Women who had usage rights to rain fed land may lose those rights when irrigation is developed. Women, especially single parents, may have difficulty in complying with the labor requirements for construction and maintenance; and therefore lose an opportunity to acquire irrigated land. The increased household labor requirement of irrigation may fall disproportionately in women.

Anticipating the negative impact of irrigation development on women and a proactive search for opportunities for positive impact can ensure that women receive an equitable share of the benefits from irrigation.

The following summary table, based on the additional assessments of proposed irrigation sites conducted in July 2015, provides recommended threshold determinations for the 7 sites being considered by AVANSE.

TABLE 14: SUMMARY OF THRESHOLD DETERMINATIONS FOR IRRIGATION SITES

Irrigation site	Threshold determination	Remarks
Grison Garde	Negative with conditions	No major problems with the Grison Garde site
Dubré	Negative with conditions	No major problems but owing to insufficient water, full target area not achievable
La Suisse	Positive	Insufficient water, potential source of conflict
Chalopin	Positive	Insufficient water, potential source of conflict
Garde Saline	Positive	Insufficient water, potential source of conflict
Robino	Positive	Insufficient water, potential source of conflict
Bas Maribahoux	Negative with conditions	No major problems if the entire canal is cleaned; potential source of conflict, if not cleaned entirely

Road Rehabilitation

Positive Impacts

Physical Environment

Once a road is rehabilitated, it will have an improved surface and improved drainage and stream crossings. This will result in less runoff and erosion and thus less sedimentation being deposited in rivers.

Socio-Economic Environment

When roads are improved, farmers will be able to get their produce out to markets for sale during all seasons, and traders will find it easier to get to the area. This will increase the incomes of the farmers. With the improvement of the roads and the increased income of local farmers, businesses will expand and there will be more money in circulation. Markets in the region will become more vibrant because many more people can afford to buy and new businesses will open up to provide goods and services that now people can afford.

According to the traffic survey done by AVANSE, large trucks and buses rarely travel on the targeted roads because of their poor condition. In some cases, the only transport available is motorbikes. Sick adults and children and women in labor have to be carried or taken by motor bikes when referred to a larger hospital. The absence of transport, leads to fatalities that can be avoided. Once a road is improved, other forms of transport like buses and taxis will be able to access the communities along the road and get sick people to hospital faster. Children who have to go to school far away from home will also be able to get to school easily because of the availability of transport.

Negative Impacts

Physical Environment

Many of the planned road improvements will require river and stream crossings, and some may cross marshes and swamps. Blocking of streams to build culverts could lead to flooding upstream especially during the rainy season. It could also lead to a shortage of water downstream. These activities may have adverse effects on both surface and groundwater resources if they are not designed carefully.

Biological Environment

One of the major unavoidable impacts of road rehabilitation will be the effect on terrestrial vegetation in the vicinity of the construction works. The impacts on natural vegetation is associated with the construction of road bed, bridges and other drainage structures, operation of quarry and borrow areas, construction of access to quarry and borrow sites, and construction of the workers' camp. Prior to construction, the secured right of way must be cleared of vegetation. Borrow pits and access to borrow pits will also have to be cleared. To mitigate these impacts, borrow pits and access roads to borrow pits should be located as to avoid cutting down large diameter trees. Also, the cleared areas, other than the road surface, should be re-vegetated upon completion of construction.

There are no significant areas of natural or semi natural forest along the targeted roads, nor critical habitats for endangered species. Only one road is in the newly established PN3B Marine Protected Area (RN-6 to Coicou), but it is in an area already developed. ,.

Socio-Economic Environment

It has been more than a year since AVANSE began planning work on some of the road rehabilitation projects. People in the communities are anxiously waiting for the project to start. However, so much time has passed that they have started to wonder if the project will ever take

place. Hence they have started to lose interest in the project, which threatens the anticipated community support and participation.

Roads will remain in use during their rehabilitation. Without adequate road signage for pedestrians and road users (especially bicycle and motor bike riders) there will be an increase in accidents. Currently drivers do not have to contend with traffic, but when work commences on the roads, traffic will increase, so poor road etiquette could increase accidents. Slippery and unstable surfaces especially during the rainy season could also lead to accidents. Deep trenches left unprotected from excavation could also increase accidents (falls) for particularly animals and children. Without adequate knowledge of proper road usage, improved roads conditions could increase accidents.

Traffic stoppages and detours slow down traffic and increase travel time. They could impact on accessing health care for the sick in times of emergency. Creation of detours may also impact vegetation.

All temporary structures and trees on the Right of Way must be identified and removed by local authorities prior to commencement of road work. This could create displeasure and strong objections to road rehabilitation from some owners living along the road.

Ravine Stabilization

Other than the general impacts associated with large-scale construction, the impacts of planned ravine stabilization are largely positive.

Positive Impacts

Physical Environment

Ravine stabilization will reduce erosion in the ravines. Sediments will be held by a series of retaining walls built in each ravine. The result will be that less sediment will be discharged in rivers or wetlands.

The improvement of the ravine will result in flood reduction in several neighborhood located all along the ravine. Currently after rain events, a ravine will rush run-off water downstream to discharge in a river or in a wetland. The stabilization work in the ravine will slow down run-off water entering the ravine from the hills and from drainage outlets and therefore control flooding episodes. Properties along the river will be protected from flood water by the construction of walls on both sides of the ravine and construction of walls built in gabion soles in the ravine bed.

Negative Impacts

Socio-Economic Environment

Ravine stabilization will require community support. Community participation is often neglected in programs such as these, with the assumption that it is a good thing, so everyone will support it. Involvement of the community in design can ensure that the design is compatible with the needs of the community, build local skills and keep management responsibilities in the hands of the community.

Major Drainage

No major drainage project has yet been designed, so assessing the impacts beyond those of large-scale construction is purely hypothetical. However, some generic impacts or areas of concern can be identified.

Positive Impacts

Socio-Economic Environment

The drainage projects will bring water logged agricultural areas back into full production, thereby increasing farmer incomes, with the spinoff effect of increasing community incomes.

Negative Impacts

Biological Environment

Routing of drainage structures will be critical. They are planned for the northern plain. In some instances AVANSE is considering the possibility of drainage directly into the ocean. That could well require passing through or discharging into mangroves. It will be critical that routing alternatives be considered to minimize impacts on ecosystems.

FOCUSED ACTIVITY PACKAGE ALTERNATIVE

On June 17th, DAI received a partial termination notice for AVANSE. The project was instructed to stop implementation related to the maize and bean value chains, as well as most agroforestry (IR2) activities, road rehabilitation and ravine stabilization, market strengthening activities not already negotiated and not linked to post-harvest and processing actions, and all IR4 activities. Consequently, the new focus of the project became three agricultural value chains (cacao, rice and plantain/banana), irrigation, some agroforestry/hillside stabilization (linked to the proposed irrigation sites), and some private sector market strengthening and post-harvest and processing support activities. On August 13th, the project received a new, modified Statement of Work which added detail and specifics to the retained activities indicated in the partial termination notice. **The PEA team considered the new scaled-down project activities together as the Focused Activity Package Alternative.**

Under the focused activity package, interventions will be organized under increasing agricultural productivity, improving watershed stability, and strengthening agricultural markets. Activities focused on increasing productivity will focus on three target crops: rice, cacao and plantains/bananas. AVANSE field technicians will work with lead farmers and FFS groups to promote good agricultural practices. For rice, the package will include improved seed, earlier seedling transplanting, wider spacing between seedlings, increased use of compost, and more efficient water use where possible.

The main elements of the improved package for cacao comprise pruning of both shade and cacao trees, grafting of superior varieties in old plantations, closer spacing of seedlings during plantation establishment, and use of plantain/banana for shade in new or younger plantations.

For plantain/banana, AVANSE will promote the PIF method for improved planting material, trimming of suckers and hot water soaking before planting, enhanced planting densities, elimination of diseased leaves, and drainage ditches for areas prone to flooding. See Table 11 above for more details on good agricultural practices (GAPs) for the 3 focal crops. (It should also be noted that, in most cases, the GAPs constitute mitigation measures and have been included in the umbrella EMPR for IR 1 activities [see Annex F].)

Access to water resources and management of water resources for irrigation will also receive more emphasis under the focused activity package alternative. Two of the target crops will benefit from improved water management on irrigated lands: rice and plantain/banana. Enhanced irrigation and drainage for rice, coupled with promotion of the SRI package, will be implemented in the Ferrier/Bas Maribahoux area (Jassa watershed) as well as the Grison Garde and Dubré areas (Haut du Cap watershed). Irrigated infrastructure actions will consist of cleaning intake areas and canals/ditches and repair of sluice gates, targeting improved delivery

of water and improved evacuation during high rainfall periods to avoid flooding. Plantain/banana irrigation and improved management will target two areas: the Limonade/Quartier Morin zone (principally in the Grande Rivière du Nord watershed but also parts of the adjacent Trou du Nord and Haut du Cap watersheds) and the Bas Limbé zone (Limbé watershed). Water management actions will include cleaning of drainage systems that evacuate water from the mouths of ravines as well as delivery of surface and well water through pumps. The planned, life-of-project area targets for these irrigated land interventions are summarized in the table below.

TABLE 15: SUMMARY OF INTERVENTIONS ON IRRIGATED LAND

Value Chain/Crop	Area to date (ha)	Area planned (ha)	Total
Rice	1161	1100	2261
Plantain/Banana	0	1250	1250
Grand Total			3511

Watershed stabilization activities will build on and follow the same principles developed under AVANSE's original scope of work but will be concentrated in micro-catchments above the main, target irrigation areas in the Jassa and Haut du Cap watersheds. These activities will focus on demonstrating and promoting perennial agroforestry systems in sloped areas. This will consist of planting vetiver grass, pineapples, and fruit and other trees along contour bunds to reduce erosion and runoff. The delivery mechanism will continue to be demonstration blocks and grants to community-based organizations to scale up best watershed stability and agroforestry practices.

Market strengthening activities will target post-harvest processing and storage as well as improving linkages among actors along the value chain, especially between producers and buyers and/or exporters. For rice, post-harvest processing will improve support and linkages to enhanced milling operations, principally in the Ferrier area of the Jassa watershed and the Fort Liberté area in the Marion watershed. Cacao interventions will include provision of drying tables and enhanced fermentation. Private sector partnerships will comprise collaboration with a rice trading company (LEA Trading) in the Ferrier area, a cacao fermentation and export company (PISA) in the Acul du Nord area, and a cacao export company (Novella) in the Grande Rivière du Nord area.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The overwhelming majority of impacts associated with the focused activity package alternative are positive. Negative impacts can be reduced to insignificant levels by implementing mitigation measures. An emphasis on cacao, rice and plantain/banana will enhance positive socio-economic impacts as these three value chains are the most lucrative and have excellent potential for raising household income. Moreover, two of the value chains – cacao and rice – have shown the highest likelihood for adoption with respect to the improved production package that AVANSE is promoting. More rapid uptake of these packages should reinforce socio-economic benefits linked to increased revenue.

Other positive impacts are associated with the good agricultural practices (GAPs – which also represent mitigation measures when compared to traditional practices) promoted by AVANSE. They include improved soil structure and fertility via use of compost and incorporation of weed residue (as opposed to burning) and integrated pest management practices that will reduce use of pesticides. Similarly, promotion of double cone mechanical weeder in improved rice

production systems will reduce the use of herbicides. Also, rehabilitation and pumping activities associated with irrigation sites will also result in a more reliable source of water for beneficiaries as well as reduced flooding.

Under the focused activity package, remaining agroforestry and hillside stabilization activities will be concentrated upstream and adjacent to irrigation rehabilitation work (e.g., Grison Garde). This will allow AVANSE to group resources and positive impacts within a smaller area while demonstrating a comprehensive agricultural production and environmental management model that can subsequently be replicated and scaled up in other areas.

Other positive impacts of hillside stabilization activities include reduced erosion, reduced runoff and increased infiltration associated with contour bunds. Mature agroforestry blocks will also have positive biological impacts by creating refugia for threatened fauna (especially birds) and reducing pressure on vestiges of natural forest. Planting of fruit trees and other economically-valuable species will also increase the value of the land and augment household revenue.

The PEA team recommends an emphasis on cover crops (e.g., *Mucuna*) within the focused activity package alternative. This would occur as part of the hillside stabilization activities above irrigation rehabilitation sites and would further reduce erosion and sediment loads within waterways and irrigation canals. Overall, this will allow for more efficient irrigation systems and reduced labor inputs associated with maintenance and cleaning of the systems.

Impacts associated with market strengthening activities are largely positive. This includes increased capacity, processing efficiency and profitability for grant recipients. Farmers will also benefit from enhanced access to markets and better prices for their products.

The elimination of the maize and bean value chain and production activities also has positive impacts. Overall, this will result in reduced use of agro-chemicals: inorganic fertilizer and some pesticide inputs were part of the maize and bean package being promoted by AVANSE. The risk of losing natural vegetation and beneficial agroforestry blocks through maize and bean expansion is also reduced owing to the elimination of these activities.

Finally, the absence of road rehabilitation and ravine stabilization activities eliminates many of the potential environmental issues of the AVANSE project. A significant amount of mitigation work associated with erosion control due to roadbed enlargement and grading is absent in the focused activity package. Similarly, the need for controlling environmental disturbance related to construction of gully plugs and check dams in large ravines has been eliminated. The potential for compensation related to resources lost owing to road rehabilitation is also absent under the focused activity package.

Potential negative impacts associated with the focused activity package that can be reduced through mitigation measures include:

- More intensive use of food production parcels by farmers with limited holdings who are converting the majority of their land to cacao,
- Soil disturbance on steep slopes or conversion of pastureland associated with initial installation of hillside stabilization and agroforestry packages,
- Impacts associated with small-scale construction (contamination from chemicals, noise, and erosion), and
- Reduced downstream availability of water.

All natural habitat and the biodiversity it harbors within the AVANSE intervention zone is severely threatened. Any activities that employ agro-chemicals or disturb the soil or vegetation

in or adjacent to natural areas or biodiversity hotspots can have adverse environmental impacts. The PEA team therefore recommends specific mitigation measures for AVANSE activities inside and adjacent to the PN3B and KBAs. These measures will limit AVANSE's interventions in these areas and may reduce results and impacts. These activities comprise:

- Jassa watershed – rice adjacent to PN3B (Fig. 16);
- Marion watershed – rice in and adjacent to PN3B (Fig. 21)
- Trou du Nord watershed – plantain/banana within the PN3B (Fig. 25);
- Grande Rivière du Nord watershed – plantain/banana within and adjacent to the PN3B and plantain/banana within the Citadelle KBA (Fig. 28);
- Haut du Cap watershed – plantain/banana adjacent to the PN3B and Citadelle KBA and within the Côtes du Nord KBA (Fig. 30); and
- Limbé watershed – plantain/banana within the Côtes du Nord KBA (Fig. 33).

(See figures [cited above] in Chapter 6 for spatial details.)

Specific mitigation measures will be based on modified GAPs for plantain/banana and rice. Within and adjacent to PN3B and the KBAs, AVANSE's agricultural packages will not promote:

- Use of inorganic fertilizer,
- Use of pesticides, and
- Mechanized plowing.

As an alternative and a mitigation measure, AVANSE will promote pilot trials of no till practices coupled with cover crops in these areas. (See discussion below in Chapter 6 in the sections on Jassa and Trou du Nord for additional details on AVANSE's impacts and activities with respect to the PN3B.)

Please refer to the environmental consequences sections for each watershed and extension zone below in Chapter 6 for a detailed discussion of the impacts associated with the focused activity package alternative.

NO-ACTION ALTERNATIVE

The No-Action Alternative for this PEA is different than for most PEAs, in that it does not assume no-action, but rather, no further action. AVANSE has been implemented for nearly two years, so it has taken many actions. The No-Action Alternative is, therefore, the termination of all future AVANSE activities.

To the extent that the beneficiaries in AVANSE's programs have made behavioral changes such that they will continue using the practices promoted by AVANSE, the No-Action Alternative will not be a reversal to the pre-AVANSE condition. It will, in that case, be a continuation of at least some of the AVANSE practices. Determining which practices may be continued and which may not is beyond the scope of this PEA.

IMPACTS OF THE NO-ACTION ALTERNATIVE

Because AVANSE has been under implementation for nearly two years and many of its IR1 and IR2 activities with farmers are well under way as is the voucher program with six boutiques, the impacts of the No-Action Alternative are not just the absence of the impacts of the Original Proposed Action. The current level of positive and negative impacts associated with the FFSs and the agroforestry activities as well as those of the voucher program are also impacts of the No-Action Alternative. As these impacts are by-in-large positive, the No-Action Alternative actually has a net positive impact on the environment, as compared to the pre-AVANSE state.

The future of these impacts, however, is different from the Original Proposed Action and the Focused Activity Package Alternative. To the extent that the changes in behavior associated with AVANSE's intervention are sustainable, the current impacts should remain over the long-term. They may even grow, via lateral diffusion. However, they will not grow as fast as they would if AVANSE continues to operate through the end of the project period, as there would not be the additional three years of programmed interventions to stimulate adoption of AVANSE-promoted practices.

The positive and negative impacts associated with AVANSE's proposed infrastructure projects and its proposed support to post-harvest handling, storage and processing will not be realized. That means that the positive economic benefits of these activities will not occur. Rather, the negative impacts associated with the deteriorated roads and the eroding ravines would continue unabated. It also means that the opportunity for introducing cleaner technology into agricultural product processing will not be acted upon.

SIGNIFICANT IMPACTS

The previous sub-sections have identified several direct and indirect environmental impacts that were expected from implementation of the Original Proposed Action or its alternatives. With the application of the specific mitigation measures presented in this PEA and its annexes, none of these impacts are anticipated to be significant. However, three impacts do warrant special concern:

- Water quantity impact to downstream users and ecosystems associated with irrigation projects that propose increasing surface water withdrawals.
- Potential mangrove destruction associated with major drainage systems on the northern plain.

These are the two activities for which this PEA recommends Positive Determination.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

There were no irreversible or irretrievable commitments of resources associated with the Original Proposed Action or its alternatives. However, the two activities recommended for Positive Determination have the potential to make irreversible or irretrievable commitments of resources and warrant environmental assessment.

CUMULATIVE IMPACTS

As can be seen in

Table 15, AVANSE's activities are spread across the project's six watersheds and two extension zones, with a large number of activities for IR1 in each watershed and IR2 activities in three watersheds. At the beginning of the analysis for this PEA, the PEA Team believed that the cumulative impact of interest would be the relatively small negative impact of on-farm practices at over 60,000+ farms. This also appears to be the concern identified in the Scoping Statement. The concern was that although the level of impact on each farm was small, its cumulative impact, when looked at in a watershed context, could be significant. As the analysis progressed, however, it became clear that the net environmental consequence on each small farm was positive, not negative. Thus, the cumulative impact analysis of many small AVANSE-promoted practices is a positive impact, not a negative impact.

TABLE 16: AVANSE ACTIVITIES BY WATERSHED

Activity	Jassa	Marion	Trou du Nord	Grande Rivière du Nord	Haut du Cap	Limbé	Port Margot, Borgne, Pilate
Number of FFS in IR1 by Focus Crops (February 2015)							
Banana	0	0	0	33	33	20	0
Cacao	0	600	0	224	1270	200	1857
Beans	155	28	34	1	409	5	0
Maize	42	0	78	106	171	0	0
Rice	67	60	0	0	20	0	0
Total	264	688	112	364	1903	225	1857
IR2 Life of Project Activities (ha)							
Initial agroforestry blocks	256	195	155	78	54	141	0
Agroforestry expansion via POs	540	540	1,080	810	810	1350	0
Agroforestry expansion via IPs	4,000	4,000	4,000	4,000	4,000	4,000	0
Reforestation	4,000	4,000	4,000	4,000	4,000	4,000	0
Total	8,796	8,735	9,235	8,888	8,864	9,491	0
Life of Project Known Number of Infrastructure Activities							
Surface Water Irrigation	1	2	0	0	3	1	0
Small Area Groundwater Irrigation	0	0	20	20	0	0	0
Road Rehabilitation	4	3	1	2	7	2	0
Ravine Stabilization	1	1	1	1	1	1	0
Major Drain Construction	0	0	0	0	0	1	0

For example, an analysis of IR2's cumulative impacts can be based on the areas in the six watersheds that have benefitted from soil conservation and agroforestry systems as well as reforestation. The original life-of-project targets for these areas are presented in Table 15. The area covered by the interventions represents less than half of each watershed. For example, in AVANSE's smallest watershed, Marion (21,600 ha), the area that will benefit from IR2 interventions is approximately 8,700 ha or 40% of the watershed. In larger watersheds, this percentage decreases, e.g., 28% in Jassa and 14% in Grande Rivière du Nord.

However, IR2 interventions have targeted only the hillier and more mountainous areas of each watershed. With the exception of Limbé and Grande Rivière du Nord, these areas also represent less than half of the watersheds. In the watersheds with smaller mountainous areas, coupled with the fact that the vast majority of IR2 impacts are positive, we can posit a significant positive cumulative impact on soil and water resources as well as on land productivity. Even in the more mountainous watersheds, the positive impact will be significant. Going forward, IR2 activities will target unstable hillsides immediately above the irrigation schemes that AVANSE will help rehabilitate in the Jassa, and Haut du Cap watersheds.

The concern for cumulative impacts, therefore, shifted to AVANSE's infrastructure activities that had the greatest potential long-term negative impacts: irrigation and major drain construction, and their associated negative consequences on water availability and mangroves, respectively. AVANSE's proposed pumped irrigation activities are reliant upon the groundwater resources in the unconfined alluvial aquifer below the northern plain. That resource is abundant and

productive. AVANSE's activities will require a small fraction of the safe yield in the aquifer; however, the aquifer is the major source of water for many other users in the region. Four of the major new users in the area where AVANSE is planning to develop pumped irrigation systems are Caracol Industrial Park, the Université Roi Christophe, the residential complex, and the AgriTrans banana plantation. These users, however, will use less than less than 10 percent of the safe yield in the aquifer, so that the cumulative impact of AVANSE's activities will not be an issue.

Several other institutions have or are developing surface water irrigation projects in the AVANSE project area. These include MARNDR and Agro-Action Allemande. MARNDR, for instance, is planning to build two surface water irrigation projects in the Marion watershed, in addition to the two that AVANSE is considering. Agro-Action Allemande has constructed or rehabilitated several surface water irrigation systems in the Jassa and Haut du Cap watersheds. This involvement of other institutions in the development of surface water irrigation projects in the AVANSE project area intensifies the potential impact on surface water availability, and heightens the need for site-specific assessment of water availability for any AVANSE irrigation activity that increases the withdrawal of surface water.

Northern Haiti still has extensive expanses of mangrove forests, but they are under pressure owing to demand for fuel wood and charcoal and creeping urban and agricultural development. The major drainage construction activities envisioned by AVANSE ("envisioned" because no concrete preliminary designs have been developed) could destroy linear stretches of mangroves owing to the drainage discharge to the ocean. Although the total area of mangrove destruction may be small, in combination with the cumulative impacts on mangroves from other development activities, the small area of destruction may be significant, and warrant further environmental assessment.

MITIGATION MEASURES

This section of the PEA presents general mitigation measures. Specific mitigation measures are presented in Annexes F-J. The PEA proposes two general levels of environmental review with associated mitigation measures: 1) in-house environmental review by AVANSE, and 2) site-specific EMPR review as per established LAC procedures.

IN-HOUSE ENVIRONMENTAL REVIEW BY AVANSE

Several types of activities covered by this PEA were determined to be of such a nature that their potential environmental impacts could be adequately addressed and mitigated via an umbrella EMPR. These activities are:

- Non-infrastructure IR1 activities;
- IR2 watershed stabilization and reforestation activities;
- IR3 processing facility grants for construction of less than 1,000 m² or for equipment installation;
- Voucher program for fertilizer;
- Irrigation projects for less than 25 hectares reliant upon wells tapping the unconfined alluvial aquifer in the northern plain; and
- Road rehabilitation.

Within the umbrella EMPRs, this PEA includes site-specific screening forms (EMPR Table 1) for all of the categories listed above except for IR1 and IR2 activities, as well as mitigation measures and mitigation measure monitoring forms (EMPR Tables 2 and 3). The mitigation

measures were developed using USAID guidelines where available, and other internationally recognized guidelines where no specific USAID guidelines exist.

Review and approval of these activities will be done by the AVANSE Environmental Compliance team. The reviews will be maintained in the AVANSE files and their results reported on in AVANSE quarterly and annual reports. The reviews will not require approval or concurrence from the Mission Environmental Officer or the Regional Environmental Advisor.

SITE-SPECIFIC EMPR REVIEW AS PER ESTABLISHED LAC PROCEDURES

Other activities covered by this PEA were determined to have too many site-specific and design characteristics contributing to their potential environmental impacts to be adequately addressed and mitigated via umbrella EMPRs. These activities require site-specific EMPRs before implementation. They include:

- Ravine stabilization;
- Irrigation system rehabilitation that does not increase surface water diversions;
- New inputs to be supported by vouchers; and
- The following types of activities if they occur within the boundaries of the Marine Protected Area:
 - o Irrigation projects,
 - o Road rehabilitation, and
 - o IR3 production and processing facility grants.

Review and approval of these activities will be done through the established LAC EMPR procedures, which require approval by the Mission Environmental Officer and the Regional Environmental Advisor.

Even though this PEA does not include umbrella EMPRs for all these activities, it does include a generic list of mitigation measures that may be applicable to these activities depending upon the site specific conditions and design characteristics. The PEA also includes site-specific screening forms for 7 large-scale irrigation systems and the proposed drainage works in Bas Limbé (see Annex J).

COMPARISON OF ALTERNATIVES

Table 17 presents a tabular, qualitative relative level of potential impact of the Original Proposed Action and the Focused Activity Package Alternative as compared to the No-Action Alternative as a baseline. As can be seen from the table, the Focused Activity Package Alternative has greater environmental benefits than either the Proposed Action or the No-Action Alternative.

TABLE 17: COMPARISON OF THE RELATIVE IMPACT OF EACH ALTERNATIVE

Impact	Proposed Action	Focused Activity Package	No-Action
PHYSICAL ENVIRONMENT			
Soil Erosion	+1	+2	0
Effects of Agricultural Chemicals	+1	+2	0
Water Quantity	-1	-1	0
Water Quality	+1	+2	0
BIOLOGICAL ENVIRONMENT			
Natural Vegetation	-1	0	0

Impact	Proposed Action	Focused Activity Package	No-Action
Effects on Aquatic Species	+1	+2	0
Three Bays Marine Protected Area	+1	+2	0
SOCIO-ECONOMIC ENVIRONMENT			
Increased Income	+2	+2	0
Increased Access to Markets	+2	+2	0
Historical and Cultural Resources	0	0	0

Rankings: -2 Strong adverse effect
-1 Adverse effect
0 Neutral or no change
+1 Positive effect/benefit
+2 Strong positive effect/benefit

PREFERRED ALTERNATIVE

The preferred alternative is the **Focused Activity Package Alternative** described in more detail above. This alternative is preferred because it has net positive environmental impact with few negative consequences and will allow AVANSE to achieve its purpose.

By way of summary, this alternative comprises increased agricultural productivity for 3 focus crops: rice, cacao and plantain/banana. Improved production techniques will be extended to participating farmers through FFS and other mechanisms. By the end of the project, it is expected that improved rice management practices and production technologies will have been adopted on approximately 2,200 ha. Enhanced rice production will occur primarily in the Jassa and Haut du Cap watersheds. Improved plantain/banana production is targeted on about 3,900 hectares. These activities will occur mainly in Grande Rivière du Nord, Haut du Cap and Limbé watersheds. The target for improved cacao production is 7,500 ha. Improved management practices and production technologies will be extended in all of AVANSE's watersheds and extension zones but with significant concentration areas in Marion, Grande Rivière du Nord, Haut du Cap, Borgne, and Port Margot. In addition, these practices and technologies will target farmers in and around Pilate commune adjacent to Borgne and Port Margot.

Infrastructure activities in the Focused Activity Package Alternative will emphasize improving access to water and enhanced water management in irrigated areas. This includes cleaning irrigation canals and intakes as well drainage ditches and ravines. Overall, these interventions will ameliorate production on approximately 3,400 ha of land, split between 2,200 ha targeting irrigated rice and 1,250 ha targeting irrigated plantain/banana. Watershed stability activities under this alternative will comprise promotion of revenue-generating agroforestry systems on micro-catchment slopes above the targeted irrigation zones. AVANSE plans a total of 1,500 ha of these interventions focused mainly in the Jassa and Haut du Cap watersheds. Market strengthening activities will target the three value chains, facilitating market linkages and partnerships as well as post-harvest processing and storage. While these activities will occur throughout the eight watersheds and extension zones, major initiatives will focus on rice processing and marketing in the Jassa and Marion watersheds, and cacao processing and market linkages in Haut du Cap and the two cacao extension zones.

Please refer to Chapter 6 below for details and analysis of the Focused Activity Package Alternative in each of AVANSE's eight watersheds and extension zones.

6. WATERSHED AND EXTENSION ZONE CONTEXT AND ENVIROMENTAL CONSEQUENCES

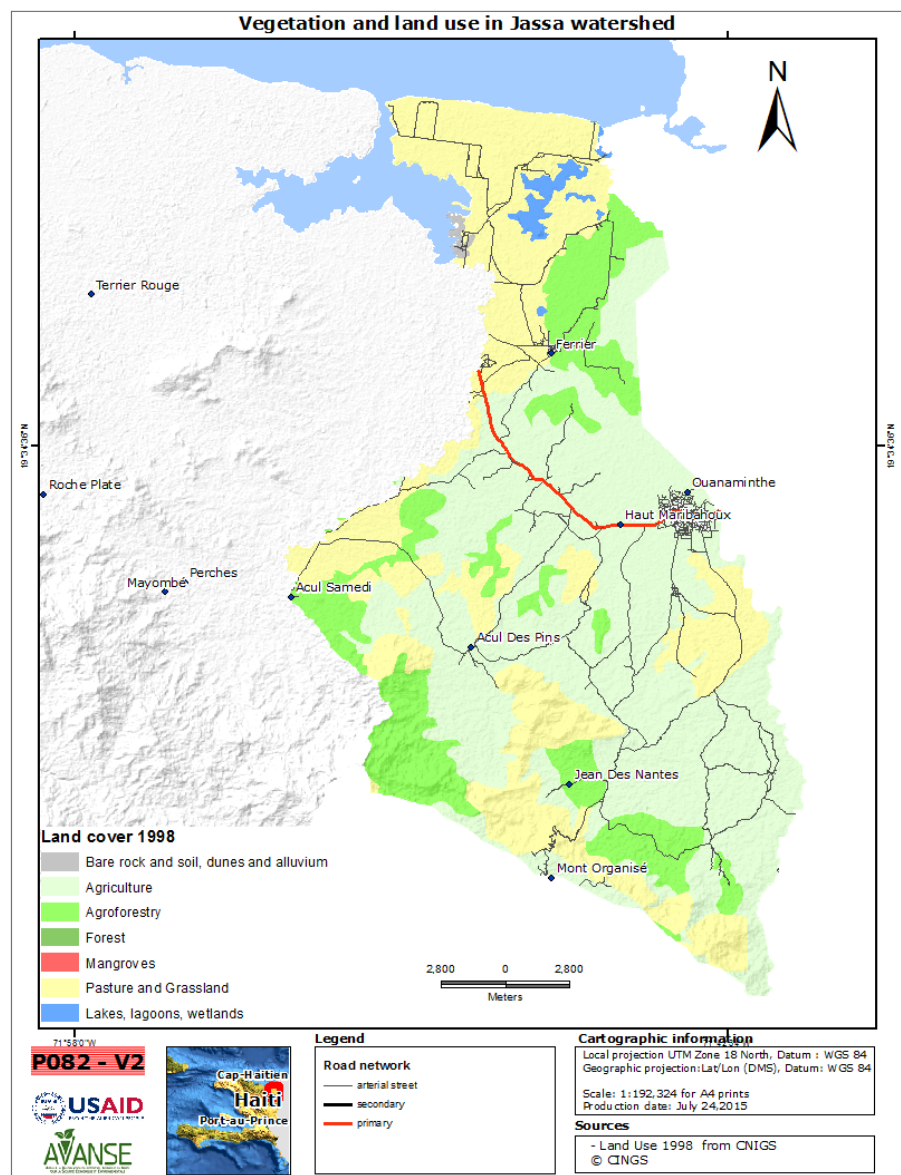
This chapter presents information on the affected environment within each of AVANSE's six watersheds and two extension zones. It also analyzes, as required by 22 CFR 216.6(c)(3), the environmental consequences of the focused activity package alternative described in chapter 5 above. The environmental and social impacts of this alternative for each of AVANE's eight watersheds and extension zones are described.

JASSA WATERSHED

PHYSICAL ENVIRONMENT

The Jassa watershed is the second largest of AVANSE's watersheds, covering 427 km². From a hydrological perspective, the watershed is well developed and can be divided into 29 sub-watersheds (DAI, 2013a). Compared to the other AVANSE watersheds and extension zones, Jassa has a low percentage of hilly and mountainous areas (see Figure 14).

FIGURE 14: LAND USE AND LAND COVER IN JASSA



TOPOGRAPHY

Jassa contains a large coastal plain area – 317 km² – with only 26% of the watershed higher than 75 m. The higher elevation areas are confined to the southern third of the watershed. The relatively flat terrain coupled with numerous streams and rivers favor lowland and irrigated agriculture.

GEOLOGY AND SOILS

In the Jassa watershed, the colluvial soils of the Maribahoux plain are rich and deep with good agricultural potential. In the lower part of the upland area, the soils tend to be derived from diorite and are characterized as poor (low fertility and organic matter) and sandy while the higher altitude soils, although shallow, are still productive (Neptune et al., 2010).

WATER RESOURCES

There are many rivers and streams in the Jassa watershed. A unique water body found in the watershed is the Lagon-aux-Boeufs – a brackish lake on the coastal plain of Dauphin, to the east of Fort-Liberté. The lake is fringed with mangroves and xerophytic shrubland set within the otherwise agricultural coastal plain. The lake is further described in the Biological Environment section below.

BIOLOGICAL ENVIRONMENT

COTES DU NORD, LAGONS DU NORD-EST KBAS

The Lagon aux Boeufs east of Dérac in the Jassa watershed is a large, brackish lake of approximately 390 ha that is unusual in that it has well developed mangroves along much of the shoreline (Figure 15) – uncommon for a non-marine ecosystem. It supports an important population of the West Indian Whistling-duck (*Dendrocygna arborea*) (IUCN listing: vulnerable). It is suspected that the Caribbean Coot (*Fulica caribaea*) and Piping Plover (*Charadrius melodus*) occur (both listed by IUCN as near threatened), but this requires confirmation. Large numbers of migratory ducks and shorebirds use the site which supports a population of Caribbean Flamingo (*Phoenicopterus ruber*) (Sergile, 2008). According to BirdLife International, the bird diversity of the Lagon aux Boeufs is far higher than any other area on the coastal plain of the Nord-Est Department. The American Crocodile (*Crocodylus acutus*) is still often observed at Lagon aux Boeufs (IUCN listing: vulnerable).

There are about 400 men that fish the lake throughout the year. The fishers have lobbied local government to implement measures to protect the lake's mangroves; they feel that the destruction of the mangroves is having a negative impact on the fish population. In an unusual move that may be unique in Haiti, the former mayor of Fort Liberté deputized the fishers to police the mangroves giving them the



FIGURE 15: RED MANGROVES AT LAGON AUX BOEUFs

authority to arrest anyone founds cutting the trees. It is our understanding that this action is grounded in local government law and as such represents perhaps the first example in Haiti of the devolution of authority to civil society groups to protect natural resources. The significance of this cannot be overestimated. It may provide an example to many other local authorities and CSOs working across different NRM sectors.

PROTECTED AREAS

Part of the Three Bays National Park falls within the Jassa watershed. The park contains coastal and marine ecosystems including mangroves, coral reefs, and seagrass beds as well as lagoons, coastal lowlands, and adjacent foothills extending more than 8 km inland in certain areas and totaling over 75 km².

TABLE 18: SUMMARY CHARACTERISTICS FOR JASSA WATERSHED

Characteristic	Statistic
Total area	427 km ²
Population	94,132
Population density	237 people/ km ²
Area < 75 m (elevation)	317 km ²
Area 75 – 600 m (elevation)	91 km ²
Area > 600 m (elevation)	20 km ²
Area of agriculture	215 km ²
Area of agroforestry	72 km ²
Area of pasture/grassland	134 km ²

ADDITIONAL NOTES ON VEGETATION

The upper Jassa watershed is one of the few zones of the AVANSE target area that has any remaining natural forest cover. Maps based on 1998 LANDSAT imagery show a block of forest around Mont Organisé though data from Global Forest Change show numerous pockets of deforestation between 2000 and 2012. Field visits confirmed that the remaining forest is in small patches on the highest, steepest slopes. Deforestation has been the result of forest clearing for agriculture as well as for charcoal production. In this area, all the land has been claimed by local people and there are informal restrictions on who can access the forested areas for wood or other resources. It is widely assumed that in Haiti commercial charcoal production is a principal driver of deforestation but in northern Haiti, the clearance of woodland and forest is typically associated with opening areas for agriculture (DAI, 2014b).

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in the Jassa watershed is approximately 94,100. The population density was approximately 237 people per km² in 2005 (IHSI, 2005). At 431 people per km², Ouanaminthe was by far the most densely populated commune in the watershed.

LAND TENURE

Most (73%) of the farms in the Jassa watershed are between 1 and 3 ha (DAI, 2014b). The watershed has a smaller percentage (12%) of farms less than 1 ha, compared to the other AVANSE watersheds and extension zones (see Table 6 for more information). Jassa follows the same trend found within all of the AVANSE watersheds and extension zones in that 84% of the land is owned while only 16% is either rented or sharecropped (see Table 7 for more information).

LAND USE

Agriculture dominates the Jassa watershed, accounting for approximately 50% of the watershed's area. Pastures and grassland make up about 31% of the land while agroforestry comprises 17%. See Table 17 for more information.

ECONOMIC ACTIVITIES

The main economic activities for people in the Jassa watershed are agriculture and commerce (IHSI, 2005). Owing to its geographic location, much of the commercial transactions occur with the Dominican Republic. This is especially true in Ouanaminthe and Capotile communes.

HISTORICAL AND CULTURAL RESOURCES

Notable cultural sites in the Jassa watershed include 10 voodoo temples in the Ouanaminthe commune.

HEALTH AND EDUCATIONAL FACILITIES

Ouanaminthe commune has 16 health centers while Fort Liberté commune – straddling the Jassa and Marion watersheds – benefits from one hospital and three health centers. Over 160 primary and secondary schools can be found in these communes; they also host over 25 vocational and superior or university-level schools. See Table 10 for additional details.

ENVIRONMENTAL CONSEQUENCES

The lowlands of the Jassa watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. AVANSE's activities will enable farmers to make better use of these resources by improving rice production through infrastructure improvements, better access to agricultural inputs and associated training as well as facilitating access to markets. The potential environmental and social consequences of these activities include altering the water balance in biologically important wetlands such as the Lagon aux Boeufs and possible contamination of groundwater, rivers, lakes and inshore waters with agro-chemicals and waste from agricultural processing facilities.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in the Jassa watershed will focus principally on improving rice production and marketing. This will include infrastructure improvements in the Bas Maribahoux area. 11.6 km of water supply and drainage canals will be rehabilitated through cleaning. Cleaning of canals will enhance water management and improved drainage from the irrigated perimeters will reduce flooding in the wet season. To enhance performance of the rehabilitated irrigation systems, AVANSE will implement soil and water conservation measures at five sites in the sub-catchments above the systems.

**TABLE 19: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES⁸ IN JASSA WATERSHED**

Activity	Quantity
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⁸ Summary tables of Focused Activity Package activities include ongoing and planned activities: AVANSE's interventions for the rice, cacao and plantain/banana crops and value chains began under the project's original scope of work and will continue under the Focused Activity Package Alternative.

Activity	Quantity
Plantain/Banana (ha)	n/a
Cacao (ha)	175
Rice (ha)	850
Interventions on irrigable land (ha)	850
Length of treated irrigation/drainage canals (km)	11.6

FIGURE 16: AVANSE ACTIVITIES IN THE JASSA WATERSHED

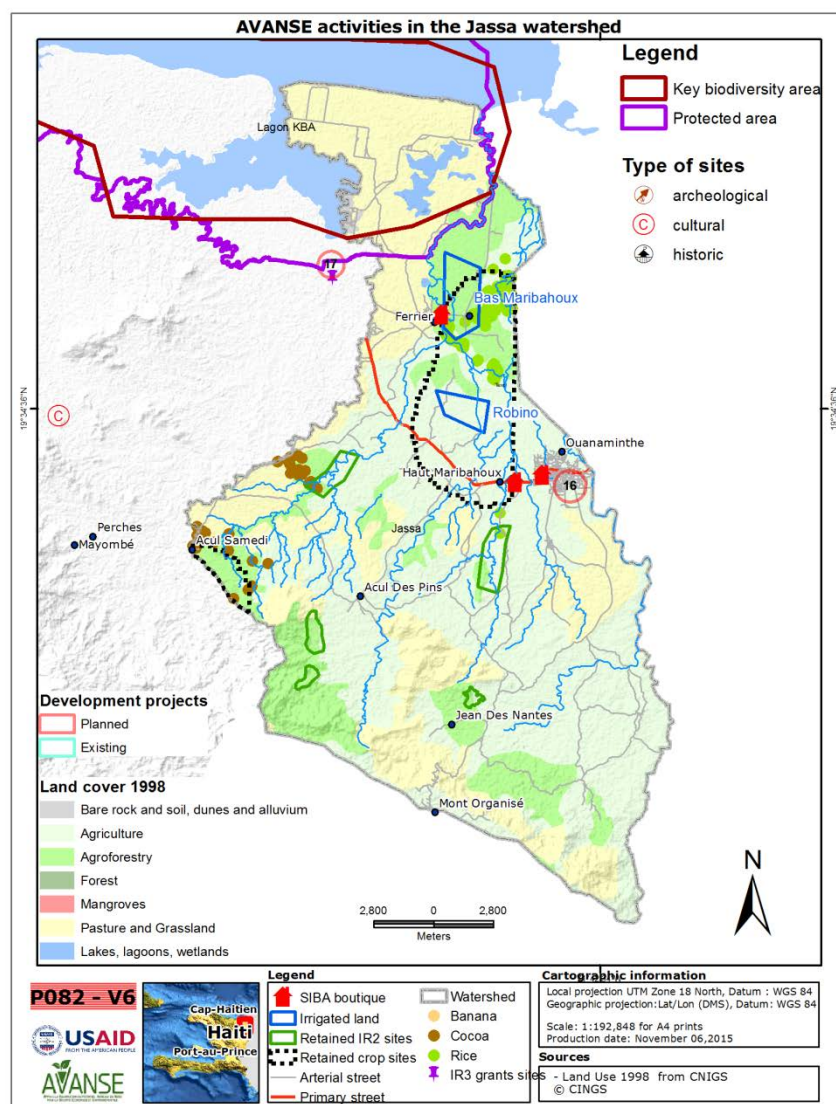
AVANSE had previously planned to improve the irrigation infrastructure of the Robino perimeter. Though this activity has been dropped from the revised action plan for the final two years of the project, here we provide an environmental and social review of the proposed actions to facilitate any future reprogramming of AVANSE activities.

AGRICULTURAL PRODUCTIVITY INCREASED – IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: the Jassa watershed is drained by the Lamatry, Canari and Le Sable rivers that flow into the Jassa River which ultimately drains into the Masacre River before reaching the coast at the border between Haiti and the Dominican Republic. 74% of the Jassa watershed lies below 75 m and most of the lower watershed is flat and poorly drained. Cleaning of canals will enhance the flow of water diverted from the Jassa River. Nevertheless, in years with normal rainfall patterns, low flow during the dry season will limit rice production to no more than two crops.

AVANSE's activities will improve the management of water resources for the irrigation of about 700 ha of rice lands in Bas Maribahoux and will enhance the use of agricultural inputs such as fertilizers and reduce the need for using chemical pesticides. AVANSE will implement Farmer Field Schools (FFS) to promote the adoption of SRI. Farmers in other irrigation systems report



using 30% to 50% less water with SRI compared with traditional rice-growing practices. The reduction in water requirement and proposed infrastructure improvements will permit farmers to have a second season of rice and will facilitate expansion of the system without extraction of more water from the Jassa River. Of the 700 ha of rice under improved management, about 320 ha will benefit from improvements to irrigation infrastructure implemented by AVANSE.

Biological environment: the improved drainage from the Bas Maribahoux perimeter will not affect the Lagon aux Boeufs since the outflow will be channeled back to the Jassa River, which does not drain into the wetland.

It is anticipated that when Bas Maribahoux farmers adopt the SRI package they will use 60% to 80% less fertilizer that is used for traditional rice production. Promotion of organic fertilizer as an alternative to inorganic fertilizer is part of AVANSE's GAP package for rice as is integrated soil fertility management (see Table 11 above for additional details). The GAP package is also part of the mitigation measures for agricultural productivity activities presented in Annex F. As part of the mitigation measures linked to the PN3B, KBAs and coastal areas, we have included the goal of eliminating the use of inorganic fertilizers in the rice GAPs and the umbrella EMPR for IR1 (see Annex F). FFS rice farmers in other irrigation systems consistently report using only 10% of the quantity of seed for SRI rice compared with traditional rice production. The Bas Maribahoux farmers use saved seed and seed purchased in the DR for planting. Some of the purchased seed is treated with pesticides, so this potential contaminant will be significantly reduced. The farmers also use herbicides for traditional rice production but farmers elsewhere note that they use less or no pesticide on SRI rice.

SRI water management entails a series of light irrigations of 3-5 cm. The soil is allowed to dry between irrigations. Unlike traditional rice, it is not kept inundated with 15 to 20cm of water. Thus, when SRI is adopted there will be essentially no drainage of water containing fertilizer and pesticide residue to the Jassa and Masacre Rivers.

Socio-economic environment: AVANSE's activities will provide improved incomes for an estimated 1,300 farming families from increased rice production and another 9,000 from agroforestry activities in the upper watershed. By introducing SRI techniques and improved seed, most farmers can expect to double their production based on AVANSE's experience in neighboring areas such as Croi Cou in the Marion watershed. Other SRI adopters have reported increasing their yields by as much as 200% and, with experience, even greater increases are possible. SRI does require additional labor but farmers have noted that the reduced need for fertilizer and pesticides more than offset the increased cost of labor. Overall, production costs are lower and yields are higher.

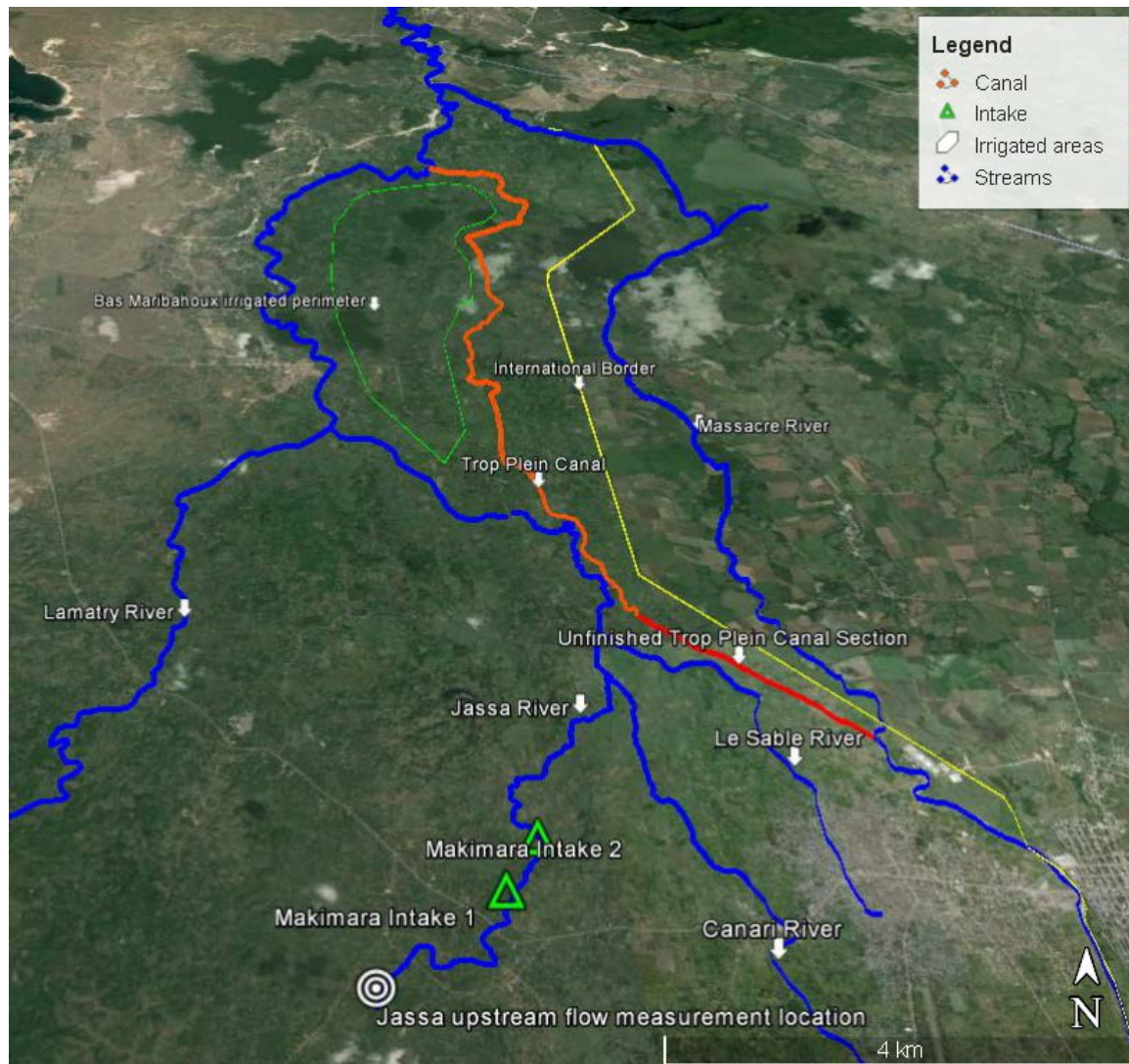
In the lower watershed, groundwater is brackish and many households rely upon vendors to bring drinking water to their communities. There may be an opportunity for AVANSE to introduce improved water supply as well as better sanitation and hygiene to those communities where the project engages with farmer and water user associations. Such initiatives would be supplemental to AVANSE's core activities but are potentially valuable targets of opportunity.

NEGATIVE IMPACTS

Physical environment: there are two intakes on the Jassa River that divert water to irrigated land on both sides of the river. The first intake, located 200 m north of the Route National (Makimara Intake 1 on Figure 17), has a capacity of 100 l/s and drains into the Canari River after irrigating an unknown area of land. The gate on the right has been shut down since 2007 when a second intake (Makimara Intake 2 on Figure 17) was constructed by Agro Action Allemande, 675 m

downstream from the first intake, taking water away from downstream farmers. This intake, with two gates on either side of the river, has a capacity of 100 l/s. These two intakes have the capacity to reduce the flow downstream significantly. Farmers further downstream raised concerns that they are unable to obtain water during the dry season to irrigate their crops because of these upstream diversions. The exact amount of land being irrigated by the diversions is unknown since the supply also depends on the amount of water available in the river. However, the combined capacity would supply water to irrigate 300 hectares of land (1 l/s/ ha).

FIGURE 17: LOWER JASSA WATERSHED: BAS MARIBAHOUX IRRIGATED PERIMETER



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Whenever it is available, water from the Jassa River is diverted further downstream into the Trop Plein Canal to irrigate lands near Ferrier. This canal is used for both irrigation and drainage. The Trop Plein canal drains back into the Jassa River downstream of the system, north of Ferrier. Farmers complain about the lack of water near Bas Maribahoux, which caused the rice crops to fail this year (2015).

The farmers in the Bas Maribahoux area previously received funding from the Government of Haiti (Ministère de Paysannerie) to dig an additional water supply canal to draw water from the Masacre River (see Figure 17). The construction has not been completed because the initiative

was not funded. An additional 750 m of canal remains to be excavated. AVANSE will not support this initiative since field assessments indicate that significant engineering works will be required on the Masacre to ensure that there is adequate water in the river channel to supply the canal during the dry season (possibly using pumps). In addition, the Masacre is an international waterway that flows from the Dominican Republic (DR) immediately upstream of the proposed diversion and flows back into the DR immediately downstream of the proposed offtake. A bilateral treaty between the Government of Haiti and the Government of the DR requires a negotiated agreement for any changes in the use of water in the Masacre catchment (Article 10: Tratado de Paz, Amistad Perpetua y Arbitraje – February 20, 1929).

En razón de que ríos y otros cursos de agua nacen en el territorio de un Estado y corren por el territorio del otro o sirven de límites entre los dos Estados, ambas Altas Partes Contratantes se comprometen a no hacer ni consentir ninguna obra susceptible de mudar la corriente de aquellas o de alterar el producto de las fuentes de las mismas.



FIGURE 18: MECHANIZED HARVESTING OF RICE IN BAS MARIHABOUX

The planned AVANSE activities in Bas Maribahoux include facilitating contract plowing and mechanized harvesting using heavy equipment. There is a potential for compacting the lower soil zone and thereby exacerbating drainage problems (see Figure 18).

Biological environment: drainage water from the proposed irrigated perimeter at Bas Maribahoux is likely to contain some agro-chemicals and pesticides that may have a detrimental impact on aquatic organisms further downstream. However, we expect that the level of agro-chemicals in the drainage water will be very low due to AVANSE's promotion of SRI techniques and organic fertilizer. The Jassa River flows into the Masacre River and then to the coast but does not drain into either the Lagon aux Boeufs or the Bay of Fort Liberté – both of which are

environmentally sensitive habitats of high importance for biodiversity. The mouth of the Masacre River is at the extreme eastern point of the Trois Baies protected area (PN3B) but in an area that is designated as a buffer zone. We do not anticipate any negative environmental consequences this far downstream from the irrigation perimeters.

In general, potential impacts of AVANSE activities on the PN3B (parts of the Jassa, Marion, Trou du Nord, and Grande Rivière du Nord watersheds overlap with the Park) include agrochemicals in irrigation drainage water and other waterways, reduced water availability due to irrigation or pumped groundwater activities, and increased sediment loads in waterways from agricultural production activities. AVANSE has developed a suite of GAPs and mitigation measures to reduce these impacts to insignificant levels. Most of these are described below in the section on the Trou du Nord watershed. In addition, we cite two additional mitigation measures here: watershed stabilization and agroforestry activities in the uplands of the Jassa watershed, and promotion of cacao agroforests (much better at conserving soil and reducing erosion as compared to the alternative of maize/bean production) in the four watersheds that overlap with the PN3B; both of these will reduce sediment loads in waterways that flow through the Park.

AVANSE also envisions a number of complementary or supportive activities with respect to the PN3B. These include collaboration with CBOs and NGOs promoting mangrove restoration and conservation, collaborating with the Ministry of Environment on raising awareness about the Park, and facilitating support for local fisher groups implementing fisheries management measures. At the time of this report, a management plan for the PN3B did not exist so no information on specific Haitian government restrictions within the Park was available. The arrêté that created the Park specified the following general restrictions:

→ within the buffer zone, resource exploitation is subject to current legal restrictions, and → within the transition zone, resource exploitation is permitted through prior authorization of the Ministry of the Environment.

At the time of this assessment, AVANSE is in contact with the Ministry of Environment to clarify the boundaries of the buffer and transition zones as well as to clarify restrictions within these zones. Once clarified, all AVANSE activities within these zones will abide by any GOH restrictions.

AVANSE expects to provide rice seed to farmers in the Bas Maribahoux perimeter and other areas where Farmer Field Schools are implemented. Seed will be provided directly to some farmers for training purposes and to others through the SIBA initiative. If rice seed for planting has been treated with pesticides, AVANSE will acquire only seed that has been treated with products that are approved for seed treatment under the 2014 Annual Update of the Mission PERSUAP: Maxim XL (EC) and Thiram 75 (WP). Battalion 0.2 is also approved but it is not considered suitable for treating rice seed. The PERSUAP also recommends Actellic 5E (pirimithos-methyl 57%) for post-harvest treatment of seed to prevent insect damage. Some vendors of rice seed for planting use Actellic to reduce damage to the seed while it is being stored prior to being sold to farmers. We regard Actellic treated rice as suitable for planting.

Since treated seed can be harmful to human health and to aquatic organisms, it will be stored, handled and used only under strict compliance with PERSUAP guidelines. Treated rice seed distributed through the SIBA initiative will be stored apart from all other commodities.

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers and treated rice seed.

The Jassa watershed contains several known pre-Colombian archaeological sites of the Taino culture. Other sites are likely to occur in the area but no IR 1 activities will result in new land clearance or excavation of new canals and drainage lines.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

POSITIVE IMPACTS

Physical environment: in the Jassa watershed, IR 2 activities will be implemented at five sites (see Figure 16), covering about 540 ha, upstream of the planned irrigation improvements in Bas Maribahoux. The AVANSE team has located priority sites using satellite imagery to identify areas with extensive bare ground on hillsides in the upper catchments of rivers and streams that supply irrigated perimeters with water. The interventions will include vegetative measures to control soil erosion – vetiver grass, agroforestry and cover crops – and installing physical structure to capture runoff and reduce erosion – contour bunds and temporary fences. By reducing soil erosion on hillsides, AVANSE will diminish siltation in rivers and irrigation canals, maintain soil cover for productive agriculture and replace bare hillsides with valuable trees and crops that provide nutritious foods and income.

Biological environment: enhanced vegetation cover will provide habitat for wildlife included several threatened species – particularly birds and reptiles – that are endemic to Hispaniola.

Socio-economic environment: agroforestry activities will provide increased incomes for small-holder farmers from cash crops such as pineapple, plantain and okra while food crops such as maize, beans and peanuts will improve family nutrition. Many of the hillsides where AVANSE will support interventions are relatively unproductive pasture. By implementing farmer field schools that promote agroforestry, AVANSE will help individual farming families gain to access *konbit* labor to prepare their parcels for new crops – labor that is otherwise in short supply since many young people have moved from the rural areas to find work.

NEGATIVE IMPACTS

Physical environment: potential negative consequences of agroforestry and erosion control measures include exposing the land surface to runoff before the vegetative cover is established or when annual crops such as peanuts are harvested. AVANSE will limit these risks by intercropping with trees and perennial shrubs and grasses such as vetiver. In addition, AVANSE will promote the use of cover crops such as *mucuna* (*Mucuna pruriens*) that not only protect the soil surface from erosion but also contribute organic matter that enhances the water retention capacity of the soil.

Biological environment: we do not anticipate any negative consequences though extending agroforestry across the upper watersheds will require broad adoption. In other watersheds where AVANSE has been implementing soil conservation initiatives, early adopters have been supporting their neighbors by providing advice, labor and planting materials.

Socio-economic environment: AVANSE's agroforestry activities will require collaboration among farming families to provide labor for initial land preparation and planting. The *konbit* system remains very active in this part of Haiti, so no major challenges are foreseen.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: the improvements to rice milling operations in the Ferrier Commune will mitigate environmental issues such as poor management of waste water and rice hulls.

AVANSE will ensure that grantees such as G&G adopt improved environmental management practices. Cleaner production practices will include an input/output analysis of materials and wastes, a waste management plan, and proper disposal of organic waste via a reduce, reuse and recycle program. Please refer to the Umbrella EMPR for IR3 Grants in Annex H for additional details.

Biological environment: currently, rice millers use rodenticides to control pests. Improved pest control practices at the rice milling sites will reduce the potential risks to human health and wildlife.

Socio-economic environment: AVANSE's activities in the Jassa watershed will include supporting at least one rice milling operation – G&G – with grant funding to improve their operations. In addition, the project will collaborate with LEA Trading to establish an integrated production and marketing scheme for rice production in Bas Maribahoux. These interventions will provide an estimated 1,000 smallholder farmers with access to inputs such as improved seed, fertilizer and equipment as well as better market access through group agreements with service providers and buyers.

By supporting the adoption of SRI on about 700 ha of rice lands, AVANSE will reduce the exposure of farmers and farm workers and their families to agro-chemicals – particularly molluscicides and fertilizers, which are used in significantly lower quantities with SRI.

NEGATIVE IMPACTS

- *Physical environment:* it is anticipated mechanized equipment may be used for plowing and harvesting, which could result in soil compaction and poor drainage. An EMMP has been added to this PEA, AVANSE will monitor the impact of mechanized farming on soil structure and drainage and, if warranted, will promote the use of animal traction for plowing. This aligns with MARNDR current policies and guidelines. It should be noted that AVANSE is piloting a voucher program for plowing services based on a number of factors including high farmer demand for these services, labor shortages, and the high cost of employing labor. An August 2014 study by AVANSE did an economic analysis on this topic, "Plowing Services for Increased Agricultural Production and Farmer Incomes in North and North East Haiti, DAI 2014g. It compared tractor-based, animal traction-based, motoculteur-based, and simple tool-based plowing services. Tractor-based services, effective only in the plains areas, were the most productive option. They also provided the least expensive services to farmers, the best quality service, and the fastest service.. AVANSE will use existing plowing service providers and will ensure that appropriate equipment is used and that operators are trained with respect to suitable plowing times based on moisture conditions, that equipment is adjusted, and that operators pay attention to the depth of the plowing.. We will also work with beneficiaries so that they incorporate more organic matter (compost, manure, etc.) into their plot so as to improve soil structure and water retention capacity; test no-till and cover crop options in a small portion of the fields to promote climate smart agricultural techniques; cover the plowed soil around bananas with mulch so as to retain moisture, increase organic matter and protect the soil against wind erosion and rill erosion (if the land contains any slopes), and in flood prone areas, we will encourage beneficiaries to dig drainage ditches around the perimeters of their fields...

Biological environment: see above under IR 1 activities.

Socio-economic environment: rice processing activities are currently poorly managed with milling operations barely meeting acceptable health and safety standards for workers. AVANSE grantees will be required to upgrade their facilities to comply with international standards. These include requirements for ensuring safe operation of equipment; workers' exposure to dust, fumes and noise; provision of appropriate sanitation for workers; safe disposal of waste water and solid waste such as rice hulls; and safe storage, handling and use of pesticides (particularly rodenticides). It will be essential for AVANSE to ensure that dust, fumes, waste water and solid waste from the mill do not create any adverse health conditions for people living in the vicinity of rice milling operations.

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE's only infrastructure interventions in the Jassa watershed will be the cleaning of canals and drainage ditches in the Bas Maribahoux rice perimeters near Ferrier. Flooding creates major problems in Ferrier when the Jassa River overflows its banks during the rainy season. Farmers complain that the canal is not large enough to evacuate the flood water (see Figure 17).

The amount of water needed to supply the irrigation systems along the Jassa is difficult to assess because at present the full size of each system is unknown. Some areas have been converted to pasture in recent years and it is unknown whether they would be considered for irrigation, if system improvements are implemented. Based on the size of the intakes, we can infer that the potential area could be several hundred hectares.

Cleaning work has started in the upper part of the Bas Maribahoux canal independent of support from AVANSE. The project plans to clean and enlarge 5.6 km of the Trop Plein canal targeting about 320 ha of the roughly 700 ha of land that are currently under irrigation in the area. The total length of the canal is 11.6 km to the exit back into the Jassa River. The material to be dredged during the cleaning and the enlargement of the canal will primarily be soil and sediment (earth) mixed with some vegetation. The sediment material will be cleaned of debris and used to build the slopes of the canal. This operation will not include the removal of trees or encroach on properties where houses or any other structures are built. As for the disposal of other debris not being used for construction purposes, they will be given to farmers to reinforce the berms separating the rice parcels. (The use of canal dredging and cleaning material has been incorporated into the four irrigation and drainage EMPRs in Annex J.)

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1.

NEGATIVE IMPACTS

Physical environment: on 10 June, 1977, the flow in the Jassa River was 443 l/s (Source: MARNDR). During the course of this assessment, flow measurements were taken at different locations along the Jassa River on 28 July, 2015. Upstream of the first uptake, the measured flow was 143 l/s (see Figure 17). Flow measured at the first intake was 40.7 l/s and flow measured at the second diversion was 32.9 l/s for a total of 65.8 l/s.

The flow of 210 l/s downstream below the junction with Canari River is explained by the presence of a shallow aquifer seeping through the riverbed. At this point, the Jassa has become a draining river. Further downstream the Jassa River is completely dry (Figure 19) with more intakes leading the remaining water into the Trop Plein canal.

In summary, the flow in the Jassa River upstream of Intake 1 is insufficient to irrigate the available farmland. Based on the available water upstream and downstream of the diversions, plus the additional seepage from groundwater, only 320 ha land can be irrigated, leaving 30 l/s



**FIGURE 19:
DRY BED OF
JASSA RIVER 3
KM NORTH OF
MAKIMARA**

in the river for ecological functions. NB: the 30 l/s figure is drawn from a recent PlanConsult study (PlanConsult, 2015) of a nearby river (the Anba Lanba in the Haut du Cap watershed). PlanConsult cites widely used guidance in France (Souchon and Keith, 2001) that environmental flow should be 1/10th of the total flow. In the case of the Jassa River in the area of the intakes, 30 l/s is above the 1/10th guidance. Table 20 overleaf summarizes the findings.

TABLE 20: FLOW MEASUREMENTS AT DIFFERENT LOCATIONS ALONG THE JASSA AND CANARI RIVERS

Flow measurement locations	Flows (l/s)	Irrigable lands (ha)
Jassa (upstream)	143	143
Intake 1 (one gate on right bank)	40.7	40
Intake 2 (two gates)	32.9 (65.8)	33 (66)
Canari River (before junction with Jassa)	3	N/A
Jassa (downstream below junction with Canari)	210	210

Other than the proposed works at Bas Maribahoux, AVANSE should not pursue the construction or rehabilitation of any system that will divert more water from the Jassa River unless additional sources of water are identified. Groundwater pumping is a potential option since the Plaine du Nord aquifer has enormous reserves but this is not currently being considered by AVANSE. Another possible option would be water storage systems upstream of the irrigated areas but these would require significant areas of land and the engineering requirements would be substantial.

Robino: AVANSE previously planned to rehabilitate 300 ha in Robino through the construction of a new intake on the Jassa River and a network of primary and secondary canals to irrigate lands that were formerly irrigated. Currently, the Robino irrigation system is dysfunctional and the canals are overgrown with vegetation. This system was abandoned seven years ago (2007) when the construction of the Makimara intake by Agro Action Allemande compromised water availability further downstream. There is insufficient base flow in the Jassa River to irrigate more land without causing strains on other users. Therefore, the construction of this system should not be implemented.

Bas Maribahoux: the cleaning of the Trop Plein Canal will help carrying flood water back to Jassa River downstream of Bas Maribahoux rice fields. However, ***it will not bring more water for irrigation*** (emphasis added). The cleaning of the Trop Plein canal should cover the full length of the supply and drainage system – which is 11.6 km to the downstream outfall into the Jassa River. Cleaning only the upper section of the canal could lead to disastrous flooding downstream and might also lead to conflict among farmers. Moreover, cleaning the Trop Plein canal alone will not provide more water to the Maribahoux system. There is a need for additional sources of water to increase the irrigated area. While flooding is certainly a significant problem that needs to be addressed, the lack of irrigation water remains the major constraint for rice production in the area.

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1. Also, as noted above, the excavation of the partially completed supply canal from the Masacre River to Bas Maribahoux should not be pursued by AVANSE given the need for significant engineering work on the Masacre and the complexity of addressing potential conflicts over water rights on an international waterway.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Jassa watershed comprise a package of interventions focused on the rice value chain. In the upper catchment the activities are focused on reducing soil erosion and improving water management through agroforestry. In the Bas Maribahoux area, cleaning of irrigation canals and the drainage network has the potential to improve the management of irrigation water over an area of about 700 ha though water availability in the dry season is sufficient for only about 320 ha. AVANSE will promote the adoption of SRI through training and better access to improved rice seed and other inputs such as fertilizer. SRI will reduce the quantity of water needed for each rice crop, reduce the need for pesticides to control weeds, snails, insects and other pests. These activities will improve the health of the environment – especially downstream where the Jassa River empties into the sea – and reduce human health risks.

AVANSE will also broker linkages between farmer groups and private companies that provide services such as plowing, harvesting, milling, access to inputs and markets. The full package

will contribute to improving productivity (yields), quality of the rice and enhance farmers' access to markets. The initiative in Bas Maribahoux will be a pilot that, if successful in its first year, AVANSE can replicate in other rice growing areas in Jassa and other target watersheds in northern Haiti.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

As per CEQ 40 CFR § 1508.7⁹ a Cumulative Impact Assessment (CIA) is defined as “ the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” In practice, the CIA implies identifying, assessing and analyzing the “combined, incremental adverse or beneficial effects of human activity spatially and/ or temporally as accumulated over time from one or more sources.”¹⁰

The cumulative environmental impacts of the Focused Activity Package Alternative for AVANSE have been *separately* identified, and *interactively* and *additively* assessed for each of the 6 watersheds and 2 extension zones. The CIA of AVANSE 's activities was additionally assessed with respect to the potential cumulative impact of non-AVANSE projects and development initiatives in the watersheds and extension zones so that the overall environmental impacts of all projects were taken into consideration. It should be noted that an EIA exists for only 2 of the 15 projects being developed or planned in AVANSE's project area, so expert judgment based on the information gathered on the environmental profiles of those activities was used for undertaking the relative environmental impacts of the non-AVANSE projects.

In order to capture (1) *Interactivity of Actions*; and (2) *Additivity of Impacts* accurately, the PEA team developed a matrix for the AVANSE activities. The matrix was used to assess the interactivity of multiple AVANSE activities in producing additive environmental impacts (beneficial and detrimental) on the physical and socio-economic environment within each watershed and extension zone. The PEA team generated the matrix as follows. First, potential major environmental impacts (MEIs) were grouped into three main categories: (1) Physical Environment impacts (such as soil erosion, effects of agro-chemicals, water quality, and water quantity), (2) impacts on the Biological Environment (such as effects on natural vegetation, aquatic species, and the Three Bays Marine Protected Area), and (3) Socio-Economic Environment impacts (such as effects on income, market access, and historical and cultural resources). The MEIs represent the outer level of analysis within the matrixes. The inner level of analysis is the AVANSE activities themselves. A ranking ranging from -3 to +3 with -3 being the most adverse environmental impact and +3 the most beneficial environmental impact was applied to each cell in the matrixes in order to rank the relative level of interactive and additive environmental impacts of combined activities. The PEA team then used its best professional judgment, based on field visits and discussions with stakeholders, to assign a qualitative value to relevant cells in each matrix.

Each matrix's interior cell (blue cells) represents the *interactive effects* of the activities that are linked horizontally on the upper area of the matrixes and vertically on the left side of the matrixes. The cells also represent the additive impacts of the above mentioned 2 activities as

⁹ <https://www.law.cornell.edu/cfr/text/40/1508.7> Title 40 published on 2014-07-01

¹⁰ http://www.usaidgems.org/Workshops/SenegalRegional2014/Session%2011%20-%20Cumulative%20Impact%20Assessment/Senegal%20Bilateral%20Session11_CIA.pdf

directly related to the MEIs found horizontally on the lower part of a given matrix and vertically on the right side of the matrix. The sum of all the blue cells of an activity or project in a specific watershed – calculated horizontally and vertically in yellow cells at the end of a given column or row – constitutes the total additive and interactive cumulative environmental impact of that specific activity or project.

For any given watershed or extension zone, the total additive and interactive cumulative environmental impact of all activities will be equal to the total of the value of the blue cells. As an example, the possible maximum or minimum value for AVANSE activities in the Trou du Nord Watershed is 432 (if all cells have a value of 3) or -432 (if all cells have a value of -3). Ultimately, the higher the total cumulative environmental impact value of the activities of AVANSE or the projects (case of AVANSE and non-AVANSE CIA) on a specific watershed, the greater the environmental benefits for the physical, biological, and socio-economic environment of the watershed. Conversely, the lower the total value, the greater the adverse environmental impacts on the physical, biological, and socio-economic environment of that specific watershed.

The result for the Jassa watershed was a positive cumulative impact. See Table 20¹¹ below for details. There are, however, several activity pairings that, when analyzed for additive and interactive impacts, produced an adverse effect. These comprise GAPs for irrigated rice production when crossed with institutional collaboration to promote GAPs, support to nurseries and grafting, agroforestry support to cacao production, and facilitate post-harvest handling, storage and processing. Alterations and improvements to these activities as well as mitigation measures that could further reduce the adverse impacts of these activities include:

- Enhanced GAPs for irrigated rice could include heightened promotion of the use of the double cone mechanical weeder in order to eliminate use of herbicides, and heightened promotion of organic fertilizer coupled with an aggressive timeline for eliminating inorganic fertilizer use.
- Improvements to institutional promotion of GAPs could include more frequent extension visits to rice producers, use of enhanced extension communication methods and products, and collaborating with MARNDR to scale up communication and use of AVANSE's GAPs for the three focal crops throughout the North and Northeast Departments.
- Improved mitigation measures for nurseries and grafting could include heightened promotion of the use of organic fertilizers (as an alternative to inorganic fertilizers) in nurseries, and increased use of IPM techniques in the nurseries as a means of reducing pesticide use.
- Agroforestry support to cacao production could be improved via increased planting of fruit and timber trees (for shade) within cacao plots; an emphasis could be placed on planting native species such as Haitian Oak and Mahogany which would have positive effects on biodiversity.
- Improvements to post-harvest handling, storage and processing could include extending the cleaner production practices to be applied at the G&G rice mill to other mills in the watershed.

AVANSE will consider incorporating these improvements into the cited activities.

The Jassa watershed has been identified as a potential target for several large development projects. These include the following:

- Watershed and natural disaster reduction programs (Oxfam and IDB)

¹¹ The cumulative impact assessment matrixes are also available as excel files which can be sent under separate cover.

- The creation of the Three Bays Protected Area
- Irrigation development projects (MARNDR and several multilateral donors)
- Sisal production and processing (Sisalco, IDB and MARNDR)
- A residential housing scheme near Ouanaminthe (site 16 on Figure 16)

The proposed Oxfam watershed management project will target the upper portions of the Jassa and Canari catchments and, if implemented, would contribute positively to reducing sediment loads of the rivers that provide water to the Bas Maribahoux irrigation perimeters.

The Three Bays Protected Area project will not have any direct impact on AVANSE activities in Jassa. We do not anticipate that AVANSE's interventions will have any negative consequences on ecosystem functions or biodiversity in the main protected area or its buffer zones.

Over the past 25 years, several irrigation projects have been proposed in the Jassa watershed with funding provided by multilateral donors including the World Bank, UNDP and FAO. At this time, we are not aware of any new initiatives that are in development. If additional projects are developed along the Jassa, the availability of water for the perimeters in Bas Maribahoux would be seriously compromised – especially in the dry season. These risks are likely to be exacerbated by climate change, which is expected to lead to reduced rainfall in this part of Haiti and increased seasonality that may intensify drought during drier times of year.

The Sisalco initiative includes an area of about 1,000 ha near Ferrier that is designated for sisal production. Processing occurs at a facility in the Caracol Industrial Park. At this time, smallholder interest in sisal production is low – mainly because prices are low but also because sisal production is still associated with an era when privileged landowners had large holdings under sisal throughout this part of Haiti.

A residential housing development has been proposed near Ouanaminthe by the IDB. Since this is adjacent to the Masacre River, we do not anticipate any cumulative impacts related to AVANSE activities with regard to water supply, power supply or waste management.

There are several collaborative opportunities that AVANSE could consider with respect to enhancing positive cumulative impacts linked to other development projects. These include exchanges with the Oxfam project on best watershed stabilization practices in the upper reaches of the Jassa watershed and an analysis of how to scale up these practices to achieve wider coverage, and collaboration with PN3B staff on communicating various details on the existence of the Park and permitted activities in order to improve environmental management practices of households living in the buffer and transition zones. AVANSE staff should also closely monitor any plans to implement additional irrigation projects in the watershed. If new projects are being designed, the results and analysis of the present PEA with respect to available surface water should be shared and a dialog on using groundwater as opposed to surface water resources initiated.

TABLE 21: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN JASSA

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Jassa	ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS	
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agro-forestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/ Drainage Systems				
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	-1	-1	-2	-2	1	-1	-1	-2	-2	1	1	1	-8	Soil erosion	PHYSICAL ENVIRONMENT	-8
	GAP for Irrigated Banana Production	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2	Effects of Agricultural Chemical		2
	GAP for Cacao Production	-1	2	2	2	2	2	2	2	3	2	2	1	-1	20	Water Quality		20
	Institutional Collaboration to promote GAP	-2	1	2	1	1	1	1	1	1	1	-1	1	1	9	Water Quantity	9	
	Support to Nurseries and Grafting	-2	1	2	1	1	1	1	1	1	1	1	1	1	11	Water Quantity	11	
	Irrigation systems water Users Ass. Capacity Building	1	1	2	1	1	1	1	1	1	1	1	1	2	15	Natural Vegetation	15	
	Small-Scale Irrigation projects	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2		2	
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2	Effects on Aquatic Species	2	
	Agro-forestry support to Cacao production	-2	1	3	1	1	1	1	1	1	1	1	1	1	12		12	
AGRICULTURAL MARKETS STRENGTHENED	Facilitate Post Harvest handling, storage and processing	-2	-1	2	1	1	1	-1	-1	1	-1	-1	1	1	1	Three Bay Marine Protected Area	1	
	Promote the use of voucher as a market oriented subsidies mechanism	1	-1	2	-1	1	1	-1	-1	1	-1	1	1	-1	2	Increased Income	2	
INFRA	Well Fed Irrigation Systems	1	0	1	1	1	1	0	0	1	1	1	0	1	9	Increased Access to Market	9	
	Gravity based Irrigation/ Drainage Systems	1	-1	-1	1	1	2	-1	-1	1	1	-1	1	-1	2	Historical & Cultural Resources	2	
INTER + ADD Cumulative IMPACTS		-8	2	20	9	11	15	2	2	12	1	2	9	2	79	TOTAL CUMULATIVE IMPACTS	79	
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species			Three Bay Marine Protected Area		Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS	CONCLUSION		
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT								

MARION WATERSHED

PHYSICAL ENVIRONMENT

At 216 km², Marion is the smallest of AVANSE's six watersheds (but larger than the two cacao extension zones). Similar to Jassa, most of the watershed is low, flat or gently sloping terrain. The watershed is home to the capital of the Nord-Est Department: Fort Liberté. This city is on a small peninsula that juts into a large lagoon or bay known as Fort Liberté Bay (see Figure 20).

TOPOGRAPHY

The coastal plain dominates Marion's topography. Hilly or mountainous areas are found in the extreme southern portion of the watershed. Only about one quarter of the land is above 600 m.

WATER RESOURCES

The main water resources in or adjacent to the watershed are the Marion River and Fort Liberté Bay.

BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

Parts of the Three Bays National Park and the Northeast Lagoon KBA fall within the Marion watershed. There are large expanses of seagrass beds in Ft. Liberté Bay which appear to be in relatively good condition. There are also some fragments of natural forests – dominated by pine species – in the higher altitude areas at the extreme southern end of the watershed.

FIGURE 20: LAND USE AND LAND COVER IN MARION

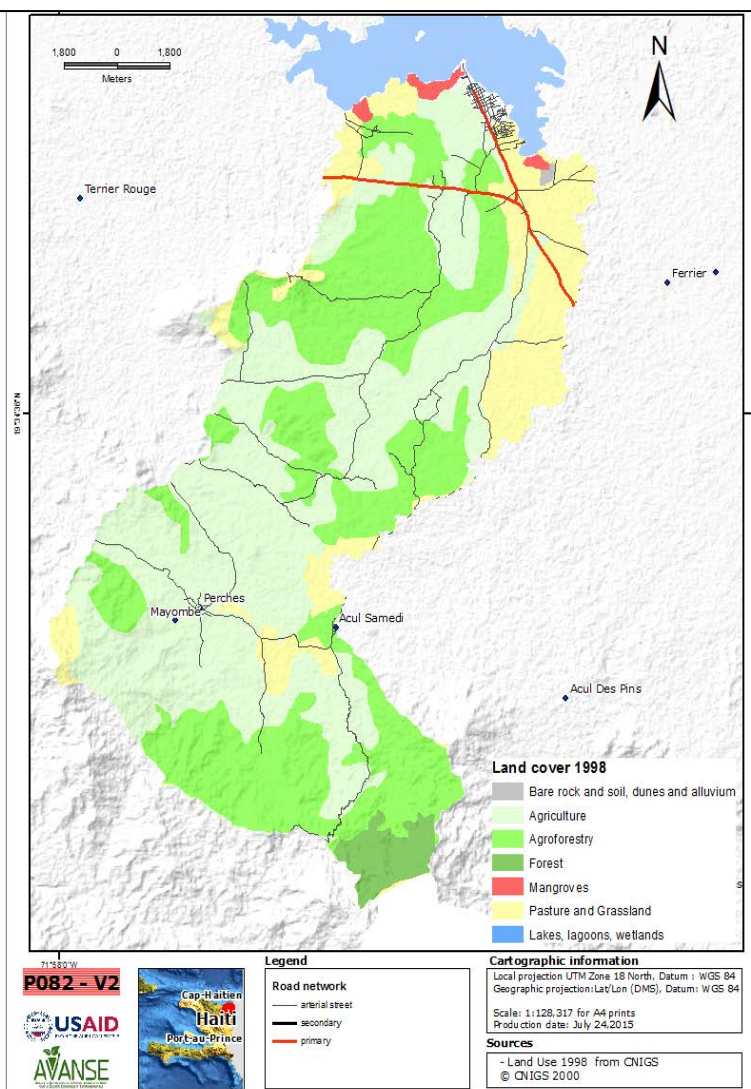


TABLE 22: SUMMARY CHARACTERISTICS FOR MARION WATERSHED

Characteristic	Statistic
Total area	216 km ²
Population	43,061
Population density	166 people/ km ²
Area < 75 m (elevation)	159 km ²
Area 75 – 600 m (elevation)	50 km ²
Area > 600 m (elevation)	8 km ²
Area of agriculture	97 km ²
Area of agroforestry	78 km ²
Area of pasture/grassland	32 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in the Marion watershed is approximately 43,100. The population density was approximately 166 people per km² (IHSI, 2005). Fort Liberté had the most people (approximately 11,800 people) among the 3 communes that overlap with the watershed.

LAND TENURE

Marion's farm size distribution follows the trends of most of the other watersheds and extension zones with over 60% of the farms falling between 1 and 3 ha. The watershed does have the highest percentage (26%) of farms over 3 ha among AVANSE's watersheds and extension zones. Only a small percentage of the land is rented or sharecropped (13%); the rest of the land is owned. See Tables 6 and 7 for more information.

LAND USE

A large percentage of Marion's land is used for agriculture or agroforestry: 45 and 36%, respectively. Besides Borgne, Marion also contains the largest area covered by forest – 5 km². See Table 21 for additional details.

ECONOMIC ACTIVITIES

With respect to economic activities, the population of Marion is mainly engaged in agriculture, animal husbandry and commerce (IHSI, 2005). Activity with livestock is most pronounced in Terrier Rouge commune.

HISTORICAL AND CULTURAL RESOURCES

Marion watershed contains one historical mountain, four forts (Fort de la Bouque, Fort Dauphin, Fort St. Joseph and Fort Labonet), and 10 voodoo temples. Morne Deux Mamelles (804 m) is considered a cultural resource.

HEALTH AND EDUCATIONAL FACILITIES

Health facilities in the Fort Liberté and Terrier Rouge communes, both of which straddle the Marion watershed, include one hospital and three health centers. These two communes also have over 90 primary and secondary schools and over 10 vocational and university-level establishments. Please refer to Table 10 for additional details.

ENVIRONMENTAL CONSEQUENCES

The lowlands of the Marion watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. AVANSE's activities will

enable farmers to make better use of these resources by improving rice production through infrastructure improvements, better access to agricultural inputs and associated training as well as facilitating access to markets. The potential environmental and social consequences of these activities include altering the water balance in biologically important ecosystems such as the Fort Liberté bay – which is part of the Three Bays Protected Area and possible contamination of groundwater, rivers, small lakes and inshore waters with agro-chemicals.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's activities in the Marion watershed will focus principally on improving rice production through the introduction of SRI and better access to seed and fertilizers. Previously, this included planned infrastructure improvements at two locations – Chalopin and Garde Saline – where reconstructed diversions and rehabilitation of supply canals would increase water availability especially in the dry season. These activities have not been prioritized in the action plan for the final two years of the AVANSE project. Nevertheless, here we provide an environmental and social review of the proposed actions to facilitate any future reprogramming of AVANSE activities.

**TABLE 23: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES IN MARION WATERSHED**

Activity	Quantity
Plantain/Banana (ha)	n/a
Cacao (ha)	800
Rice (ha)	1050
Interventions on irrigable land (ha)	1050
Length of treated irrigation/drainage canals (km)	n/a

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: AVANSE's activities will promote the adoption of SRI to improve the management of water resources for the irrigation of about 500 ha of rice lands – about 470 ha at Chalopin and 30 ha at Garde Saline – and will enhance the use of agricultural inputs such as fertilizers and reduce the need for using pesticides.

The watershed is drained by the Marion River that drains into the Fort Liberté Bay. Two other large irrigation systems are found in the watershed: Dumas (237 ha), which is upstream of Chalopin and Croi Cou (162 ha) to the north, downstream of Chalopin (see Figure 22). All of these systems obtain irrigation water from the Marion River. At Dumas, there is no single hard-built intake for the perimeter. In order to dam the river, farmers use branches and other vegetative materials, sand bags, and plastic sheeting. The possible reconstruction of a diversion on the Marion River below the Dumas offtake would improve water supply to the Chalopin perimeter in the dry season. Cleaning of canals would enhance the flow of water diverted from the Marion River.

The **Chalopin** irrigation system in the lower Marion watershed is cultivated with rice (61%), pasture for cattle 17% and the remainder is planted with trees (Societe d'Expertise et d'Ingenierie LGL SA, 2013). The system currently occupies 170 ha. The system is irrigated by a diversion called Janm Pantalon made of rocks and plant materials that is located on the Marion

River. This is also the starting point of the river Malfety, which flows to the left (north) and carries water to the Garde Saline irrigation system. The Marion River continues to the right (north-east) to Croi Cou where it is used to irrigate 160 ha of land. The diversion does not function as intended, letting more water flow toward Croi Cou and has to be rebuilt after heavy rainfall. In years with normal rainfall, low flow during the dry season limits rice production to no more than two crops.

The Garde Saline system on the lower end of the Marion Watershed consists of 30 ha of which 36 % is cultivated with rice. Garde Saline perimeter is irrigated with water from the Malfety. According to users, the Malfety River is a channel dug by FONDEV to reduce flooding from the Marion River. It is located 5.12 km north of the Chalopin intake. According to farmers, there are very few lands being irrigated with water from the Malfety River between Chalopin and Garde Saline, except for Romeo.

FIGURE 21: LOWER MARION WATERSHED: DUMAS, CHALOPIN, CROI COU AND GARDE SALINE IRRIGATED PERIMETERS

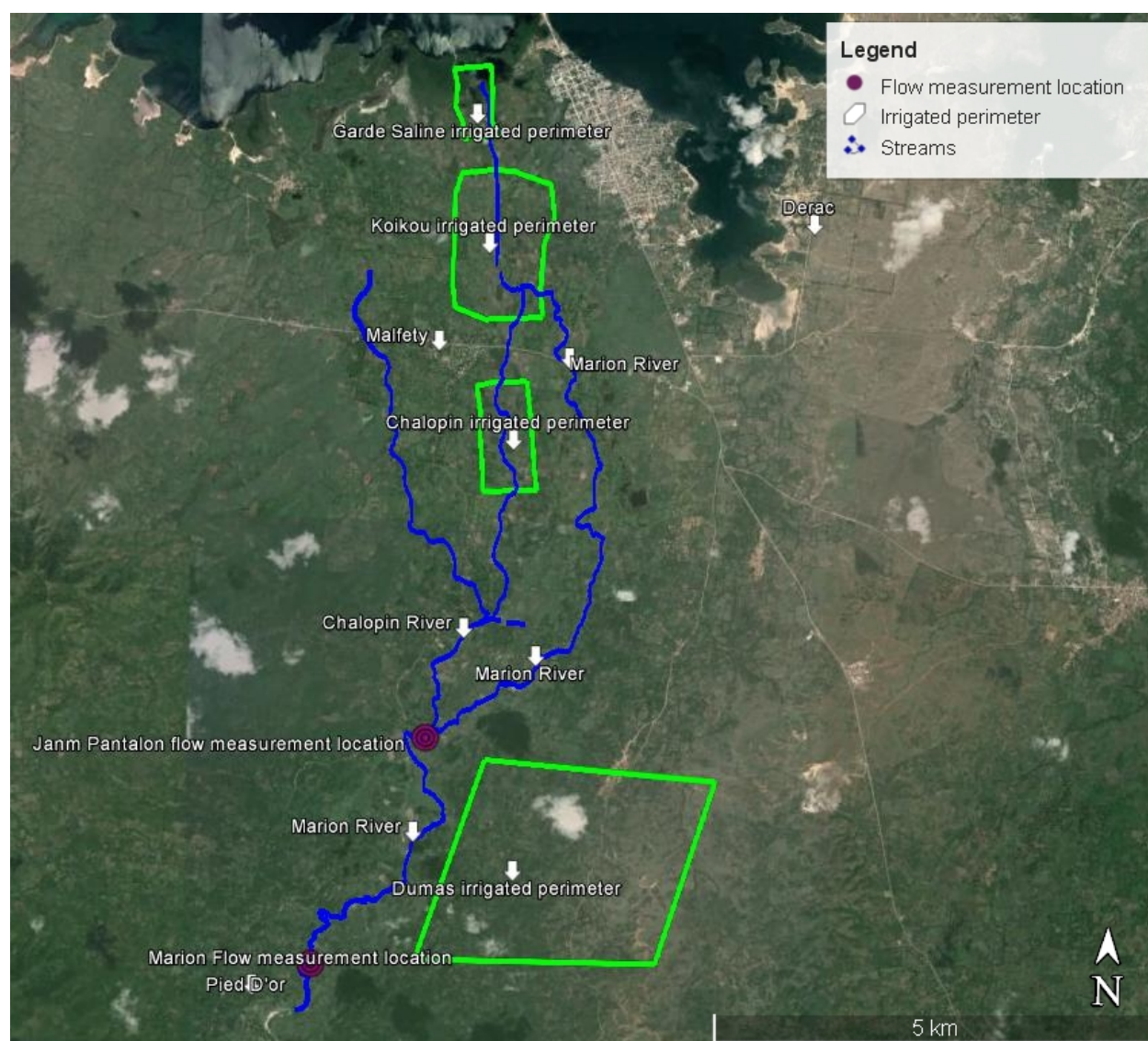
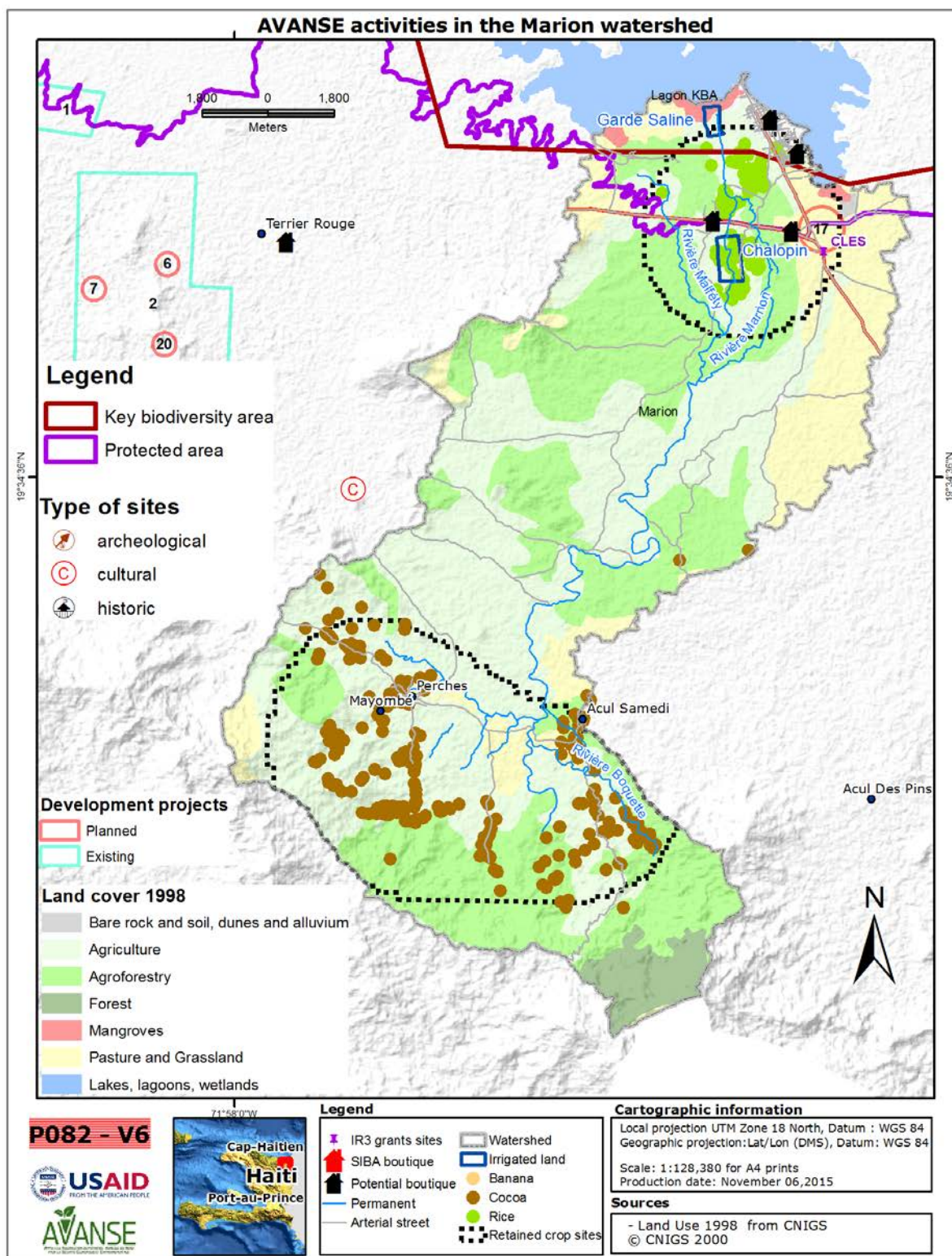


FIGURE 22: AVANSE ACTIVITIES IN THE MARION WATERSHED



AVANSE has implemented cacao improvement activities in the upper parts of the Marion watershed. These activities will continue through extending the Farmer Field School program that has enhanced cacao production by introducing improved varieties, grafting improved stock onto old trees and linking farmers to buyers.

Biological environment: farmers in the Chalopin FFS report that they are using 60% to 80% less fertilizer with SRI than they formerly used for rice production. Farmers typically use saved seed, but periodically renew their stock by purchasing pesticide treated seed of the Jaragua variety in the DR. Because they use only 10% the amount of seed for SRI rice, potential contamination is reduced. Moreover, since SRI requires less water, very little drainage water returns to the river and pollution by fertilizer and pesticide residuals is significantly reduced. Improved water management in the Chalopin and Garde Saline perimeters would reduce potential negative impacts on flows into the Fort Liberté Bay. Moreover, SRI rice production techniques and associated promotion of GAPs for the rice package should significantly reduce inorganic fertilizer use and the amount of agro-chemicals in drainage water (see Table 11 above and Annex F for more details). This will, in turn, reduce adverse effects on aquatic flora and fauna. As part of the mitigation measures linked to the PN3B, KBAs and coastal areas, we have included the goal of eliminating the use of inorganic fertilizers in the rice GAPs and the umbrella EMPR for IR1 (see Annex F).

Expanding agroforestry systems through the introduction of cacao will have positive impact on soil and water conservation in the upper watershed and will also create improved habitat for wildlife – including several threatened endemic species of birds and reptiles.

Socio-economic environment: AVANSE's activities will provide improved incomes for an estimated 1,600 farming families from increased rice and cacao production. Farmers are convinced of the superiority of SRI over traditional rice and will continue to use the SRI technology even after AVANSE comes to an end. One farmer commented: "All you have to do is see it." Farmers reported more than double the number of tillers (45 to 60 with SRI, 20 to 25 with traditional rice), number of grains, and the superior height of SRI rice plants after only 15 days. Yields of traditional rice were 3 to 5 t/ha and 8 to 12 t/ha with SRI. More labor is needed for harvesting but the increased value of the production more than covered the cost of additional labor. All the members of the Ecole Bayaha FFS have adopted SRI and the same is true for 8 other FFS in Chalopin (about 200 farmers). Farmers report that non-FFS participants, family members and neighbors who worked with them in *konbit* had also adopted SRI. This suggests a much more rapid adoption of the improved practices than was originally thought possible.

Cacao production provides farmers with additional income from a diversified agroforestry system that includes other commercial crops as well as food crops that improve household nutrition.

NEGATIVE IMPACTS

Physical environment: rice farmers in the Marion watershed rely heavily on river water for irrigating their crops. When there is adequate water, they can produce three crops each year and their annual production can be more than double that before the formal irrigation systems were established. However, the lower portion of the watershed has at least five irrigated perimeters (Dumas, Chalopin, Malfety (Romeo), Croi Cou and Garde Saline) and competition for water is intense – especially during the dry season and in times of drought. In 2015, most farmers in Chalopin have yet to harvest any rice because two crops have already failed owing to lack of irrigation water. There is a significant risk that if diversions for upstream perimeters are improved, the water supply for perimeters further downstream will be compromised. Moreover,

there could be negative consequences for environmental flows in the lower reaches of the Marion River.

Biological environment: drainage from the proposed irrigation improvements will contain some agro-chemicals and pesticides that may have a detrimental impact on aquatic organisms further downstream. However, we expect that the level of agro-chemicals in the drainage water will be very low due to AVANSE's promotion of SRI techniques and organic fertilizer. The Marion River flows to the coast at the Bay of Fort Liberté – an environmentally sensitive habitat of high importance for biodiversity. Discharge into the bay occurs mainly during the wet season when high flow volume reduces the concentration of agrochemicals in the river water.

AVANSE anticipates providing rice seed to farmers in the Marion perimeters where Farmer Field Schools are implemented. Seed will be provided directly to some farmers for training purposes and to others through the SIBA initiative. If any rice seed for planting has been treated with pesticides, AVANSE will acquire only seed that has been treated with products that are approved for seed treatment under the 2014 Annual Update of the Mission PERSUAP: Maxim XL (EC) and Thiram 75 (WP). Battalion 0.2 is also approved but it is not considered suitable for treating rice seed. The PERSUAP also recommends Actellic 5E (pirimithos-methyl 57%) for post-harvest treatment of seed to prevent insect damage. Some vendors of rice seed for planting use Actellic to reduce damage to the seed while it is being stored prior to being sold to farmers. We regard Actellic treated rice as suitable for planting.

Since treated seed can be harmful to human health and to aquatic organisms and will be stored, handled and used only under strict compliance with PERSUAP guidelines. Treated rice seed distributed through the SIBA initiative will be stored apart from all other commodities.

Agro-chemicals are not used on cacao but farmers use a variety of techniques to control rats and mice that damage the cacao pods. At this time, we are not aware of any use of toxic rodenticides – rather farmers use concoctions made of salt that kill the rodents. AVANSE will ensure that FFS training includes safe ways to control such pests.

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers and treated rice seed.

Increased cacao production may reduce the area under food crops such as maize, beans and peanuts. If farmers reduce the area available for annual crop production, they may have to use their other parcels more intensively, with shorter fallow or no fallow, resulting in decreased yields and increased erosion. For the most part, this has not occurred because the agroforestry blocks of the upper watersheds are often on marginal soils that are left in fallow for long periods and are not critical for food production.

The Marion watershed contains several known pre-Colombian archaeological sites of the Taino culture. Other sites are likely to occur in the area but no IR 1 activities will result in new land clearance or excavation of new canals and drainage lines.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

POSITIVE IMPACTS

Physical environment: in the Marion watershed, there are no planned IR 2 activities since significant infrastructure improvements to the irrigated perimeters are not anticipated. If this changes, the AVANSE team will locate priority sites using satellite imagery to identify areas with

extensive bare ground on hillsides in the upper catchments of rivers and streams that supply irrigated perimeters with water.

The potential interventions will include vegetative measures to control soil erosion – vetiver grass, agroforestry and cover crops – and installing physical structure to capture runoff and reduce erosion – contour bunds and temporary fences. By reducing soil erosion on hillsides, AVANSE will diminish siltation in rivers and irrigation canals, maintain soil cover for productive agriculture and replace bare hillsides with valuable trees and crops that provide nutritious foods and income.

Biological environment: enhanced vegetation cover will provide habitat for wildlife included several threatened species – particularly birds and reptiles – that are endemic to Hispaniola.

Socio-economic environment: agroforestry activities will provide increased incomes for small-holder farmers from cash crops such as pineapple, plantain and okra while food crops such as maize, beans and peanuts will improve family nutrition. Many of the hillsides where AVANSE will support interventions are relatively unproductive pasture. By implementing farmer field schools that promote agroforestry, AVANSE will help individual farming families gain to access *konbit* labor to prepare their parcels for new crops – labor that is otherwise in short supply since many young people have moved from the rural areas to find work.

NEGATIVE IMPACTS

Physical environment: potential negative consequences of agroforestry and erosion control measures include exposing the land surface to runoff before the vegetative cover is established or when annual crops such as peanuts are harvested. If such interventions are implemented, AVANSE will limit the risks by intercropping with trees and perennial shrubs and grasses such as vetiver. In addition, AVANSE will promote the use of cover crops such as *mucuna* that not only protect the soil surface from erosion but also contribute organic matter that enhances the water retention capacity of the soil.

Biological environment: we do not anticipate any negative consequences if agroforestry interventions are implemented upstream of sites where irrigation infrastructure is improved. Agroforestry activities that have been undertaken by AVANSE in the past may continue to expand without additional project interventions. In several watersheds where AVANSE has been implementing soil conservation initiatives, early adopters have been supporting their neighbors by providing advice, labor and planting materials.

Socio-economic environment: AVANSE's agroforestry activities will require collaboration among farming families to provide labor for initial land preparation and planting. The *konbit* system remains very active in this part of Haiti, so no major issues or challenges are foreseen.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: the improvements to CLES rice milling operations near Fort Liberté will mitigate environmental issues such as poor management of waste water and rice hulls. AVANSE will ensure that grantees such as CLES adopt improved environmental management practices.

Biological environment: currently, rice millers use rodenticides to control pests. Improved pest control practices at the rice milling sites will reduce the potential risks to human health and wildlife.

Socio-economic environment: AVANSE's activities in the Marion watershed will include supporting at least one rice milling operation – CLES – with grant funding to improve their operations. In addition, AVANSE is planning to engage with three new boutiques to expand access to agricultural inputs such as fertilizer, rice seed and plowing services. Improving smallholder access to these products and services will have a beneficial impact on rice production.

NEGATIVE IMPACTS

Physical environment: it is anticipated mechanized equipment may be used for plowing and rice harvesting, which could result in soil compaction and poor drainage. AVANSE will monitor the impact of mechanized farming on soil structure and drainage and, if warranted, will promote the use of animal traction for plowing. This aligns with MARNDR current policies and guidelines.

Biological environment: see above under IR 1 activities.

Socio-economic environment: rice processing activities are currently poorly managed with milling operations barely meeting acceptable health and safety standards for workers. AVANSE grantees will be required to upgrade their facilities to comply with international standards. These include requirements for ensuring safe operation of equipment; workers' exposure to dust, fumes and noise; provision of appropriate sanitation for workers; safe disposal of waste water and solid waste such as rice hulls; and safe storage, handling and use of pesticides (particularly rodenticides).

If AVANSE expands its SIBA boutique program to Marion and if the program includes treated rice seed, appropriate mitigation measures will be needed to ensure safe storage, handling and use of the products (see above under Jassa IR1 activities).

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE's does not anticipate any infrastructure interventions in the Marion watershed. Previously, improvements to irrigation infrastructure were contemplated for the Chalopin and Garde Saline perimeters.

The Chalopin intake is located 1.78 km after the Janm Pantalon diversion on the Malfety River (see Figures 22 and 23). According to users, the check dam and the canal system are functional but the dam is too low to raise water high enough to enter the canal networks. Moreover, floods occur during the rainy season. After the diversion, the Malfety River continues its course to the Garde Saline perimeter. The Chalopin intake feeds the Batardeau and Chalopin systems through a 532 m long masonry channel and an earthen canal system. In the dry season, the Marion River does not provide any irrigation water because the water level is too low. According to local farmers, however, the river floods every rainy season.

The AVANSE project had planned to rehabilitate the Chalopin perimeter and construct a new intake at the Janm Pantalon diversion site to allow more water to flow into the Malfety River. Additionally, the Chalopin intake was to be raised to allow more water into the canal network in order to irrigate an additional 260 ha of farm land.

FIGURE 23: JANM PANTALON DIVERSION ON THE MARION RIVER WITH MARION ON THE LEFT AND THE CHANNEL TO MALFETY-CHALOPIN ON THE RIGHT (SOURCE: SOCIÉTÉ D'EXPERTISE ET D'INGÉNIERIE LGL SA, 2013)



The project also planned to implement the construction of intake, irrigation canal and drainage network at Garde Saline. The water needs for all the systems along the Marion River is summarized in the table below.

TABLE 24: IRRIGATION WATER NEEDED FOR DIFFERENT PERIMETERS WITHIN THE MARION WATERSHED

System Name	Current (ha)	Extension (ha)	Total (ha)	Irrigation water needed (l/s)
Dumas	0	0	237	237
Chalopin	170	260	430	430
Croi Cou	162	0	162	162
Garde Saline	0	30	30	30
Total water needed				859

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1.

NEGATIVE IMPACTS

Physical environment: during this study, flow measurements were conducted at three locations along the Marion River. The table below summarizes the findings (see Figure 22 for sampling locations). The flow measured on 28 July, 2015 upstream of the Dumas intake at Pied d'Or was only 220 l/s. This volume of water can irrigate only 190 ha (assuming 1 l/s/ha is needed to grow rice under SRI) leaving 30 l/s for ecological functions. There is insufficient water to irrigate even Dumas during the dry season. According to some farmers, however, the current water level is very low compared with the dry season under normal years owing to the very low rainfall.

TABLE 25: FLOW MEASUREMENTS AT DIFFERENT LOCATIONS ALONG THE MARION RIVER

Sampling locations	Flow (l/s)
Marion Upstream Pied D'or	332
Marion Upstream of Janm Pantalon downstream of Dumas intake	220
Marion (below Janm Pantalon)	112

The hydrology of the Marion River is not well known. A study from UNDP reported a low flow of 150-200 l/s at Pied d'Or (Société d'Expertise et d'Ingénierie LGL SA, 2013). No date was provided. Other values were obtained from the archive of the Ministry of Agriculture: a flow rate of 450 l/s from 10 June 1977.

There is insufficient water in the Marion River during periods of low flow to irrigate all of the proposed irrigation systems without compromising the water needs of the existing irrigation systems within the Marion watershed even with improved efficiency and the adoption of SRI. Implementing the system at Chalopin would reduce the flow of water to Croi Cou and Garde Saline and could lead to conflict among farmers and other water users. At other times of the year – as indicated by the flow in the river in June (MARNDR source) – more water is available, so slightly more land can be irrigated. The system expansions planned by AVANSE should not be implemented unless other sources of water are identified such as through groundwater pumping. Another alternative would be to create water storage systems upstream of the intakes but there is insufficient land available for such large and potentially complicated engineering works.

Chalopin: There is insufficient water in the Marion River during base flow. Implementing this construction would withdraw more water and could create conflict among upstream and downstream users. Therefore, the construction of this system should not be implemented.

Garde Saline: The system, located at the lower end of the watershed, depends on the outfall from the irrigation systems in the upper watershed. During base flow, there is insufficient water to reach this area. Therefore, the construction of this system should not be implemented.

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Marion watershed comprise a package of interventions focused on improving rice production on the plains and limited cacao expansion in parts of the

upper watershed. AVANSE will promote the adoption of SRI through training and better access to improved rice seed and other inputs such as fertilizer. SRI will reduce the amount of water needed for each rice crop, reduce the need for pesticides to control weeds, snails, insects and other pests. These activities will improve the health of the environment – especially downstream where the Marion River empties into Fort Liberté Bay – and reduce human health risks.

Cacao interventions in the upper watershed will increase farmers' incomes – improving their ability to provide for their families.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Cumulative impacts of the AVANSE project activities have been assessed using the methodology described above for the Jassa watershed. The overall result of the assessment is a positive cumulative impact as depicted in Table 25 below. Results of the cumulative impact assessment for Marion are almost identical to those for Jassa. Please see the discussion of how to further reduce the adverse impacts of discrete activities in the Jassa section above.

The Marion watershed has been identified as a potential target for several large development projects. These include the following:

- The creation of the Three Bays Protected Area
- Irrigation development projects (MARNDP and several multilateral donors)
- A residential housing scheme near Fort Liberté (IDB) (site 17 on Figure 21)
- An unregulated solid waste site near Fort Liberté
- Small tourism development projects

The Three Bays Protected Area project will not have any direct impact on AVANSE activities in Marion. While expansion and rehabilitation of existing irrigated perimeters could have a detrimental impact on the quantity and quality of water flowing into the Fort Liberté Bay, AVANSE's promotion of SRI will have a largely beneficial impact by reducing water needs and the use of agro-chemicals. We do not anticipate that AVANSE's interventions will have any negative consequences on ecosystem functions or biodiversity in the protected area or its buffer zones.

Over the past 25 years, several irrigation projects have been proposed in the Marion watershed with funding provided by FONDEV including Dumas, Chalopin and Croi Cou. MARNDP's Office de Petit Périmètre d'Irrigation is in the process of developing a small irrigation system near Bas de Perches that will draw water from the Marion River to irrigate about 15 to 20 ha of land. If implemented, this scheme would further reduce water availability in the perimeters downstream (Dumas, Chalopin, Croi Cou and Garde Saline). Another small scheme is also planned near Acul Samedi where groundwater will be pumped to provide irrigation on about 25 ha of land. At this time, we are not aware of any other new initiatives that are being considered. If more projects are developed along the upper Marion, the availability of water for the existing perimeters will be further compromised – especially in the dry season.

The proposed residential housing development near Fort Liberté will be located in the general vicinity of the CLES rice mill. It will be essential for AVANSE to ensure that dust, fumes, waste water and solid waste from the mill do not create any adverse health conditions. In addition, the mill currently taps groundwater for the sanitation facilities and for some processing operations. It will be essential to monitor water quality regularly to ensure that there is no contamination from residential sanitation systems or the unregulated solid waste site that is situated in the same general vicinity. Some solid waste from Ouanaminthe is dumped at this site but local authorities

have stated that in the near future all waste will be processed at the proposed solid waste site at Mouchinette near Limonade.

Fort Liberté has several historical sites that have been proposed as sites for promoting tourism. We do not anticipate any cumulative impacts related to AVANSE's activities in the Marion watershed.

Similar to Jassa, a collaborative opportunity that AVANSE could consider with respect to enhancing positive cumulative impacts linked to other development projects is working with PN3B staff on communicating various details on the existence of the Park and permitted activities in order to improve environmental management practices of households living in the buffer zone. Conversely, AVANSE staff should closely monitor plans to implement additional irrigation projects in the watershed. The results and analysis of the present PEA with respect to available surface water should be shared and a dialog on using groundwater as opposed to surface water resources initiated. Experience with watershed stabilization actions, that can help with infiltration and groundwater recharge should also be shared with MARNDR and other actors intervening in the irrigation sector.

TABLE 26: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN MARION

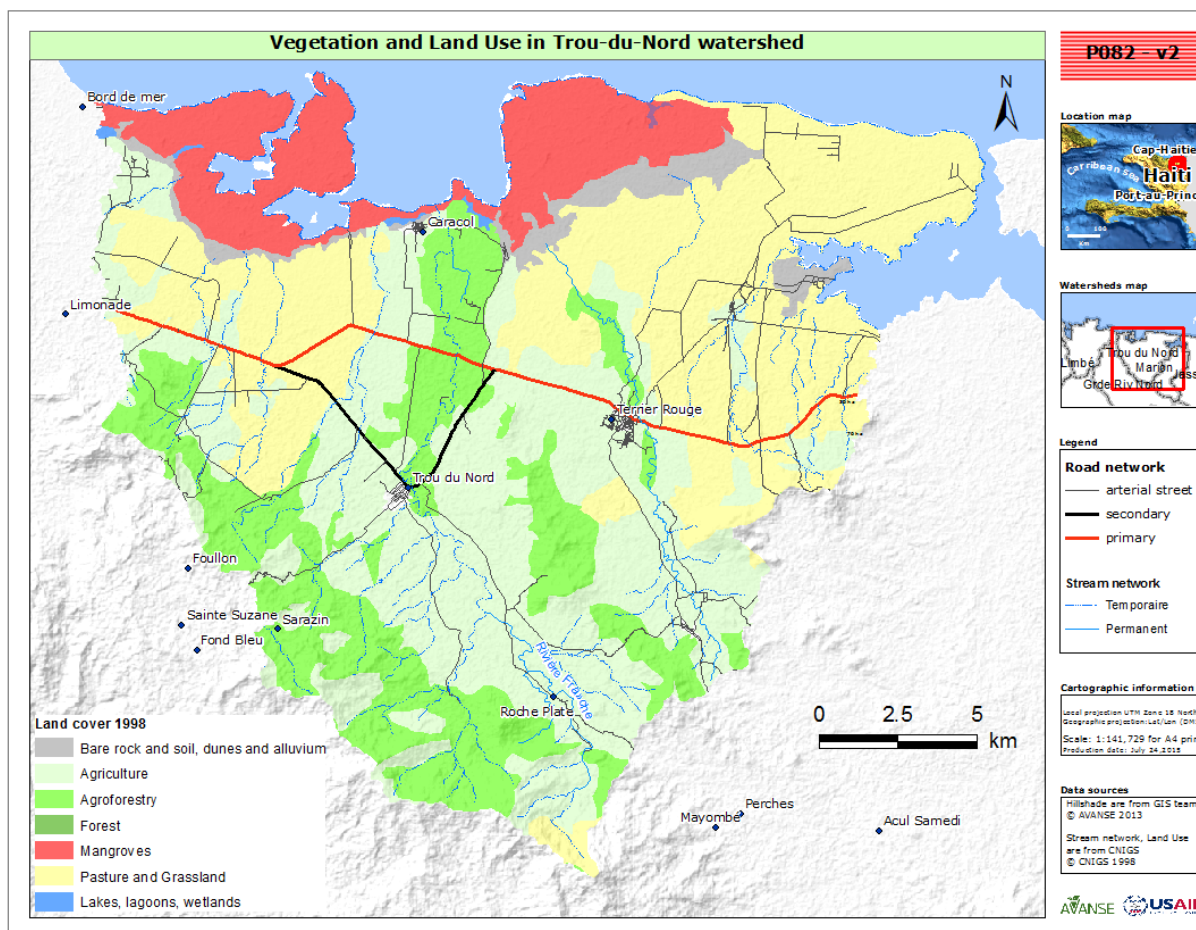
WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED			AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Marion		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agro-forestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/ Drainage Systems					
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	-1	-1	-2	-2	1	-1	-1	-2	-2	1	1	1	-8	Soil erosion	PHYSICAL ENVIRONMENT	-8	
	GAP for Irrigated Banana Production	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2	Effects of Agricultural Chemical		2	
	GAP for Cacao Production	-1	2	2	2	2	2	2	2	3	2	2	1	-1	20	Water Quality		20	
	Institutional Collaboration to promote GAP	-2	1	2	1	1	1	1	1	1	1	-1	1	1	9	Water Quantity		9	
	Support to Nurseries and Grafting	-2	1	2	1	1	1	1	1	1	1	1	1	1	11	Water Quantity		11	
	Irrigation systems water Users Ass. Capacity Building	1	1	2	1	1	1	1	1	1	1	1	1	2	15	Natural Vegetation	BIOLOGICAL ENVIRONMENT	15	
	Small-Scale Irrigation projects	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2	Effects on Aquatic Species		2	
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	-1	0	2	1	1	1	0	0	1	-1	-1	0	-1	2	Three Bay Marine Protected Area	SOCIO-ECONOMIC ENV.	2	
AGRICULTURAL MARKETS STRENGTHENED	Agro-forestry support to Cacao production	-2	1	3	1	1	1	1	1	1	1	1	1	1	12	Increased Income		12	
INFRA	Facilitate Post Harvest handling, storage and processing	-2	-1	2	1	1	1	-1	-1	1	-1	-1	1	1	1	Increased Access to Market	CONCLUSION	1	
	Promote the use of voucher as a market oriented subsidies mechanism	1	-1	2	-1	1	1	-1	-1	1	-1	1	1	-1	2	Historical & Cultural Resources		2	
INTER + ADD Cumulative IMPACTS	Well Fed Irrigation Systems	1	0	1	1	1	1	0	0	1	1	1	0	1	9	TOTAL CUMULATIVE IMPACTS	9		
	Gravity based Irrigation/ Drainage Systems	1	-1	-1	1	1	2	-1	-1	1	1	-1	1	-1	2		2		
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species	Three Bay Marine Protected Area	Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS		CONCLUSION					
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT									

TROU DU NORD WATERSHED

PHYSICAL ENVIRONMENT

At 424 km², Trou du Nord is one of AVANSE's larger watersheds. The primary watershed can be divided into eighteen secondary or sub-watersheds (DAI, 2013a). Unique characteristics include large mangrove areas and a fringing coral reef not far off the coast.

FIGURE 24: LAND USE AND LAND COVER IN TROU DU NORD



TOPOGRAPHY

Similar to some of the other AVANSE watersheds, Trou du Nord is dominated by a flat, coastal plain with some hilly and mountainous areas in its southern portions. The vast majority of the land (87%) lies below an elevation of 75 m. Only 5 km² lies over 600 m.

WATER RESOURCES

The Trou du Nord River is the main water resource within the watershed; Caracol Bay is another key water resource. With respect to specific data on water resources, ENVIRON, a consultant to IDB on the Caracol Industrial Park project, reported field measurements on the Trou du Nord River during both drier seasons in 2011 as being 0.45 m³/s (February) and 0.70 m³/s (July). The also pump tested wells at the Caracol Industrial Park and found that a well

pumping at a sustained yield of 50 to 60 l/s resulted in a 20 m drawdown at the well and a 3 m drawdown at a test well 116 m away (ENVIRON, 2011b).

BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

A large portion of the recently designated Parc National des Trois Baïes (PN3B) falls within the Trou du Nord watershed and adjacent marine areas. The Park encompasses important mangrove, coral reef and seagrass marine ecosystems. This same area is also part of the Northeast Lagoon KBA.

Coral reefs in the area remain relatively healthy despite the mass die-off of two of its primary builders, the IUCN Red Listed Elkhorn Coral and Staghorn Coral (*Acropora palmata*, and *A. cervicornis*), both critically endangered. Many colonies of these two species have been observed on the Caracol fringing coral reef (Wiener, 2013) adjacent to Trou du Nord. The large seagrass beds in Caracol Bay appear to be impacted by somewhat heavy sediment loads; however, they remain in good condition. At Caracol, the fishers were aware of the creation of the new PN3B but to date that have had no communications with the authorities concerning any fishing restrictions.

The largest mangrove forests in the AVANSE project zone are in the Trou du Nord watershed (5,133 ha) (FoProBiM, 2013). In addition, an endemic fish, the Few-rayed Limia (*Limia pauciradiata*) was found in the lower Trou du Nord River (Wiener et al. 2013). The only known habitat for this fish is the Grande Rivière du Nord and the Trou du Nord rivers in north-east Haiti (Wiener et al., 2013; Fishbase.org).

TABLE 27: SUMMARY CHARACTERISTICS FOR TROU DU NORD WATERSHED

Characteristic	Statistic
Total area	424 km ²
Population	75,863
Population density	277 people/km ²
Area < 75 m (elevation)	370 km ²
Area 75 – 600 m (elevation)	48 km ²
Area > 600 m (elevation)	5 km ²
Area of agriculture	147 km ²
Area of agroforestry	83 km ²
Area of pasture/grassland	134 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in Trou du Nord is approximately 75,900. Based on information from 2005, the population density was approximately 280 people per km² (IHSI, 2005). At 723 people per km², Limonade was by far the most densely populated commune that overlaps with the watershed.

LAND TENURE

Farm size in the Trou du Nord watershed is generally between 1 and 3 ha. Trou du Nord does have one of the larger percentages (24%) of farms greater than 3 ha among the AVANSE watersheds and extension zones. With respect to access to land, over 75% of the land is owned with only a small percentage sharecropped or rented. See Tables 6 and 7 for more information.

LAND USE

Pasture, grasslands and agricultural areas account for about 67% of the Trou du Nord watershed with 20% being classified as agroforestry. Mangroves occupy about 11% of watershed. See Table 26 for more details.

ECONOMIC ACTIVITIES

The main economic activities for people in the Trou du Nord watershed are fishing, animal husbandry, agriculture and commerce (IHSI, 2005). Fishing is mainly found in Caracol commune while livestock rearing is found in Sainte Suzanne and Terrier Rouge communes.

HISTORICAL AND CULTURAL RESOURCES

There are a number of cultural and historical sites in Trou du Nord watershed:

- Caracol commune harbors the Columbus ship wreckage and 5 voodoo temples,
- Trou du Nord commune has the Coco Clervil cave, the Bassin St Jean and Bassin Tounen, and colonial wells, and
- Terrier Rouge commune has three caves: Grotte de Grand Bassin, Grottes de Nappes, and Grotte de Notre Dame de Lourdes.

HEALTH AND EDUCATIONAL FACILITIES

Caracol commune as well as Limonade and Terrier Rouge (parts of these latter two communes fall within the Trou du Nord watershed) contain 12 health centers. These communes also have over 100 primary and secondary schools as well as 18 vocational schools. See Table 10 for more information.

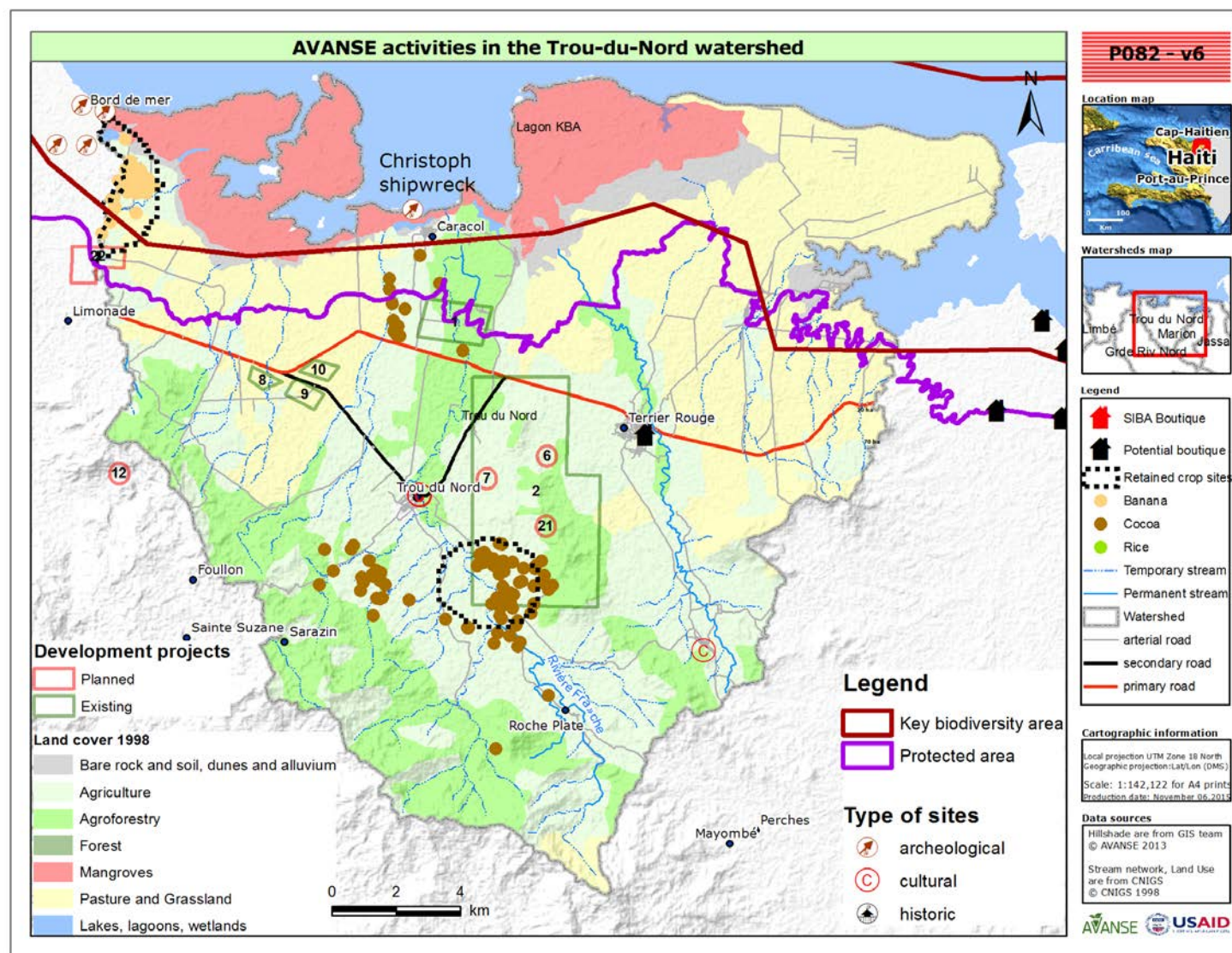
ENVIRONMENTAL CONSEQUENCES

The lowlands of the Trou du Nord watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. Previously, AVANSE's activities in the watershed focused on helping smallholder farmers improve maize and bean production (and integrated cropping system) in the lower and middle watershed and expanding cacao production in the middle and upper watershed. AVANSE is no longer supporting maize and bean production. The project also considered introducing irrigated plantain production near Caracol using pumped groundwater. The potential environmental and social consequences of these activities include reducing groundwater availability for other development activities and possible contamination of groundwater, rivers, lakes and inshore waters with agro-chemicals.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in the Trou du Nord watershed will focus principally on improving cacao production and marketing as well as plantain production near Bord de Mer. Although previously planned interventions in plantain production near Caracol are not currently being considered, we will review the potential environmental and social implications here.

FIGURE 25: AVANSE ACTIVITES IN THE TROU DU NORD WATERSHED



**TABLE 28: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES IN TROU DU NORD WATERSHED**

Activity	Quantity
Plantain/Banana (ha)	850
Cacao (ha)	400
Rice (ha)	n/a
Interventions on irrigable land (ha)	n/a
Length of treated irrigation/drainage canals (km)	n/a

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems.

Expanding and improving plantain production near Caracol would enhance soil and water management providing better drainage in areas that are currently subject to periodic flooding.

Biological environment: by promoting agroforestry, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. It should be noted that traditional cacao plots – multi-story systems with a diverse mix of cacao, fruit and shade trees – represent some of the most biodiverse habitats in the AVANSE intervention zone. AVANSE's efforts to promote, maintain and enhance these plots thus represent a positive biological impact.

Socio-economic environment: AVANSE's activities will provide improved incomes for an estimated 100 farming families from increased cacao production. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

Expanding and improving plantain production near Bord de Mer and, potentially, Caracol would increase farmers' incomes and provide jobs to local residents.

NEGATIVE IMPACTS

Physical environment: cacao production is not likely to have any negative consequences on the physical environment in the upper watersheds. In contrast, if implemented, plantain production near Caracol will involve improved drainage and groundwater pumping for irrigation. Pumping of groundwater for plantain production is also being considered for the area near Bord de Mer (see Figure 25). At this time, the number and exact location of existing wells and boreholes that will be rehabilitated is not known. An EMPR will be completed once the site specific information is available. It is also likely that some agro-chemicals would be used to control pests such as nematodes and fungal infections.

The aquifer of the Plaine du Nord extends from the Dominican Republic in the east to Acul du Nord in the west. It underlies the lower portions of the watersheds of the Jassa, Marion, Trou du Nord, Grand Rivière du Nord and Haut du Cap. The aquifer comprises mainly sand, silt and clay eroded from the crystalline basement and volcanic rocks that form the hills and uplands to the south. The sediments fill a tectonic trough that marks the northern edge of Hispaniola and are about 400 m thick (UNDP, 1991). The water balance comprises potential recharge totaling

about 250 m³/year. Losses include surface drainage of about 140 m³/year; evaporation of 100 million m³/year and subsurface drainage to the sea of about 10 m³/year (UNDP, 1991; IDB, 2012).

Several large development initiatives are planned or are underway in the lower watershed that will depend on groundwater abstraction. These include the Caracol Industrial Park and the associated power station; the University of Limonade; the Nourribio banana plantation operated by AgriTrans; and several residential areas including EKAM. It is estimated that the Industrial Park will eventually employ over 60,000 people and that the local population will increase by at least 300,000 people. While the park itself will use about 2.4 million m³/year of groundwater, the surrounding population will need an estimated 13 million m³/year for domestic use (Briceño, no date). The Nourribio plantation will require about 1 million m³/year during the initial phase of production. In effect, groundwater abstraction rates may eventually approach about 16 million m³/year. At this time, the available hydrogeological information indicate that these rates of abstraction can be sustained but it is not clear if high abstraction rates will result in increased seawater intrusion into parts of the aquifer along the coast – including near Caracol where most of the new investments are located (Marchand, 2012).

While pumping of groundwater for growing plantain will not place a large additional demand on groundwater resources, the cumulative impact of all these activities could compromise the viability of some of the investments especially near the coast, if increased seawater intrusion occurs. In the area near Bord du Mer, the zone of potential seawater intrusion lies much closer to the coast, so the risks of salinization are not as great. Nevertheless, if AVANSE does implement groundwater pumping for plantain irrigation in this area, it will be essential to establish a network of test wells to monitor groundwater quality. Additional information is provided below in the section dealing with plantain production in Grande Rivière du Nord.

Biological environment: the Trou du Nord River is currently endorheic – it discharges into the Bay of Caracol only during periods of peak flow. For most of the year the river water seeps into the sandy sediments along the coast. In effect, any agrochemicals derived from agricultural activities in the watershed are unlikely to contaminate the waters of the bay, which is part of the Three Bays Protected Area.

Overall, AVANSE has developed a number of GAPs and mitigation measures that will reduce any negative impacts from lowland rice and plantain/banana production on coastal zones and the PN3B to insignificant levels. (Very little of AVANSE's cacao program operates in the lowlands but, since the promoted package is wholly organic, there will be no adverse impacts on coastal ecosystems.) These include:

- Promotion of compost and organic fertilizer with the goal of elimination of inorganic fertilizer use in the rice value chain;
- Soil mapping and fertility survey and soil testing (will further reduce use of inorganic fertilizer);
- Promotion of IPM and organic/biological pest control (which will, among other positive effects, reduce use of fungicides for plantains);
- Promotion of double-cone mechanical weeders in improved rice production systems (will reduce the use of herbicides);
- Promotion of SRI which uses significantly less water;

- Better on-farm water management and improved efficiency of use for all irrigated focus crop technical packages; strengthening of existing WUAs and creation of new WUA's will also contribute to a more equitable distribution and more efficient use of water;
- Pursuit of collaboration on mangrove rehabilitation and conservation efforts; and
- No conversion of mangroves or wetlands nor expansion of agriculture into mangrove areas.

(Please see general discussion of positive IR1 and IR2 impacts and environmental consequences in chapter 5 above for more information.)

New cacao plantations are established on fallow or abandoned agricultural land (including abandoned coffee plots) or within existing cacao plantations (where the density of cacao trees needs to be increased); no clearing of native vegetation occurs. It should be noted that the only natural upland vegetation remaining in the AVANSE zone is the remnant montane forests in the upper reaches of the Jassa, Marion, and Grande Rivière du Nord watersheds and the far northwestern corner of the Port Margot and northeastern and eastern portions of the Borgne extension zones. AVANSE's cacao program does not operate in the upper reaches of the Jassa and Grande Rivière du Nord watersheds; consequently there is no risk of converting native ecosystems and no adverse impact on biodiversity in these areas. The cacao program does work in the upper reaches of the Marion watershed as well as throughout the Port Margot and Borgne extension zones. AVANSE personnel will strictly apply the directive of retaining natural vegetation, included in the IR 1 GAPs and mitigation measures (see Annex F), in these areas.

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers. Treatment of plantain cuttings to control nematodes involves washing of the roots in warm water and will not create any health hazards.

The Trou du Nord watershed contains several known pre-Colombian archaeological sites of the Taino culture. Other sites are likely to occur in the area, so any land clearance or improvement for plantain production would require preliminary screening for the presence of archaeological remains.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

No IR 2 activities will be implemented in the Trou du Nord watershed.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: At present, there are no IR 3 post-harvest or processing grants planned for Trou du Nord watershed.

Biological environment: by promoting the adoption of Integrated Pest Management through the SIBA initiative, AVANSE will help reduce the use of toxic agro-chemicals – particularly fungicides used on plantains. This will have a beneficial impact on downstream ecosystems including the mangroves and inshore portion of the Caracol Bay, which falls within the Three Bays Protected Area.

Socio-economic environment: AVANSE is planning to engage with one new boutique under the SIBA initiative to expand access to agricultural inputs such as fertilizer and plowing services.

Improving smallholder access to these products and services will have a beneficial impact on agricultural production.

By promoting the adoption of Integrated Pest Management, AVANSE will reduce the exposure of farmers, farm workers and their families to agro-chemicals – particularly fertilizers and fungicides used on plantains.

NEGATIVE IMPACTS

Physical environment: it is anticipated mechanized equipment may be used for plowing (mainly for plantains/bananas) and harvesting, which could result in soil compaction and poor drainage. An EMMP has been added to this PEA, AVANSE will monitor the impact of mechanized farming on soil structure and drainage and, if warranted, will promote the use of animal traction for plowing. This aligns with MARNDR current policies and guidelines. It should be noted that AVANSE is piloting a voucher program for plowing services based on a number of factors including high farmer demand for these services, labor shortages, and the high cost of employing labor. An August 2014 study by AVANSE did an economic analysis on this topic, “Plowing Services for Increased Agricultural Production and Farmer Incomes in North and North East Haiti. It compared tractor-based, animal traction-based, motoculteur-based, and simple tool-based plowing services. Tractor-based services, effective only in the plains areas, were the most productive option. They also provided the least expensive services to farmers, the best quality service, and the fastest service.. AVANSE will use existing plowing service providers and will ensure that appropriate equipment is used and that operators are trained with respect to suitable plowing times based on moisture conditions, that equipment is adjusted, and that operators pay attention to the depth of the plowing.. We will also work with beneficiaries so that they incorporate more organic matter (compost, manure, etc.) into their plot so as to improve soil structure and water retention capacity; test no-till and cover crop options in a small portion of the fields to promote climate smart agricultural techniques; cover the plowed soil around bananas with mulch so as to retain moisture, increase organic matter and protect the soil against wind erosion and rill erosion (if the land contains any slopes), and in flood prone areas, we will encourage beneficiaries to dig drainage ditches around the perimeters of their fields.

Biological environment: see above under IR 1 activities.

Socio-economic environment: rice processing activities in the AVANSE region are currently poorly managed with milling operations barely meeting acceptable health and safety standards for workers. At this time, AVANSE does not anticipate supporting any rice milling in Trou du Nord but the Caracol Industrial Park would be a potential location for such activities. If AVANSE does support such initiatives, grantees will be required to ensure that their facilities comply with international standards. These include requirements for ensuring safe operation of equipment; workers' exposure to dust, fumes and noise; provision of appropriate sanitation for workers; safe disposal of waste water and solid waste such as rice hulls; and safe storage, handling and use of pesticides (particularly rodenticides). It will be essential for AVANSE to ensure that dust, fumes, waste water and solid waste from the mill do not create any adverse health conditions for people living in the vicinity of rice milling operations.

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE's will not implement any infrastructure activities in the Trou du Nord watershed. It is anticipated mechanized equipment may be used for preparing fields for plantain production – particularly for excavating drainage ditches, which could result in soil

compaction. We do not anticipate any significant negative impacts but AVANSE will monitor plantain fields for evidence of increased waterlogging resulting from soil compaction.

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1.

NEGATIVE IMPACTS

Physical environment: see above under IR 1.

Biological environment: see above under IR 1.

Socio-economic environment: see above under IR 1.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Trou du Nord watershed comprise a package of interventions focused on improving plantain production in the lower watershed and expanding cacao production in the middle and upper watershed. These activities will improve the livelihoods of smallholder farmers by increasing income from commercial plantain and cacao production. Potential indirect impacts include reduced food production by smallholders that convert from maize and bean production to plantains and cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in cacao nurseries.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Cumulative impacts of the AVANSE project activities have been assessed using the methodology described under the Jassa watershed above. The overall result of the assessment is a positive cumulative impact as depicted in Table 28 below. Based on our analysis, there are no activities that, when crossed with another AVANSE activity and scored for additive and interactive effects, have a negative cumulative impact. The question then becomes: which activities have the smallest positive effect and could be enhanced to provide a more significant positive impact? Four activities stand out in this regard: GAPs for irrigated rice and banana production, capacity building for WUAs, and well-fed irrigation systems. Alterations and improvements to these activities as well as mitigation measures that could further enhance the positive impacts of these activities include:

- Enhanced GAPs for irrigated rice could include heightened promotion of the use of the double cone mechanical weeder in order to eliminate use of herbicides, and heightened promotion of organic fertilizer coupled with an aggressive timeline for eliminating inorganic fertilizer use.
- Enhanced GAPs for irrigated plantain/banana could target increased use of leguminous cover crops which will have positive effects on soil fertility, soil structure (increased soil organic matter), weed control, and combatting nematode infestations; this could be coupled with heightened promotion of organic fertilizer; both would reduce use of inorganic fertilizer.
- Improved support to WUAs could comprise additional training sessions and more frequent support and monitoring visits by AVANSE field agents to ensure that water management plans and maintenance activities are respected and to help members surmount any challenges to plan implementation and maintenance on a timely basis.
- Improvements to well-fed irrigation systems for plantain/banana could focus on increasing soil organic matter and the soil's water retention capacity, thus reducing water needs; this could be achieved via an emphasis on cover crops and organic fertilizers.

AVANSE will consider how these improvements can be incorporated into the cited activities.

TABLE 29: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN TROU DU NORD

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Trou du Nord		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agro-forestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/ Drainage Systems				
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	0	2	1	1	1	0	0	1	1	1	0	2	10	Soil erosion	PHYSICAL ENVIRONMENT	10
	GAP for Irrigated Banana Production	0	0	2	1	1	1	0	0	1	1	1	0	2	10	Effects of Agricultural Chemical		10
	GAP for Cacao Production	2	2	2	2	2	2	2	2	3	2	2	1	1	25	Water Quality		25
	Institutional Collaboration to promote GAP	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Water Quantity		14
	Support to Nurseries and Grafting	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Natural Vegetation		14
	Irrigation systems water Users Ass. Capacity Building	1	1	2	1	1	1	1	1	1	1	1	1	2	15	Effects on Aquatic Species	15	
	Small-Scale Irrigation projects	0	0	2	1	1	1	0	0	1	1	1	0	1	9	Three Bay Marine Protected Area	9	
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	0	0	2	1	1	1	0	0	1	1	1	0	1	9	Increased Income	BIOLOGICAL ENVIRONMENT	9
	Agro-forestry support to Cacao production	1	1	3	1	1	1	1	1	3	1	1	1	2	18	Increased Access to Market		18
AGRICULTURAL MARKETS STRENGTHENED	Facilitate Post Harvest handling, storage and processing	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Historical & Cultural Resources		SOCIO-ECONOMIC ENV.
	Promote the use of voucher as a market oriented subsidies mechanism	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Increased Access to Market	14	
INFRA	Well Fed Irrigation Systems	0	0	1	1	1	1	0	0	1	1	1	0	1	8	Increased Access to Market	TOTAL CUMULATIVE IMPACTS	
	Gravity based Irrigation/ Drainage Systems	2	2	1	1	1	2	1	1	2	1	1	1	1	17	Historical & Cultural Resources		17
INTER + ADD Cumulative IMPACTS		10	10	25	14	14	15	9	9	18	14	14	8	17	177	TOTAL CUMULATIVE IMPACTS		177
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals		Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species		Three Bay Marine Protected Area		Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS	CONCLUSION		
		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIO-ECONOMIC ENVIRONMENT						

In addition, the Trou du Nord watershed has been identified as a potential target for several large development projects. These include the following identified by the Ministry of Economy and Finance (MEF, 2015):

- The Caracol Industrial Park (site 1 on Figure 25)
- The power station associated with the Industrial Park – which also provides electricity to towns such as Trou du Nord, Limonade and Terrier Rouge as well as development projects such as Nourribio (site 1 on Figure 25)
- Road development between the Industrial Park and Cap Haïtien
- The Nourribio banana plantation (AgriTrans) (site 9 on Figure 25)
- The University of Limonade (site 8 on Figure 25)
- The EKAM (site 10 on Figure 25) and Terrier Rouge residential housing schemes
- Urban development plans for Caracol, Trou du Nord and Terrier Rouge
- The Three Bays Protected Area
- The solid waste facility at Mouchinette (under development in Grande Rivière du Nord) (site 22 on Figures 25 and 28)
- Mining concessions (sites 2, 6, 7 and 21 on Figure 25 and site 12 on Figure 28)

The main potential cumulative impacts linked to AVANSE activities are the possible negative consequences of groundwater abstraction for the Industrial Park and power station, the banana plantation and for providing residential water supply not just for the housing schemes but also the other families that will settle in the area – particularly in small towns such as Caracol, Trou du Nord and Terrier Rouge. As is described under IR 1, the risk of pumping more groundwater could compromise new activities such as the planned plantain production near Caracol, if there is increased seawater intrusion into the coastal portions of the aquifer.

Another potential negative impact is the effect of job creation near Caracol – the Industrial Park alone will have about 65,000 workers – on the availability of labor for cacao production. In northern Haiti, there is already a shortage of labor as young men and women move to urban areas looking for jobs. The impact of the development and investment projects in Trou du Nord will likely lead to further out migration from neighboring rural areas. While cacao production is not highly labor intensive, there is a risk that young children who should be attending school will be enlisted in on-farm activities. AVANSE will mitigate this through focused messaging during FFS training and other events.

One active mining exploration concession – the Majescor site between Trou du Nord and Terrier Rouge – and several potential exploration sites are located in the watershed. The Majescor site covers 50 km² and holds potentially exploitable deposits of gold, silver, molybdenum and copper. If these concessions are developed, there would be potential pollution of river water that is used for agriculture and of groundwater that is used for domestic, industrial and agricultural water supply around Caracol. We have no information on likelihood/timing of mining operations.

The main opportunity that AVANSE could explore with respect to reducing cumulative impacts of other development initiatives in the Trou du Nord watershed would be how water conservation techniques for irrigated plantain/banana could be piloted and scaled up at the Nourribio/AgriTrans banana plantation. This could include exchanges between AVANSE plantain/banana VC staff and Nourribio/AgriTrans agronomic staff. Another activity that could be explored would be a joint initiative to produce cover crop seeds of species such as Mucuna that could have multiple beneficial environmental effects (including water conservation) when planted in association with plantains and bananas.

GRANDE RIVIERE DU NORD WATERSHED

PHYSICAL ENVIRONMENT

Grande Rivière du Nord is the largest of AVANSE's watersheds and extension zones: 633 km². It also has the largest area of hills and mountains and a relatively small coastal plain zone. Thirty-one secondary watersheds have been delineated within Grand Rivière du Nord (DAI, 2013a).

TOPOGRAPHY

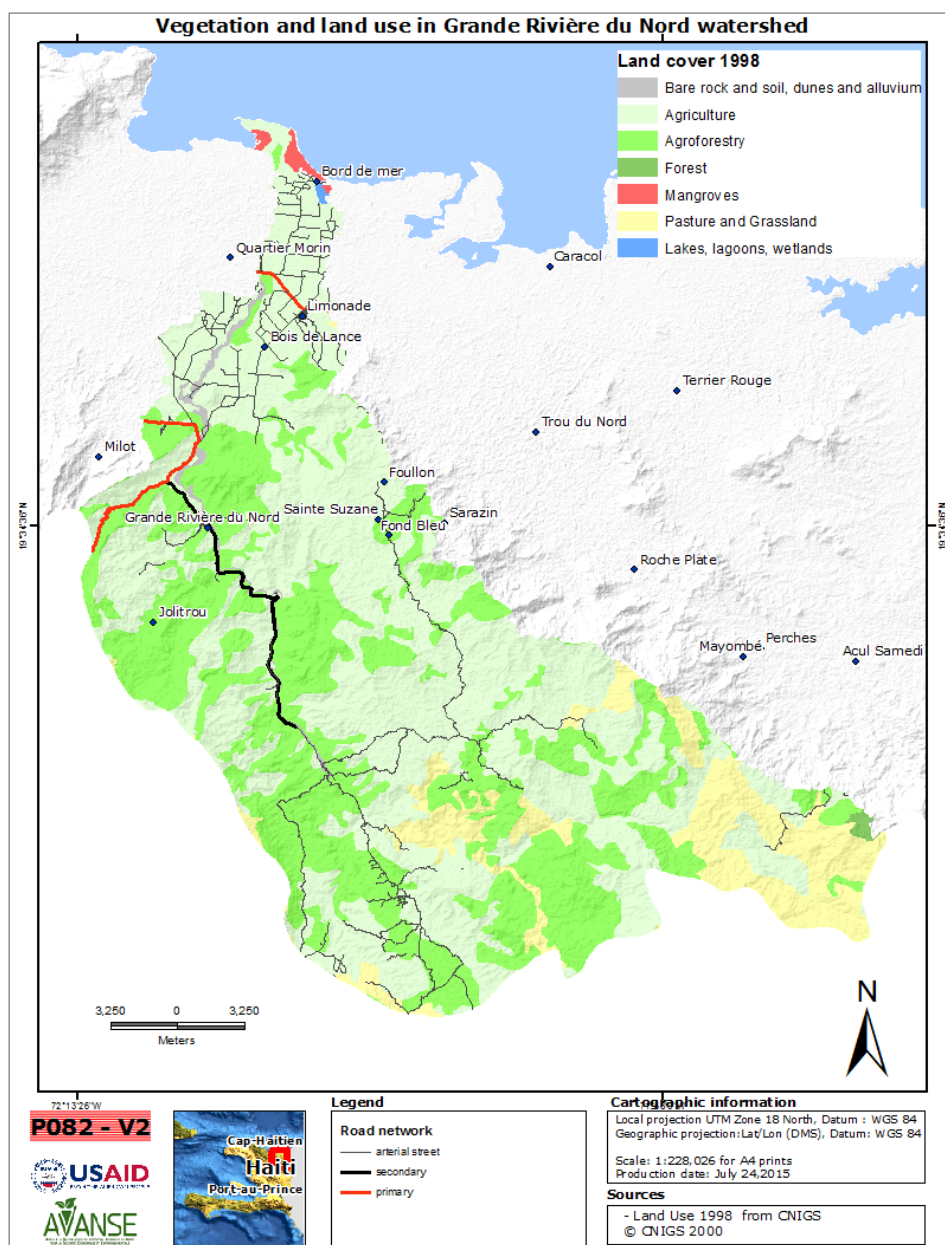
Most of the watershed falls between 75 and 600 m in elevation (59%) with a significant portion above 600 m (20%). Overall, slopes in the AVANSE upland areas can generally be divided into three categories: gentle (5-12%), moderate (13-30%), and steep (31-

60%). In the Grande Rivière du Nord watershed, gentle slopes comprise 20% of the area, while moderate and steep slopes cover 51% and 16%, respectively.

GEOLOGY AND SOILS

In Grande Rivière du Nord, 73% of the watershed is underlain by igneous rocks including basalt, tonalite, diorite and andesite; 19% of the watershed is composed of sedimentary rock derived from alluvial processes and scree, talus or rock slides (Oxfam Québec and CATIE, 2011). According to the soil potential map produced by Oxfam Québec and CATIE (2011), only 20% of the Grande Rivière du Nord watershed is classified as good, very good, or excellent; soils falling

FIGURE 26: LAND USE AND LAND COVER IN GRANDE RIVIERE DU NORD



in the poor and limited categories cover 66% of the watershed. In the lower mountain, semi-humid agro-ecological zone, the soils originating from diorite and limestone are heavily eroded, shallow and possess a low water retention capacity. In the piedmont, valley and plain zones, the soils are alluvial or colluvial, usually with a silt-sand or silt-clay texture, and are relatively rich and deep.

Louissaint (2014) describes five main soil types for the Grande Rivière du Nord watershed:

- Waterlogged saline soils: these are found in the northern part of the watershed and possess a slightly alkaline pH (7.2); the texture is silt-sand with the sandy component predominating; organic matter levels are low;
- Alluvial-colluvial soils: found in the coastal plain area and in the valleys; the pH varies from slightly acidic to neutral; the texture is highly variable and can range from sandy to a predominance of clay; organic matter levels are relatively low;
- Isohumic soils: found in the coastal plain and lowland areas but also in the hilly and mountainous areas under abundant tree cover; pH is slightly acidic; variable texture ranging from silt-sand to a predominance of clay; organic matter levels are high;
- Rendzina soils: generally found on steep slopes; pH is acidic to neutral; texture is usually sandy to silt-sand; low organic matter levels; highly vulnerable to erosion; and
- Eutrophic soils: found in the mountainous zones on a range of slopes; pH acidic to slightly acidic; variable texture but usually silt-sand to sandy; low organic matter content.

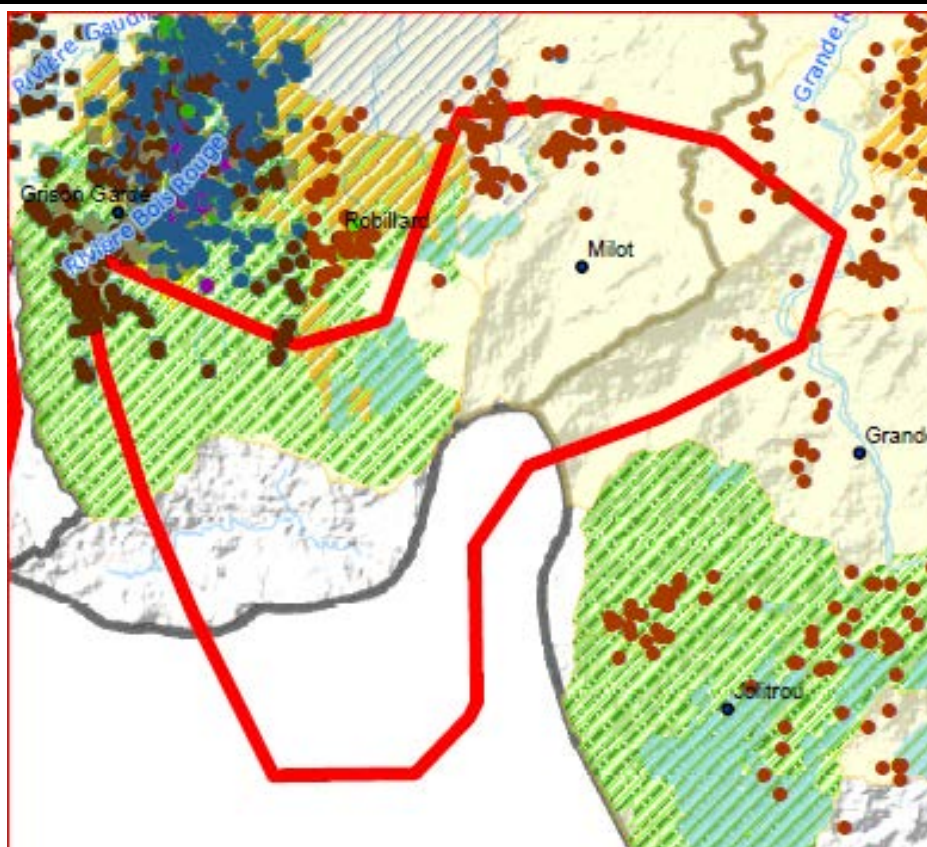
WATER RESOURCES

There is a very well developed and extensive hydrological network within the Grande Rivière du Nord watershed – especially in the upper reaches of the area. Flow data for the Grande Rivière du Nord River is variable. For example, four different publications report four different values for average annual flow: 4.29 m³/s (Ménanteau & Vanney 1997), 5.4 m³/s (Smucker et al. 2007), 7.66 m³/s (USACE 1999), and 8.18 m³/s (Evens et al. 2010). This is not completely surprising in that none of the studies identify the actual location of the flow estimate, but Ménanteau & Vanney and Evens et al. cite the same primary data as their source (1922 to 1940), yet their conclusions are on the opposite ends of the values reported. The USACE (1999) study reports a minimum daily flow of 0.02 m³/s (see Table 2 for more information).

BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

Portions of the Three Bays National Park and the Northeast Lagoon KBA are found in the Grande Rivière du Nord watershed. Parts of the Citadelle/Grottes Dondon KBA are also located in the upper reaches of the watershed (Figure 27 below). This KBA also contains the National History Park of Citadelle/Sans Souci/Ramier (CSSR). Neither is expected to be impacted by any of AVANSE's activities. An endemic fish, the Few-rayed Limia (*Limia pauciradiata*) has been found in Grande Rivière du Nord (Wiener et al. 2013; Fishbase.org).

FIGURE 27: CITADELLE/GROTTES DONDON KBA**TABLE 30: SUMMARY CHARACTERISTICS FOR GRANDE RIVIERE DU NORD WATERSHED**

Characteristic	Statistic
Total area	633 km ²
Population	253,939
Population density	260 people/ km ²
Area < 75 m (elevation)	128 km ²
Area 75 – 600 m (elevation)	374 km ²
Area > 600 m (elevation)	130 km ²
Area of agriculture	335 km ²
Area of agroforestry	224 km ²
Area of pasture/grassland	63 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in Grande Rivière du Nord is about 253,900. The population density was approximately 260 people per km² in 2005 (IHSI, 2005). Limonade and Sainte Suzanne had the most people (approximately 26,200 and 20,400, respectively) among the 10 communes that overlap with the watershed.

LAND TENURE

The majority of farms are between 1 and 3 ha though a significant portion in Grande Rivière du Nord are smaller than 1 ha (25%). Most farms are also owned – either inherited or purchased. Only 14% are rented or sharecropped. See Tables 6 and 7 for more information.

LAND USE

Agroforestry and agriculture are dominant within Grande Rivière du Nord, accounting for 88% of the watershed. Pasture and grassland is relatively small (10%) compared to other AVANSE watersheds and extension zones.

ECONOMIC ACTIVITIES

With respect to economic activities, the population Grande Rivière du Nord practices agriculture, animal husbandry, fishing and commerce (IHSI, 2005). People engage in livestock activities in Bahon and Sainte Suzanne communes, while fishing is mainly found in Bahon commune.

HISTORICAL AND CULTURAL RESOURCES

The historical and cultural sites within the Grande Rivière du Nord watershed include:

- Jean-Jacques Dessalines' residence (Grande Rivière du Nord commune),
- Colonial sites, including Colonial Jail, Autel de la Patrie, and Puerto Real, in addition to 73 voodoo temples and 9 sacred sites (Limonade commune), and
- Fort Biassou and Salnave (Vallières commune).

HEALTH AND EDUCATIONAL FACILITIES

Limonade and Quartier Morin communes, parts of which are in Grande Rivière du Nord watershed, have 16 health centers. They also have a number of primary (73), secondary (16), and vocational (12) schools.

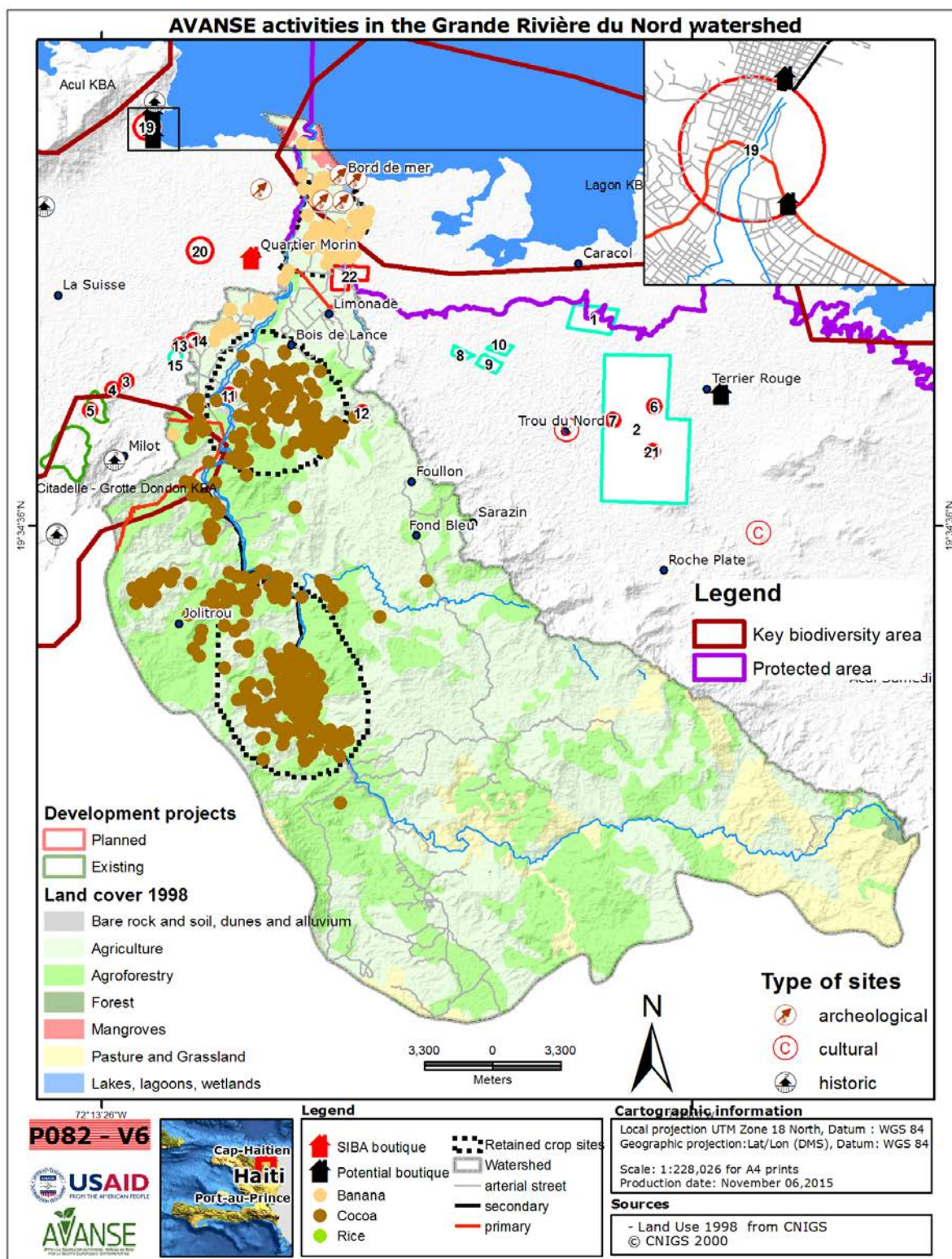
ENVIRONMENTAL CONSEQUENCES

The lowlands of the Grande Rivière du Nord watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. Previously, AVANSE's activities in the watershed focused on helping smallholder farmers improve plantain production in the lower watershed, maize and beans in the middle watershed and expanding cacao production in the middle and upper watershed. Agroforestry was previously promoted in the middle and upper watershed to reduce soil erosion and conserve water resources. AVANSE is no longer supporting maize and bean production and agroforestry activities will be curtailed in the watershed since there are no anticipated interventions in irrigated rice farming. The potential environmental and social consequences of the planned activities include the possible contamination of groundwater, rivers, lakes and inshore waters with agro-chemicals from plantain production.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in the Grande Rivière du Nord watershed will focus principally on improving plantain and cacao production and marketing. In both cases, AVANSE will provide farmers with access to genetic material (cacao seedlings/cuttings and plantain root stock to improve productivity. In addition, AVANSE's Farmer Field Schools will provide training to improve cultivation, harvesting and post-harvest handling of the two crops.

FIGURE 28: AVANSE ACTIVITES IN THE GRANDE RIVIÈRE DU NORD WATERSHED



**TABLE 31: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES IN GRANDE RIVIERE DU NORD WATERSHED**

Activity	Quantity
Plantain/Banana (ha)	1450
Cacao (ha)	900
Rice (ha)	n/a
Interventions on irrigable land (ha)	1000
Length of treated irrigation/drainage canals (km)	n/a

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: enhancing plantain production in the lower watershed between Limonade and the coast near Bord de Mer will have a positive impact on the landscape by draining areas that are prone to flooding in the rainy season. Previously, farmers drew water from the La Tannerie Dam on the Grande Rivière du Nord to irrigate land near Quartier Morin but the dam was destroyed by floods and there is little irrigation at this time. Near Bord de Mer, the Ministry of Agriculture sank wells to provide farmers with groundwater for irrigation but few pumps are operational at this time.

The AVANSE project plans to improve banana and plantain production by providing new pumps or repairing the existing pumps for boreholes near Quartier Morin along the Grande Rivière du Nord downstream of the “Paroi Bridge.” At this time, the exact location of the boreholes has not yet been determined. Groundwater pumping is also being considered in an area near Bord de Mer (including parts of the adjacent Trou du Nord watershed). At this time, the number and exact location of boreholes and pumps that will be rehabilitated has not been determined. An EMPR will be completed once the site-specific information for these two locations is available.

AVANSE also plans also to convert 100 ha currently under surface irrigation to drip irrigation for a banana and plantain pilot project that will progressively extend to other farmers. AVANSE will help improve water management practices by establishing a FFS around each pump site. Each FFS will be constituted as a Water User Association (WUA) and will receive all the technical package improvements for banana and plantain production. Around 40-60 FFS will be established (one for each pump) – each covering between 15 and 20 hectares. They will also be supported by the marketing system that AVANSE will implement in the region.

Improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems.

Biological environment: by promoting agroforestry, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. (See text on cacao’s biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE’s activities will provide improved incomes for an estimated 900 farming families from increased plantain and cacao production. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

NEGATIVE IMPACTS

Physical environment: cacao production is not likely to have any negative consequences on the physical environment in the upper watersheds. In contrast, plantain production north of Limonade (Quartier Morin) and near Bord de Mer will involve pumping of groundwater – and possibly river water – for irrigation and will require improved drainage to prevent waterlogging. It is also likely that some agro-chemicals would be used to control pests such as nematodes and fungal infections.

Groundwater pumping will require about 15 l/s for each of 50 pumps to supply water to about 15 ha under plantains: the total abstraction rate would be about 750 l/s for 750 ha near Quartier Morin and, potentially, another 200 ha near Bord de Mer. The groundwater abstraction potential near Quartier Morin it is about 900 l/s and at Bord de Mer is about 1,600 l/s and. In effect, rehabilitation of 50 wells and pumps will not have a detrimental impact on groundwater reserves. Moreover, the risk of salt water intrusion at these locations is low based on published data (Marchand, 2012: Figure 8, p. 22) though the area near Bord de Mer is close to the zone of potential salt water intrusion. However, the threat of salt water intrusion cannot be assessed with high degree of confidence until the exact location, depth and abstraction rates for the boreholes have been determined. If the boreholes are in close proximity to each other the depression of the water table will be greater and the likelihood of salt water intrusion will increase. AVANSE will complete EMPRs for the proposed pumping sites once the site-specific information is available.

In the case of pumping water from the Grande Rivière du Nord, available data suggest that there is adequate base flow to irrigate plantain and banana fields. The lowest flows occur in April and July. On 31 July, 2015, the measured flow rate was 1.78 m³/s or 1780 l/s. This is about 32% of the average for the month of July and equal to the minimum flow in the river that was registered in 1938. Based on this information, withdrawing 275 to 350 l/s would be possible without creating any disturbance to the river system. In effect, 250 to 300 hectares can be irrigated with water pumped from the river. However, there may be other irrigation systems along the Grand Rivière du Nord of which we are unaware. AVANSE will need to complete a comprehensive assessment of other users downstream of the proposed abstraction point before constructing any new intakes.

Biological environment: the Grande Rivière du Nord discharges into the sea to the west of the Bay of Caracol which is part of the Three Bays Protected Area. The coastal zone includes mangrove forests that are an important habitat for fish and other marine organisms and also provide protection from storm surges. Agrochemical use on plantain crops in the lower watershed could contaminate the mangrove ecosystems and inshore waters. AVANSE will not support the use of pesticides on plantain crops and will promote Integrated Pest Management practices to minimize the use of pesticides and ensure that the storage, handling, use and disposal of pesticides and packaging are safe. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers. Treatment of plantain cuttings to control nematodes involves washing of the roots in warm water and will not create any health hazards.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

No IR 2 activities will be implemented in the Grand Rivière du Nord watershed.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: At present, no IR 3 post-harvest or processing grant activities are planned in Grand Rivière du Nord through the AVANSE grant program.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

NEGATIVE IMPACTS

Physical environment: it is anticipated mechanized equipment may be used for preparing fields for plantain/banana production – particularly for excavating drainage ditches, which could result in soil compaction. We do not anticipate any significant negative impacts.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE's will not implement any infrastructure activities in the Grand Rivière du Nord watershed other than the provision and rehabilitation of pumps for irrigating plantain and bananas. It is anticipated mechanized equipment may be used for preparing fields for plantain production – particularly for excavating drainage ditches, which could result in soil compaction. We do not anticipate any significant negative impacts but AVANSE will monitor plantain fields for evidence of increased waterlogging resulting from soil compaction.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

NEGATIVE IMPACTS

Physical environment: see above under IR 1 activities.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Grand Rivière du Nord watershed comprise a package of interventions focused on improving plantain production in the lower watershed and cacao production in the middle and upper watershed. These activities will improve the livelihoods of smallholder farmers by increasing income from commercial production. Potential indirect impacts include reduced food production by smallholders that convert from maize and bean production to plantain or cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in cacao nurseries.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Cumulative impacts of the AVANSE project activities have been assessed using the methodology described under the Jassa watershed above. For Grande Rivière du Nord, the overall result of the assessment is a positive cumulative impact as depicted in Table 31 below. However, similar to Jassa and Marion, there are several discrete activity pairings that yield adverse impact values. For Grande Rivière du Nord, these revolve around GAPs for irrigated plantain/banana production. Please see the discussion under Trou du Nord above regarding how these GAPs can be enhanced to reduce adverse effects and as well as improved to increase positive effects.

TABLE 32: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN GRANDE RIVIERE DU NORD

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Grande Riviere du Nord		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS	
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agroforestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/ Drainage Systems					
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	-1	2	1	1	1	0	0	1	1	-1	0	1	6	Soil erosion	PHYSICAL ENVIRONMENT	6	
	GAP for Irrigated Banana Production	-1	-2	-1	-2	-2	-1	-2	-1	-2	-2	-2	-1	-1	-20	Effects of Agricultural Chemical		-20	
	GAP for Cacao Production	2	-1	2	2	2	2	2	2	3	2	2	1	-1	20	Water Quality		20	
	Institutional Collaboration to promote GAP	1	-2	2	1	1	1	1	1	1	1	-1	1	1	9	Water Quality		9	
	Support to Nurseries and Grafting	1	-2	2	1	1	1	1	1	1	1	1	1	1	11	Water Quantity		11	
	Irrigation systems water Users Ass. Capacity Building	1	-1	2	1	1	1	1	1	1	1	1	1	2	13	Natural Vegetation	BIOLOGICAL ENVIRONMENT	13	
	Small-Scale Irrigation projects	0	-2	2	1	1	1	0	0	1	1	-1	0	-1	3	Effects on Aquatic Species		3	
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	0	-1	2	1	1	1	0	0	1	1	-1	0	-1	4	Three Bay Marine Protected Area	BIOLOGICAL ENVIRONMENT	4	
	Agro-forestry support to Cacao production	1	-2	3	1	1	1	1	1	3	1	-1	1	1	12			12	
AGRICULTURAL MARKETS STRENGTHENED	Facilitate Post Harvest handling, storage and processing	1	-2	2	1	1	1	1	1	1	1	-1	1	1	9	Increased Income	SOCIO-ECONOMIC ENV.	9	
	Promote the use of voucher as a market oriented subsidies mechanism	-1	-2	2	-1	1	1	-1	-1	-1	-1	2	2	-1	-1			-1	-1
INFRA	Well Fed Irrigation Systems	0	-1	1	1	1	1	0	0	1	1	2	0	1	8	Increased Access to Market		Historical & Cultural Resources	8
	Gravity based Irrigation/ Drainage Systems	1	-1	-1	1	1	2	-1	-1	1	1	-1	1	-1	2	2			2
INTER + ADD Cumulative IMPACTS		6	-20	20	9	11	13	3	4	12	9	-1	8	2	76	TOTAL CUMULATIVE IMPACTS		76	
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species	Three Bay Marine Protected Area	Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS		CONCLUSION					
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT									

The Grande Rivière du Nord and adjacent Trou du Nord watersheds have seen several major investment projects in recent years and other sites have been identified as potential locations for other large development initiatives. These include the following identified by the Ministry of Economy and Finance (MEF, 2015):

- The Caracol Industrial Park (active site in Trou du Nord) (site 1 on Figure 28)
- The power station associated with the Industrial – which also provides electricity to towns such as Trou du Nord, Limonade and Terrier Rouge as well as development projects such as Nourribio (active site in Trou du Nord) (site 1 on Figure 28)
- Road development between the Industrial Park and Cap Haïtien (under development)
- The University of Limonade (active site in Trou du Nord)
- Urban development plans for Limonade (under development in Grande Rivière du Nord)
- The solid waste facility at Mouchinette (under development in Grande Rivière du Nord) (site 22 on Figure 28)
- The Three Bays Protected Area (under development)
- Watershed management and natural disaster reduction program (under development by the IDB in Grande Rivière du Nord)
- Mining concessions (under development in Grande Rivière du Nord) (sites 11, 12, 13, 14 and 15 on Figure 28)

The development initiatives that are proposed or underway in Grande Rivière du Nord and the adjacent Trou du Nord watershed will generally have a beneficial impact on AVANSE's activities. The large increase in population that is anticipated for Limonade, Caracol, Trou du Nord and Terrier Rouge will create new markets for plantain farmers. The improvements to the road from Caracol to the port facilities in Cap Haïtien will improve access to cacao processing facilities and export routes. The solid waste site at Mouchinette near Limonade will handle mainly urban and industrial waste but it will have a beneficial impact on surface water quality – which is currently poor owing to the large amount of plastic waste that finds its way into streams and rivers throughout northern Haiti.

A potential negative impact is the effect of job creation near Caracol – the Industrial Park alone will have about 65,000 workers – on the availability of farm labor. In northern Haiti, there is already a shortage of labor as young men and women move to urban areas looking for jobs. The impact of the development and investment projects in Trou du Nord will likely lead to further out migration from neighboring rural areas. While cacao production is not highly labor intensive, there is a risk that young children who should be attending school will be enlisted in on-farm activities. AVANSE will mitigate this through focused messaging during FFS training and other events.

The Three Bays Protected Area program has yet to start implementing field activities but we anticipate that there will be opportunities to collaborate on mangrove rehabilitation and conservation activities in areas close to AVANSE's plantain sites. We will actively seek opportunities to collaboratively monitor water quality in the lower reaches of the Grande Rivière du Nord and immediately offshore from the river mouth to ensure that neither sediment loads nor levels of chemical pollutants increase as a result of AVANSE activities. Overall, the promotion of organic fertilizer and little or no pesticide use in the cacao and plantain GAP packages and mitigations measures will reduce levels of agrochemicals in the river (see Table 11 and Annex F for more information). Due to AVANSE's modified SOW and a lack of irrigation activities in the Grande Rivière du Nord watershed, the project is no longer pursuing watershed stabilization and soil conservation activities in the uplands. However, the IDB anticipates implementing soil conservation activities in the upper reaches of the watershed. These efforts

will have a beneficial impact on the Grande Rivière du Nord's sediment loads further downstream.

One active exploration concession – the VCS flagship site near Morne Bossa west of Limonade – and several potential exploration sites are located in the Grande Rivière du Nord watershed. The Morne Bossa site covers 50 km² and holds has potentially exploitable deposits of gold, silver and copper. If these concessions are developed, there would be potential pollution of river water that is used for agriculture and of groundwater that is used for domestic water supply. At this time, we have no information on likelihood or timing of any mining operations.

The main collaborative opportunities for enhancing positive cumulative impacts of other development projects in the watershed are working with the PN3B staff on communications and working with the IDB on soil conservation. Please see the discussion under Trou du Nord and Jassa, respectively, for a brief description of potential collaboration.

HAUT DU CAP WATERSHED

PHYSICAL ENVIRONMENT

The Haut du Cap watershed contains a large area of low, coastal plain generally suitable for agriculture. There are hilly and mountainous areas in the southern parts of the watershed as well as a small coastal mountain range just west of Cap Haïtien. Fourteen sub-watersheds have been identified within the primary watershed (DAI, 2013a).

TOPOGRAPHY

Most of the Haut du Cap watershed – 71% – is below 75 m and dominated by relatively flat or gently sloping land. Mountainous or hilly terrain is found in three areas: the southern quarter of the watershed, the western border with Limbé watershed, and the coastal outcropping west of Cap Haïtien. Only 9% of the watershed is above 600 m.

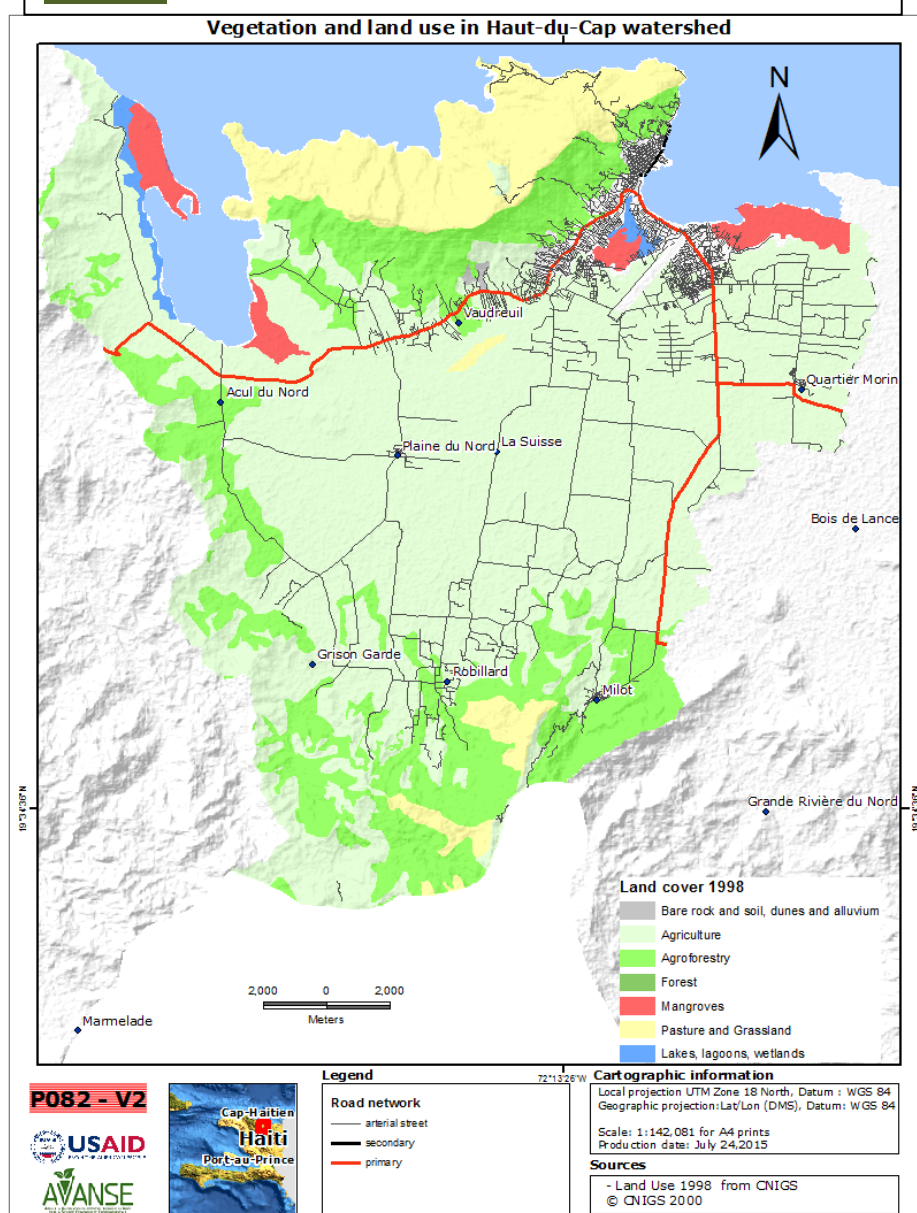
GEOLOGY AND SOILS

The soil potential map produced for the Acul du Nord commune – part of which falls within the Haut du Cap watershed – depicts a situation where the majority of the soils are classified as limited to very limited (Commune de l'Acul du Nord, 2009).

WATER RESOURCES

Compared to other AVANSE watersheds, Haut du Cap's hydrological network is less developed. With respect to specific data, PLANCONSULT, an AVANSE contractor, recorded a field flow measurement of 0.15 m³/s on 16 January 2015 on Rivière Anba Lanmè, a tributary of the Haut du Cap River.

FIGURE 29: LAND USE AND LAND COVER IN HAUT DU CAP



BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

Parts of the northern coast and Citadelle/Grottes Dondon KBAs are located in the Haut du Cap watershed. There are large seagrass beds in the Baie de l'Acul in the western part of the watershed. After Trou du Nord, Haut du Cap also contains the largest mangrove area in the AVANSE intervention zone: 936 ha (FoProBiM, 2013).

TABLE 33: SUMMARY CHARACTERISTICS FOR HAUT DU CAP WATERSHED

Characteristic	Statistic
Total area	380 km ²
Population	242,411
Population density	261 people/ km ² *
Area < 75 m (elevation)	269 km ²
Area 75 – 600 m (elevation)	78 km ²
Area > 600 m (elevation)	33 km ²
Area of agriculture	204 km ²
Area of agroforestry	80 km ²
Area of pasture/grassland	38 km ²

* excluding the commune of Cap Haïtien

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in the Haut du Cap watershed is approximately 242,400. Excluding the commune of Cap Haïtien (with a significant urban population), the population density was approximately 260 people per km² in 2005 (IHSI, 2005). At 353 people per km², Milot was the most densely populated commune in the watershed.

LAND TENURE

Haut du Cap watershed has a relatively high percentage of farms less than 1 ha: 38%. Most of the farms (51%) are still between 1 and 3 ha. Regarding access to land, Haut du Cap follows the same pattern as most of the other AVANSE watersheds and extension areas: most of the land is owned with only 13% sharecropped or rented. See Tables 6 and 7 for more information.

LAND USE

As with most of the AVANSE watersheds and extension zones, agriculture leads with 54% of the land being used for this purpose. Pasture and grassland is low compared to other areas within the AVANSE target zone and only covers 10% of the Haut du Cap watershed. Mangroves occupy 2% of the land in the watershed.

ECONOMIC ACTIVITIES

The main economic activities for people in the Haut du Cap watershed are commerce, agriculture, fishing and some livestock rearing (IHSI, 2005). Fishing is most pronounced in the Cap Haïtien and Milot communes. Animal husbandry is most common in Acul du Nord commune. There is also a significant amount of commerce that occurs between the communes found in the watershed.

HISTORICAL AND CULTURAL RESOURCES

The principal historical and cultural sites in the Haut du Cap watershed are the Citadelle and Sans Souci Palace, both in Milot commune and part of a National History Park. Other important sites include:

- Vertières on the outskirts of Cap Haïtien,
- the grave of former president Pierrot in Acul du Nord commune, and
- 12 voodoo temples and 2 sacred sites in Quartier Morin commune.

HEALTH AND EDUCATIONAL FACILITIES

The commune of Quartier Morin – part of which lies in Haut du Cap watershed – has 7 health centers. There are also 28 primary and secondary schools and one vocational school in the commune. Other rural areas in Haut du Cap watershed are similarly equipped while the urban center of Cap Haïtien has numerous health facilities and schools (including University-level facilities).

ENVIRONMENTAL CONSEQUENCES

The lowlands of the Haut du Cap watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. Previously, AVANSE's activities in the watershed focused on helping smallholder farmers improve maize and beans, rice and plantain production in the middle of the watershed and expanding cacao production in the middle and upper watershed. Agroforestry was previously promoted in the middle and upper watershed to reduce soil erosion and conserve water resources. AVANSE is no longer supporting maize and bean production and agroforestry activities will focus on areas immediately upstream from areas where AVANSE is planning to support irrigated rice farming: Grison Garde and Dubré. The La Suisse irrigation system – which lies immediately to the west of the Dubré perimeter – was previously considered a possible AVANSE site. The potential environmental and social consequences of the planned activities include possible contamination of groundwater, rivers and inshore waters with agro-chemicals used for rice/plantain production.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in the Haut du Cap watershed will focus principally on improving rice, plantain and cacao production and marketing. AVANSE will provide farmers with access to genetic material (rice seed, cacao seedlings/cutting and plantain root stock to improve productivity. In addition, AVANSE's Farmer Field Schools will provide training to improve cultivation, harvesting and post-harvest handling of the three crops.

Plantain and banana production will be supported in the area near Quartier Morin immediately adjacent to the Grande Rivière du Nord. We will not present a detailed description of these activities here since they are already described above in the section on Grande Rivière du Nord.

**TABLE 34: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES IN HAUT DU CAP WATERSHED**

Activity	Quantity
Plantain/Banana (ha)	1050
Cacao (ha)	900
Rice (ha)	360
Interventions on irrigable land (ha)	360
Length of treated irrigation/drainage canals (km)	8.14

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: improving rice production in the Grison Garde and Dubré irrigated perimeters – and, potentially, La Suisse – will improve the livelihoods of smallholder farmers and will have a beneficial impact on the environment by drainage from irrigated perimeters. By promoting SRI, AVANSE will help farmers reduce their water needs and their use of chemical fertilizers and pesticides.

FIGURE 30: LOWER HAUT DU CAP WATERSHED: DUBRE, LA SUISSSE AND GRISON GARDE IRRIGATED PERIMETERS

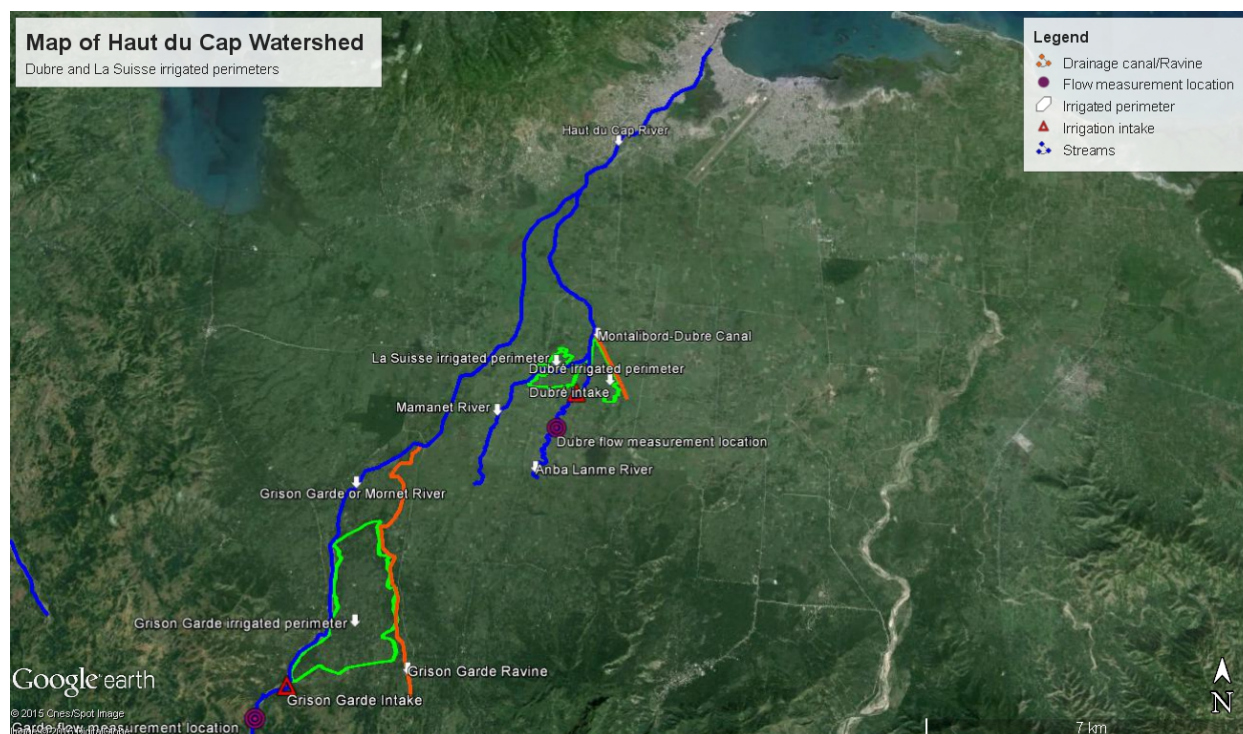
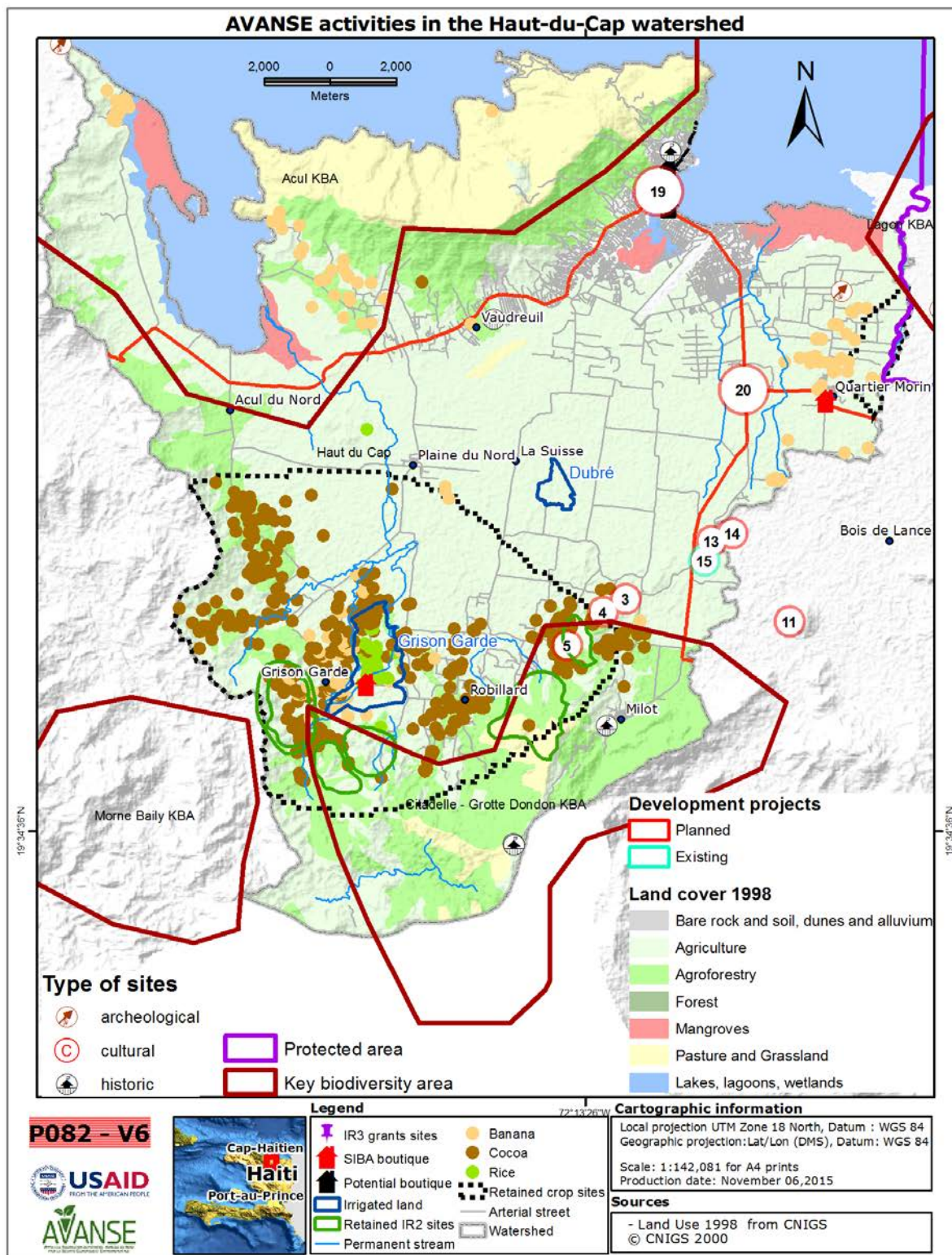


FIGURE 31: AVANSE ACTIVITIES IN THE HAUT DU CAP WATERSHED



The **Grison Garde** irrigation system covers about 220 ha and is irrigated with water from the Rivière Mornet that drains into the Rivière Gallois and then into the Rivière Haut du Cap (see Figure 31). Currently, rice is the predominant culture in Grison but farmers also grow beans, corn, cabbage, hot pepper, and plantain at smaller scale. There are no known irrigation systems downstream of Grison Garde.

The system is currently in very poor condition. The check dam is too low to elevate water into the main intake canal during the low flow season and the canal networks are dysfunctional and filled with sediment owing to lack of maintenance, repair and deforestation in the upper watershed. The system has become completely inefficient, losing water owing to infiltration through the walls and bottom of the main, primary and secondary canals. Additionally, there is no proper drainage system with all the water draining into adjacent fields, ravines, or back into the river. Fields are therefore flooded during heavy rainfall.

AVANSE plans to implement the rehabilitation and extension of the Grison Garde system with an additional 148 ha that will increase the area of the irrigated system to 368 ha. The whole system will be devoted to rice production. A number of activities have been proposed to make the system functional by maintaining irrigation water across all channels to ensure accessibility of the whole perimeter including extension areas.

The **Dubré** irrigation system is located 5.3 km north-east of the Grison Garde irrigation system and enjoys the same climate as Grison Garde. Its hydrology is different. It is irrigated with water from the Anba Lanmè River, a tributary of the Haut du Cap and is joined to its north by Rivière Mamane before draining into the Haut du Cap River to the north (see Figure 31). The system currently irrigates 78 ha. A portion of river flow is diverted by means of a check dam comprising a weir and two lateral canals on each bank with a capacity of 60 l/s each.

The system is in very poor condition with unlined primary and secondary canals. Farmers complain of poor drainage during heavy rainfall in November and in May. No other irrigation systems are found downstream of the Dubré extension system.

The AVANSE project plans to rehabilitate the existing system by fixing the primary and secondary irrigation canals and cleaning the drainage canal. Moreover, the project plans to extend the system by adding 62 ha – giving a total area of 140 hectares for the production of rice. The planned extension will include the construction of an intake upstream of the existing one as well as canal network. The irrigation demand for the extended irrigation system, based on the analysis of Grison Garde, is 140 l/s (with 1 l/s/ha) provided that the efficiency is above 90% when the system is fully functional and provided that SRI is adopted by all the farmers. With an estimated 50% reduction in water needs using SRI, the total demand would be 280 l/s.

The Dubré farmers currently grow rice one or two seasons each year and would like to grow rice year-round but cannot do so for lack of water. Adoption of SRI – which requires less water – and system rehabilitation would enable the Dubré farmers to add another season of rice production. SRI rice would be more remunerative than growing off-season cabbage, turnips, beans, carrots and maize and would dramatically increase farmers' income.

The **La Suisse** irrigation system is located on the lower Haut du Cap watershed west of the Dubré irrigation system. The current system covers 137 ha and is mainly under rice but also sugar cane, corn, beans and other crops. Water used for irrigation comes from River Mananet, a tributary of the Anba Lanmè River via an existing intake and canals on both sides of the intake with a capacity of 60 l/s each (see Figure 31).

La Suisse is an area with serious drainage problems. In the rainy season, particularly in November, the area is flooded leading to serious crop losses. This situation occurs annually particularly in November during peak rainfall.

The AVANSE project previously planned to rehabilitate the La Suisse irrigation scheme through canal construction and improved drainage. The goal of the rehabilitation was to increase the potential exploitable agricultural area at the zone; to obtain better agricultural yields for crops grown; to intensify rice crops, beans and vegetable growing; and to decrease the fallow period that generally corresponds to the rainy season. The system was planned to be extended by adding 83 ha to attain a total area of 220 ha. The rehabilitation and new extension would require a water supply of 220 l/s based on increased conveyance efficiency and the use of less water through broad adoption of SRI.

Improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems.

Biological environment: by promoting agroforestry, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.) SRI rice production techniques and associated promotion of GAPs for the rice package should significantly reduce inorganic fertilizer use and the amount of agro-chemicals in drainage water (see Table 11 above and Annex F for more details). This will, in turn, reduce adverse effects on aquatic flora and fauna. As part of the mitigation measures linked to the PN3B, KBAs and coastal areas, we have included the goal of eliminating the use of inorganic fertilizers in the rice GAPs and the umbrella EMPR for IR1 (see Annex F).

Socio-economic environment: AVANSE's activities will provide improved incomes for an estimated 10,500 farming families from increased rice, plantain and cacao production and agroforestry activities. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

Although about 25% more labor is required for growing rice using SRI compared with traditional rice (especially for planting), farmers report that the added cost is more than made up for by the reduced cost of inputs and increased yields. At Grison Garde, farmers noted that yields were 80% to 100% more than the yields under traditional cropping systems.

Universal adoption of SRI appears to occur much more rapidly than was originally thought possible. Most farmers report that all members of their FFS have adopted SRI rice technology – about 300 farmers at Grison Garde. Several farmers also reported “lateral diffusion” of SRI to family members, friends and neighbors with whom they work in *konbit*. Based on a small sample of farmers, we can assume that for every FFS members that adopts SRI, at least two other non-FFS farmers are also adopters.

NEGATIVE IMPACTS

Physical environment: rice production relies heavily on water from rivers draining the hills and uplands to the south. The main issue raised by extending the irrigation systems to produce additional rice is the availability and the supply of water to meet the needs for the entire irrigation system. The availability must take into account agricultural need as well as ecological needs downstream of the system both in terms of the quality and quantity of water.

A detailed discussion of the potential to improve irrigated agriculture at the three sites in the Haut du Cap watershed is presented below in the section below on Infrastructure.

Cacao production is not likely to have any negative consequences on the physical environment in the upper watersheds. In contrast, plantain production near Grison Garde will require improved drainage to prevent waterlogging. It is also likely that some agro-chemicals would be used to control pests such as nematodes and fungal infections.

Biological environment: the rivers of the Haut du Cap watershed discharge into the sea near Cap Haïtien and the Bay d'Acul near Acul du Nord – both areas lie outside of the Three Bays Protected Area. The shores of the Bay d'Acul include mangrove forests that are an important habitat for fish and other marine organisms and also provide protection from storm surges. Agrochemical use on rice and plantain crops in the middle watershed could contaminate the mangrove ecosystems and inshore waters. AVANSE will not support the use of pesticides on rice or plantain crops and will promote Integrated Pest Management practices to minimize the use of pesticides and ensure that the storage, handling, use and disposal of pesticides and packaging are safe. Drainage from the proposed irrigated improvements will contain some agro-chemicals and pesticides which will have a detrimental impact on aquatic organisms further downstream. However, we expect agro-chemical levels to be low based on AVANSE's promotion of organic fertilizer as part of its rice GAPs and mitigation measures.

AVANSE expects to provide rice seed to farmers in the Haut du Cap perimeters of Grison Garde and Dubré where Farmer Field Schools are implemented. Seed will be provided directly to some farmers for training purposes and to others through the SIBA initiative. If any rice seed for planting has been treated with pesticides, AVANSE will acquire only seed that has been treated with products that are approved for seed treatment under the 2014 Annual Update of the Mission PERSUAP: Maxim XL (EC) and Thiram 75 (WP). Battalion 0.2 is also approved but it is not considered suitable for treating rice seed. The PERSUAP also recommends Actellic 5E (pirimithos-methyl 57%) for post-harvest treatment of seed to prevent insect damage. Some vendors of rice seed for planting use Actellic to reduce damage to the seed while it is being stored prior to being sold to farmers. We regard Actellic treated rice as suitable for planting.

Since treated seed can be harmful to human health and to aquatic organisms and will be stored, handled and used only under strict compliance with PERSUAP guidelines. Treated rice seed distributed through the SIBA initiative will be stored apart from all other commodities.

The SIBA initiative will also provide rice farmers with access to plowing services. It is anticipated that the use of mechanized equipment could result in soil compaction and poor drainage. AVANSE will monitor the impact of mechanized farming on soil structure and drainage and, if warranted, will promote the use of animal traction for plowing. This aligns with MARNDR current policies and guidelines.

Agro-chemicals are not used on cacao but farmers use a variety of techniques to control rats and mice that damage the cacao pods. At this time, we are not aware of any use of toxic rodenticides – rather farmers use concoctions made of salt that kill the rodents. AVANSE will ensure that FFS training includes safe ways to control such pests. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers. Treatment of plantain cuttings to

control nematodes involves washing of the roots in warm water and will not create any health hazards.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

POSITIVE IMPACTS

Physical environment: IR 2 activities in Haut du Cap will focus on two zones upstream from the Grison Garde perimeter and two above Dubré. All four of these areas are in the upper portions of the catchments that provide irrigation water to the perimeters. The total area is 960 ha – 540 ha above Grison Garde and 420 ha above Dubré and La Suisse. AVANSE has used satellite imagery and ground-truthing to identify hillsides that have sparse natural vegetation cover and are prone to soil erosion when heavy rainfall creates surface runoff.

Project interventions will include vegetative measures to control soil erosion – vetiver grass, agroforestry and cover crops – and installing physical structure to capture runoff and reduce erosion – contour bunds and temporary fences. By reducing soil erosion on hillsides, AVANSE will diminish siltation in rivers and irrigation canals, maintain soil cover for productive agriculture and replace bare hillsides with valuable trees and crops that provide nutritious foods and income.

Above the Grison Garde irrigated perimeter, participating farmers have already significantly reduced erosion on steep slopes on four existing agroforestry blocks using mechanical and vegetative soil and water conservation practices. One of the existing blocks extends along about 500 m of hillside with about a 30% slope parallel to and immediately above the main Grison Garde irrigation canal. The site was chosen to protect the canal from sedimentation caused by runoff from agricultural parcels on the adjacent hillside. The block now appears to be complete with contiguous agroforestry parcels covering the whole hillside from top to bottom. Farmers report being very pleased with the results and note that they will maintain the infrastructure and continue to apply the practices without additional incentives from AVANSE. There is already evidence of “lateral diffusion” – farmer-to-farmer transference of technology – as some people that did not participate in the AVANSE FFS initiative have taken up the practices.

Biological environment: enhanced vegetation cover will provide habitat for wildlife included several threatened species – particularly birds and reptiles – that are endemic to Hispaniola. The IR 2 agroforestry blocks above Dubré are adjacent to the Citadelle/Grottes Dondon KBA that still have some forest cover and will serve as a buffer to help preserve the wooded area.

Socio-economic environment: agroforestry activities will provide increased incomes for smallholder farmers from cash crops such as pineapple, plantain and okra while food crops such as maize, beans and peanuts will improve family nutrition. Many of the hillsides where AVANSE will support interventions are relatively unproductive pasture. By implementing farmer field schools that promote agroforestry, AVANSE will help individual farming families gain to access *konbit* labor to prepare their parcels for new crops – labor that is otherwise in short supply since many young people have moved from the rural areas to find work.

NEGATIVE IMPACTS

Physical environment: potential negative consequences of agroforestry and erosion control measures include exposing the land surface to runoff before the vegetative cover is established or when annual crops such as peanuts are harvested. AVANSE will limit these risks by intercropping with trees and perennial shrubs and grasses such as vetiver. In addition, AVANSE will promote the use of cover crops such as *mucuna* (*Mucuna pruriens*) that not only protect the

soil surface from erosion but also contribute organic matter that enhances the water retention capacity of the soil.

Biological environment: we do not anticipate any negative consequences if agroforestry interventions are implemented upstream of sites where irrigation infrastructure is improved. Agroforestry activities that have been undertaken by AVANSE in the past may continue to expand without additional project interventions. In several watersheds where AVANSE has been implementing soil conservation initiatives, early adopters have been supporting their neighbors by providing advice, labor and planting materials.

Socio-economic environment: AVANSE's agroforestry activities will require collaboration among farming families to provide labor for initial land preparation and planting. The *konbit* system remains very active in this part of Haiti, so no major issues or challenges are foreseen.

By adopting agroforestry systems, some farmers may reduce the total area available for food crop production. To compensate, they may have to use their other parcels more intensively or adopt shorter fallow periods that could eventually result in decreased yields and increased soil erosion.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: one IR 3 activity will be implemented in Haut du Cap through the AVANSE grant program – the PISA cacao processing initiative. The PISA cacao fermentation facility will improve current processing capacity and enhance the quality of cacao destined for export. By centralizing fermentation activities, the facility will reduce the potential negative impact of small fermentation facilities that do not take adequate precautions to avoid pollution that can be caused by poor wastewater management.

Biological environment: the centralized cacao fermentation and processing facility will help reduce environmental pollution that can occur at small, less well-managed facilities.

Socio-economic environment: the PISA facility will enable smallholder cacao farmers and farmers' cooperatives gain better access to local buyers. Since fermentation requires that the cacao beans are processed soon after harvesting, the cooperatives and buyers will improve collection and transport of the cacao beans to the PISA facility.

NEGATIVE IMPACTS

Physical environment: the cacao fermentation process produces liquid waste that must be managed to avert pollution especially of streams and rivers. The owner/implementer of this short-listed grant is Produits des Iles S.A. (PISA). This is a private enterprise owned by REBO S.A. and focused on coffee export and cacao fermentation and export. The present project consists in increasing the cacao fermentation capacity of PISA by building a new 50m² fermentation warehouse and purchasing wooden fermentation crates. AVANSE plans to assist with investments in wooden fermentation crates. This equipment is valued at USD \$58,000 (approximately).

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)

Biological environment: liquid waste from the fermentation process could have negative consequences, if it released into streams and rivers.

Socio-economic environment: we do not anticipate any negative consequences of the PISA grant but the grantee will be required to adopt appropriate safeguards to mitigate any potential issues. These include:

- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE's will implement infrastructure improvement activities in Haut du Cap watershed in the Grison Garde and Dubré irrigated perimeters and possibly, in the La Suisse perimeter. The activities will include improving water supply to the irrigated perimeters by repairing diversions from the rivers and by cleaning supply canals and drainage systems. 6.26 km of supply canals will be cleaned at Grison Garde and 1.88 km at Dubré.

Biological environment: with the SRI technique less fertilizer and less pesticide are typically needed. Therefore, the water that eventually flows back into the river downstream of the irrigation perimeter will be less polluted thus reducing any negative impact on the downstream ecosystem.

Socio-economic environment: see above under IR 1.

NEGATIVE IMPACTS

Physical environment: FAO proposes an approximate method of determining the irrigation water need of an entire irrigation area assuming a constant average irrigation need for the entire season. Typical value for rice is 1.5 liters per second per hectare. This is equivalent to a daily water requirement of 13 mm to compensate for water lost through evapotranspiration. Moreover, this figure also compensates for the continuous percolation losses, to saturate the root zone and prepare the wet soil, called puddling, and to keep the field submerged. Other values are suggested in ONU/DCTD, 1991 to determine the irrigation need for rice varying between 0.8 and 1.1 per second per hectare. These values exclude loss by infiltration due to increased conveyance efficiency and application efficiency with the rehabilitation of the conveyance system and the adaptation of SRI.

Under AVANSE, selected farmers have received Farmer Field School training on the application of the System of Rice Intensification (SRI – Système de Riziculture Intensive). It is a climate-smart and agro-ecologically sound methodology to increase the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. Using the SRI methodology, yields are increased by 20 to 50% or more, while reducing inputs: irrigation water by 30-50%, chemical fertilizer by 20-100%, and reduced need for pesticides. With the application of SRI, a conservative value of 1 l/s/ha is suggested as the irrigation need for rice within the irrigation systems targeted by AVANSE, assuming that all farmers will adopt the system toward the end of the project.

The water needs for irrigating 368 ha at Grison Garde are 368 l/s. The major constraint that prevents better use of the perimeter and its eventual extension to 368 ha is the average flow in

the main channel – which is limited 250 l/s. With this limited capacity of the canal, only 250 hectares can be irrigated - leaving 118 ha under stress.

TABLE 35: IRRIGATION WATER NEEDS AT THE DIFFERENT IRRIGATION SYSTEMS IN THE HAUT DU CAP WATERSHED

Locations	Current irrigated area (ha)	Extension (ha)	Projected total (ha)	Water needs per hectare l/s/ha	Water needs total l/s
Grison Garde	220	148	368	1	368
Dubré	78	62	140	1	140
La Suisse	137	83	220	1	220

There are no hydrometric data on the temporal variation in the water level or flow for the Rivière Mornet. During this study, the measured flow rate (on 16 July 2015) upstream of the intake (GGSS1) was 313 l/s. This flow rate was measured with the USGS Type AA current flow meter. The measured flow rate at the intake or head canal (GGSS2) was 133 l/s, which represents only 42.5% of the flow in the river. Owing to the elevation of the intake, water cannot enter the canal so it cannot function at full capacity. At its full capacity of 250 l/s, the uptake would be 80% of the flow in the river leaving 62 l/s during periods of low flow for the ecological functions.

Grison Garde: the rehabilitation of the irrigation system at Grison Garde shows no significant potential impact on the hydrology. The Mornet River has sufficient water to sustain this irrigation system. ***The system will not withdraw more water from the river beyond the original capacity of its intake canal*** (emphasis added). Additionally, its environmental impact will be minimal with the application of SRI for rice production. The Grison Garde system will not actually be able to irrigate all 368 ha as intended. 118 hectares will not be irrigated year round despite increasing the efficiency of the system and the application of SRI. In order to irrigate more land, the intake size would have to be increased to allow the transport of more water into the perimeter.

Dubré: the hydrology of the Dubré system is not well known. PlanConsult conducted a study for the rehabilitation and extension of the Dubré system and took flow measurement upstream of the proposed extension intake site on 16 January, 2015 and found a value of 150 l/s. This value was used in the design of the new extension intake. AVANSE took flow measurements at three locations on 15 July, 2015: current intake canal; downstream of intake; and upstream of the proposed extension intake (see Figure 31). The flow at the extension intake was lower (96 l/s) than that reported for January owing to low rainfall in July – which is the typical low flow period in the adjacent Limbé and Grande Rivière du Nord watersheds. It should be noted, however, that the low flows measured in July, 2015 may not be average base flows but rather “minimum flows” given that rainfall has been considerably less than usual in the dry seasons of 2014 and 2015. In effect, a value between 150 l/s and 96 l/s (about 123 l/s) would be a more appropriate average base flow for the Anba Lanmè River. The following values were obtained.

TABLE 36: FLOW MEASUREMENT AT THE DUBRÉ IRRIGATION SYSTEM

Date	Extension intake	Existing intake canal	Downstream	Remarks
15 July, 2015	96 l/s	52 l/s	42 l/s	This study
16 January, 2015	150 l/s			PlanConsult

In summary, the flow in the Anba Lanmè River is insufficient to irrigate 140 ha year round even with the rehabilitation of the existing system, the construction of the new systems with lined canals operating at high conveyance efficiency, and increased efficiency with the application of SRI. 47 ha will be left without irrigation assuming 30 l/s should be left in the river to ensure normal ecological functions. Even with the reduced irrigable area, the system should be designed to withdraw less water during the base flow season and more during wet months. There will be minimal environmental impact with the application of SRI. PlanConsult recommends “tours d’eau” to irrigate the entire system dividing it into several different zones and irrigating by turn. This approach will not meet 100% of the crops’ water needs. Other sources of water such as groundwater would need to be identified.

La Suisse: currently, there is insufficient water in the Mamanet River to irrigate the extended system at La Suisse year round even with rehabilitation works and the adoption of SRI. Flow measurements taken on July 29 at the intake were only 50.5 l/s, which is enough to irrigate only 40 ha at high efficiency during low flow periods (with 10 l/s left in the river for ecological functions). There may be enough water to irrigate one or two crops during the wetter times of the year but not three. The system should be designed to withdraw less water during the base flow season and more during wet months. The system should not be built if other sources of water cannot be identified.

Biological environment: no negative impact is expected downstream of the Grison Garde system. This system is not expected to withdraw more water from the Mornet River than was originally planned. With the application of SRI and the rehabilitation of the canal networks, very little water containing residual fertilizers and pesticide will return to the river via surface runoff through the drain.

Socio-economic environment: see above under IR 1.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Haut du Cap watershed comprise a package of interventions focused on improving rice and plantain production in the lower and middle watershed and cacao production in the middle and upper watershed. In the upper watershed, AVANSE will support agroforestry activities to reduce soil erosion that can compromise the performance of irrigation systems further downstream. All these activities will improve the livelihoods of smallholder farmers by increasing income from commercial production. Potential indirect impacts include reduced food production by smallholders that convert from maize and bean production to plantain or cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in cacao nurseries.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Cumulative impacts of the AVANSE project activities have been assessed using the methodology described under the Jassa watershed above. The overall result of the assessment is a positive cumulative impact as depicted in Table 36 below. As with Jassa, Marion, and Grande Riviere du Nord, some discrete activity pairings produced adverse cumulative effects. These mainly centered on GAPs for irrigated rice and plantain production as well as small-scale irrigation projects. See discussion under Jassa and Trou du Nord above regarding how AVANSE could alter its program and implement additional mitigation measures to further reduce the adverse impacts.

TABLE 37: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN HAUT DU CAP

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Haut du Cap		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agroforestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation Systems				
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	-2	-1	-2	-2	1	-1	-1	-1	-1	2	1	1	-6	Soil erosion	PHYSICAL ENVIRONMENT	-6
	GAP for Irrigated Banana Production	-2	-2	-1	-1	-1	-1	-2	-1	-1	-1	-1	-1	1	-14	Effects of Agricultural Chemical		-14
	GAP for Cacao Production	-1	-1	2	2	2	2	2	2	3	1	2	1	1	18	Water Quality		18
	Institutional Collaboration to promote GAP	-2	-1	2	1	1	1	-1	1	1	1	1	1	1	7	Water Quantity		7
	Support to Nurseries and Grafting	-2	-1	2	1	1	1	-1	1	1	1	1	1	-1	5	Water Quantity		5
	Irrigation systems water Users Ass. Capacity Building	1	-1	2	1	1	1	1	1	1	1	1	1	1	12	Natural Vegetation	BIOLOGICAL ENVIRONMENT	12
	Small-Scale Irrigation projects	-1	-2	2	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-9	Effects on Aquatic Species		-9
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	-1	-1	2	1	1	1	-1	2	2	1	-1	1	2	9	Three Bay Marine Protected Area	9	
	Agro-forestry support to Cacao production	-1	-1	3	1	1	1	-1	2	2	1	1	1	2	12		12	
AGRICULTURAL MARKETS STRENGTHENED	Facilitate Post Harvest handling, storage and processing	-1	-1	1	1	1	1	-1	1	1	1	1	1	1	7	Increased Income	7	
	Promote the use of voucher as a market oriented subsidies mechanism	2	-1	2	1	1	1	-1	-1	1	1	2	1	1	10		10	
INFRA	Well Fed Irrigation Systems	1	-1	1	1	1	1	-1	1	1	1	1	0	1	8	Increased Access to Market	8	
	Gravity based Irrigation Systems	1	1	1	1	-1	1	-1	2	2	1	1	1	0	10	Historical & Cultural Resources	10	
INTER + ADD Cumulative IMPACTS		-6	-14	18	7	5	12	-9	9	12	7	10	8	10	69	TOTAL CUMULATIVE IMPACTS		69
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species	Three Bay Marine Protected Area	Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS		CONCLUSION				
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT								

The Haut du Cap watershed and adjacent Grande Rivière du Nord watershed have seen several major investment projects in recent years and other sites have been identified as potential locations for new development initiatives. These include the following identified by the Ministry of Economy and Finance (MEF, 2015):

- The upgrading and expansion of port facilities at Cap Haïtien (under development) (sites 18 and 19 on Figure 30)
- Road development between the Industrial Park and Cap Haïtien (under development)
- Residential housing near Quartier Morin (proposed) (site 20 on Figure 30)
- Tourism development at the Citadelle and Sans Souci sites and along the coast (Labadie)
- Mining concessions (proposed) (sites 3, 4, 5, 13, 14 and 15 on Figure 30)

The development initiatives that are proposed or underway in Haut du Cap will generally have a beneficial impact on AVANSE's activities. The improvements to the road from Caracol to the port facilities in Cap Haïtien will improve access to cacao processing facilities and export routes.

A potential negative impact is the effect of job creation near Caracol – the Industrial Park alone will have about 65,000 workers – on the availability of farm labor. In northern Haiti, there is already a shortage of labor as young men and women move to urban areas looking for jobs. The impact of the development and investment projects in Haut du Cap will likely lead to further out migration from neighboring rural areas. Rice farming is labor intensive, as is land preparation for plantain production, so shortage of labor may require better access to mechanized land preparation and rice harvesting. While cacao production is not highly labor intensive, there is a risk that young children who should be attending school will be enlisted in on-farm activities. AVANSE will mitigate this through focused messaging during FFS training and other events.

Tourism developments near Milot (the Citadelle and Sans Souci) and along the coast near Labadie are not close to any proposed AVANSE activities. We do not anticipate any negative cumulative impacts.

There is one active mining concession – the VCS flagship site near Morne Bossa west of Limonade in the Grande Rivière du Nord (site 15 on Figure 28) – and several potential exploration sites in adjacent parts of the Haut du Cap watershed north of Milot. The Morne Bossa site covers 50 km² and holds has potentially exploitable deposits of gold, silver and copper. If these concessions are developed, there would be potential pollution of river water that is used for rice farming in Dubré and of groundwater that is used for domestic water supply. At this time, we have no information on likelihood or timing of any mining operations.

A potential collaborative opportunity that could enhance positive cumulative impacts with other development projects and could be pursued would be coastal management in the Labadie area. AVANSE could facilitate exchanges between Labadie managers and PN3B staff with respect to best practices for coastal zone management.

LIMBE WATERSHED

PHYSICAL ENVIRONMENT

Limbé is one of the most mountainous of AVANSE's watersheds and extension zones and contains a relatively small area of lowlands. Eighteen sub-watersheds have been delineated (DAI, 2013a).

TOPOGRAPHY

Limbé possesses the highest percentage of land above 600 m (36%) among AVANSE's watersheds and is dominated by moderate to steep slopes. The majority of the flat or gently sloping land is found near the coast in Bas Limbé commune.

GEOLOGY AND SOILS

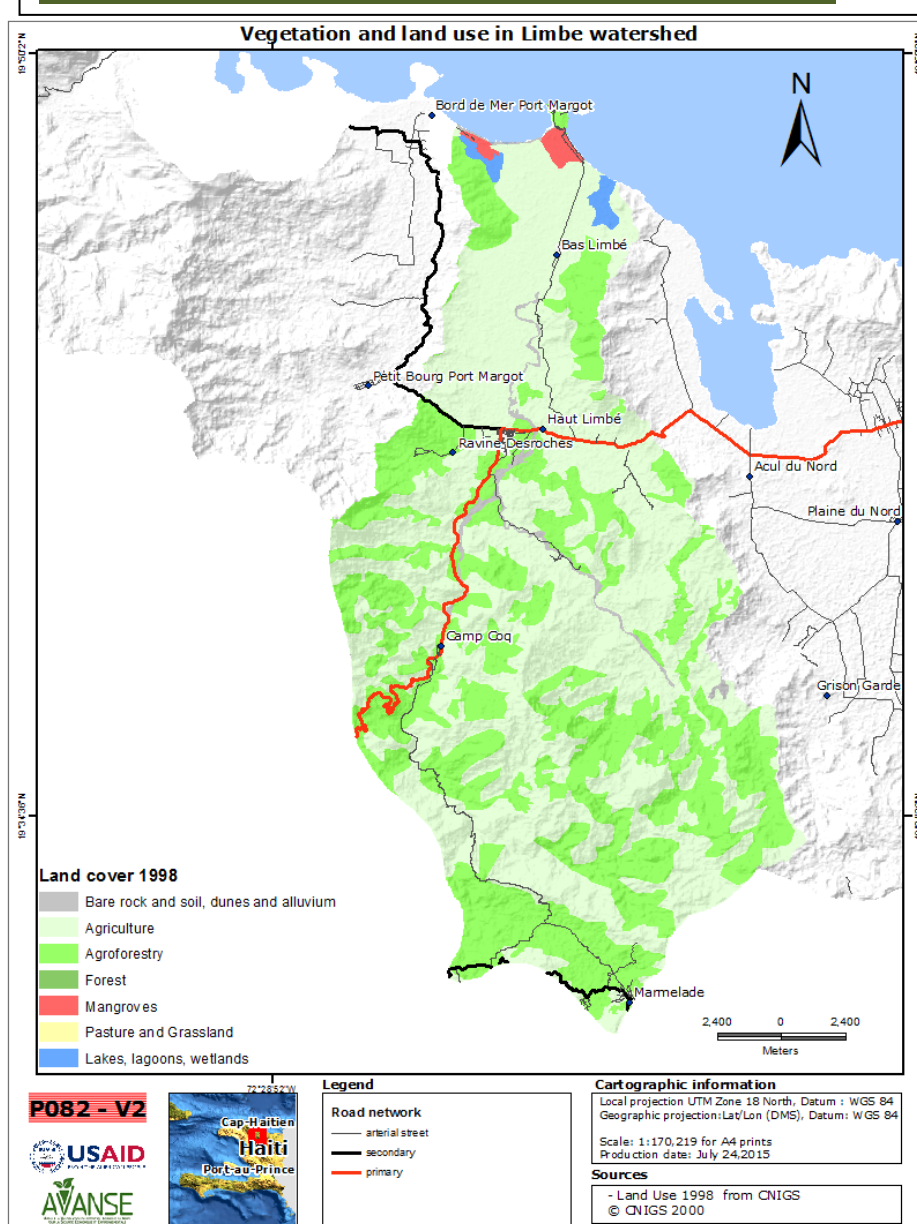
The soil potential maps produced for the Limbé watershed and part of the Haut du Cap watershed classify the majority of the soils as limited to very limited (Pierre, 2008; Commune de l'Acul du Nord, 2009).

WATER RESOURCES

With respect to the quantity of rivers and streams, Limbé's hydrological network falls in the middle of the range of AVANSE's watersheds.

Regarding specific information, flow data reported in 1999 show a mean daily output of 4.29 m³/s for the Limbé River. However, low season or minimum daily averages are much less than this: 0.3 m³/s (USACE, 1999).

FIGURE 32: LAND USE AND LAND COVER IN LIMBE



BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

The northern coast and Morne Bailly KBAs both overlap with parts of the Limbé watershed. In addition, a 2008 USAID/DAI study (Timyan 2008) named three sites in the Limbé watershed as important biological conservation sites: the mangroves near Bas Limbé, the vestige rainforest at Sou Bès, and the island of Islet Bas Limbé (Ilet Karamel). These sites host significant populations of native and endemic species, many of which are threatened, including the Horned iguana (*Cyclura cornuta*) and the Loggerhead sea turtle (*Caretta caretta*). There are also notable seagrass beds at the mouth of the Limbé River; however, they seem to be more affected by sediment loads compared to other seagrass areas adjacent to AVANSE's watersheds and extension zones.

TABLE 38: SUMMARY CHARACTERISTICS FOR LIMBE WATERSHED

Characteristic	Statistic
Total area	316 km ²
Population	215,144
Population density	363 people/ km ²
Area < 75 m (elevation)	117 km ²
Area 75 – 600 m (elevation)	84 km ²
Area > 600 m (elevation)	113 km ²
Area of agriculture	181 km ²
Area of agroforestry	127 km ²
Area of pasture/grassland	4 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

At about 215,100 people, Limbé has one of the largest populations among the AVANSE watersheds and extension zones. The population density was approximately 360 people per km² in 2005 (IHSI, 2005). Limbé had the most people (approximately 68,100 people) among the 4 communes that overlap with the watershed.

LAND TENURE

Limbé has the highest percentage (51%) of farms smaller than 1 ha and the lowest portion of farms greater than 3 ha (9%) among AVANSE's watersheds and extension zones. Access to land follows the general pattern within the project's intervention zone with most of the land being owned and only 15% rented or sharecropped. See Tables 6 and 7 for more information.

LAND USE

Over 95% of Limbé's land is used for agriculture or agroforestry. Limbé has the lowest percentage of pasture and grassland among AVANSE's 6 watersheds.

ECONOMIC ACTIVITIES

With respect to economic activities, the population of the Limbé watershed practices agriculture, commerce and animal husbandry (IHSI, 2005). Commercial activities occur with neighboring communes as well as with the Dominican Republic.

HEALTH AND EDUCATIONAL FACILITIES

Limbé commune has 2 hospitals, 4 health clinics and 2 dispensaries while the commune of Bas Limbé has 1 hospital and 2 clinics (IHSI, 2005). These establishments employ about 225

people. A number of educational facilities can also be found in these two communes: over 90 primary schools, 18 secondary schools and 16 vocational or professional schools.

ENVIRONMENTAL CONSEQUENCES

The lowlands of the Limbé watershed have extensive areas where the soils are suitable for agriculture as well as perennial rivers that provide irrigation water. Previously, AVANSE's activities in the watershed focused on helping smallholder farmers improve plantain production in the lower watershed, and expanding cacao production in the middle and upper watershed. Agroforestry was previously promoted in the middle and upper watershed to reduce soil erosion and conserve water resources. AVANSE is no longer supporting maize and bean production and agroforestry activities will be curtailed in the watershed since there are no anticipated interventions in irrigated rice farming. The potential environmental and social consequences of the planned activities include the possible contamination of groundwater, rivers, lakes and inshore waters with agro-chemicals from plantain production.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in the Limbé watershed will focus principally on improving plantain and cacao production and marketing. In both cases, AVANSE will provide farmers with access to genetic material (cacao seedlings/cuttings and plantain root stock to improve productivity). In addition, AVANSE's Farmer Field Schools will provide training to improve cultivation, harvesting and post-harvest handling of the two crops.

**TABLE 39: SUMMARY OF FOCUSED ACTIVITY PACKAGE ALTERNATIVE
ACTIVITIES IN LIMBE WATERSHED**

Activity	Quantity
Plantain/Banana (ha)	550
Cacao (ha)	325
Rice (ha)	n/a
Interventions on irrigable land (ha)	250
Length of treated irrigation/drainage canals (km)	7.7

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: enhancing plantain production in the lower watershed between Bas Limbé and the coast will have a positive impact on the landscape by draining areas that are prone to flooding in the rainy season.

The watershed is drained by the Limbé River which flows into the Atlantic Ocean. The river receives water from multiple tributaries including the Camp Coq River, Rivière Blanche, and Rivière Suffrière as well as a number of ravines. The average flow of the Limbé at Pont Christophe is 4.85 m³/s based on historical data. The minimum flow could be as low as 0.30 m³/s. During this assessment, a flow of 1.10 m³/s was measured on 31 July, 2015. MARNDP reported a flow rate of 0.436 m³/s on 3 March, 1977 and 9 June, 1977. Values of 4.35 m³/s were reported by UNDP (1991). Minimum flow usually occurs during March and July (2 .3 m³/s) while maximum flow is observed in November (32 m³/s). The largest flow recorded was in November, 1927: 233 m³/s.

There is no existing irrigation infrastructure in the lower watershed. Plantain production is rain fed though the Limbé River regularly overflows its banks in the rainy season, inundating the banana parcels. In the lower part of the watershed near the coast the plantain fields are often under water for long periods during the rainy season. When this happens intercropped papaya and beans are lost. Plantain plants also become stunted and have weak root systems, so they must be supported with tutors but still fall over from the weight of the fruit.

The Bas Limbe FFS plantain farmers have suffered from both flooding and drought since inception of the program in May 2014. FFS participants have hand dug drainage canals between the plantain rows, planting on the raised bed between the canals. The canals serve as a reservoir of water that the plants can draw on between flood “irrigations”. This costly, labor intensive practice has helped. Some farmers rent pumps to drain their fields but because there are no large canals to drain the water back to the river (or out to the sea), they often drain water from their field to a neighbor's.

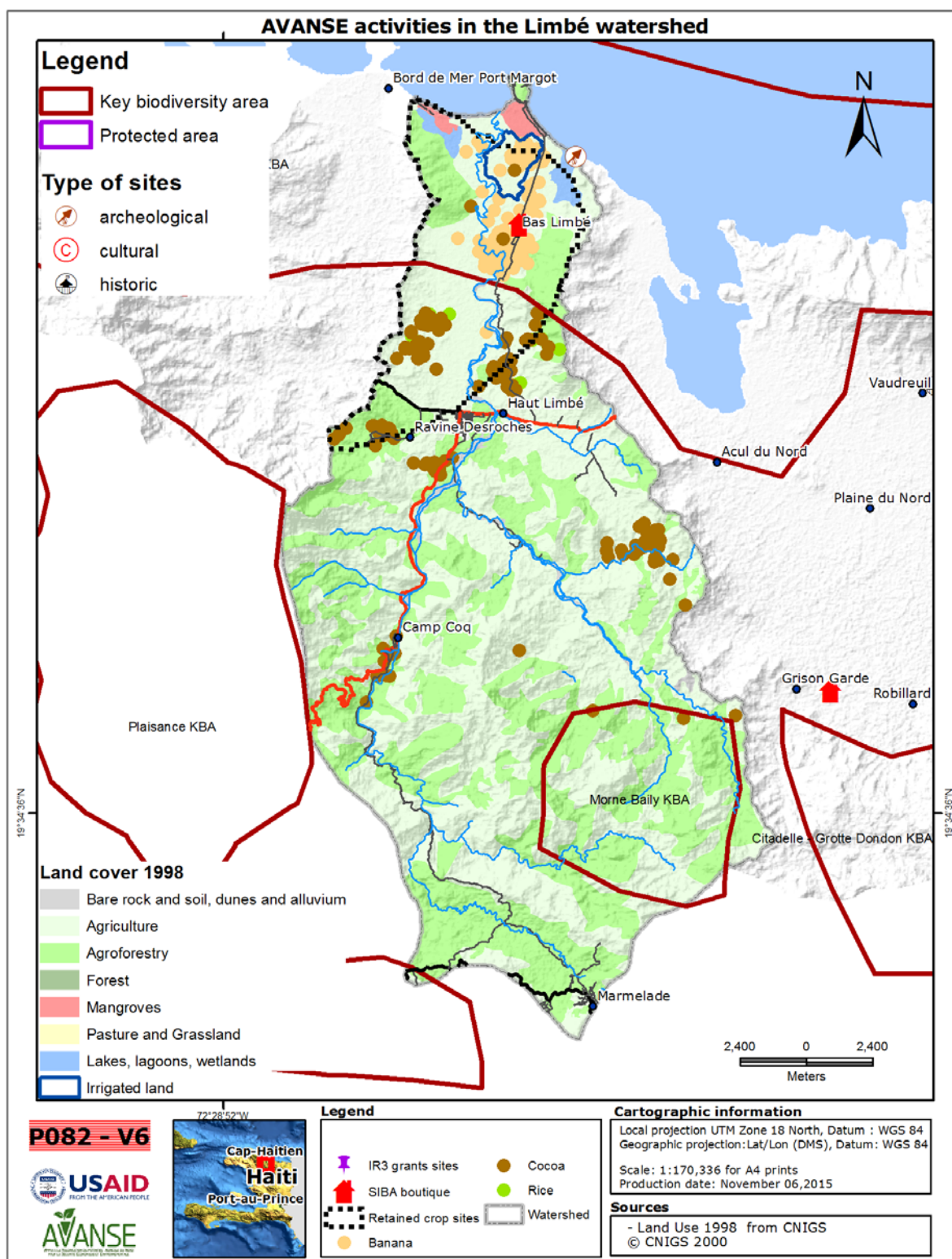
Two major ravines also discharge onto the Limbé floodplain: Ravine Corail Titoir and Ravine Rivot, which have estimate drainage areas of 7.7 km² and 4.0 km² respectively (see Figure 34). Farmers complain that the lack of proper drainage causes their farmland and homes to be flooded. AVANSE will implement the cleaning of two existing drainage canals to allow for more water coming from the ravines to be transported directly into the ocean without adversely affecting the mangrove ecosystems that lie between the farmland and the coast. Under this initiative, 4.5 km of the Corail Titoir drainage canal will be cleaned and 3.2 km of the Rivot drainage canal. In addition, the Corail Titoir canal will be extended so that excess water reaches the sea. The overall goal is to expedite the evacuation of water and reduce flooding in 285 ha of plantain fields located between the left bank of the Limbé River and the ravines. It should be noted that cleaning of the Ravine Rivot will also have significant socio-economic benefits as it will reduce the risk of flooding to homes and other structures in the town of Bas Limbé. A site-specific EMPR for this initiative can be found in Annex J.

Improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems. *Biological environment:* by promoting cacao in agroforestry systems, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

The Bas Limbé FFS plantain farmers have been supplied with clean disease free plantain suckers of the local variety preferred in the market for the first season of the two year banana FFS. They have learned how to clean and “shave” banana suckers before planting to eliminate burrowing nematodes which can cause losses of 30 to 60%. They do not use nematicides.

Socio-economic environment: AVANSE's activities will provide improved incomes for an estimated 900 farming families from increased plantain and cacao production. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

FIGURE 33: AVANSE ACTIVITES IN THE LIMBÉ WATERSHED



Plantain farmers report that they are already applying the practices that they have learned in the Farmer Field Schools. Moreover, AVANSE field technicians have noted that other farmers who have not participated in the plantain Field School are also adopting the improved practices. The new practices are expensive in terms of labor costs and inputs but the returns on investment are high. Participating farmers will have to manage their finances carefully in order to have the necessary funds to re-invest planting materials and inputs in the future.

T

FIGURE 34: LOWER LIMBÉ WATERSHED: DRAINAGE INFRASTRUCTURE IN BAS LIMBÉ



NEGATIVE IMPACTS

Physical environment: cacao production is not likely to have any negative consequences on the physical environment in the upper watersheds.

In contrast, plantain production north around Bas Limbé will require improved drainage to prevent flooding and waterlogging. It is also likely that some agro-chemicals would be used to control pests such as nematodes and fungal infections.

Biological environment: the Limbé River discharges into the sea to the west of the Bay d'Acul which is an area of important mangrove ecosystems and biodiversity. The coastal zone of the Limbé watershed includes mangrove forests that are an important habitat for fish and other marine organisms and also provide protection from storm surges. There are wetlands that provide important habitats for migratory birds and a small but significant fishery that supplements the income of the local fishers when the marine fishery is closed owing to bad weather. Agrochemicals use on plantain crops in the lower watershed could contaminate the mangrove ecosystems and inshore waters. AVANSE will not support the use of pesticides on plantain crops and will promote Integrated Pest Management practices to minimize the use of pesticides and ensure that the storage, handling, use and disposal of pesticides and packaging are safe. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. In some parts of the watershed, farmers have replaced rice cultivation with plantain fields mainly because of severe bird predation on the rice crop (mainly by exotic Weaver species – the African Village Weaver, *Ploceus cucullatus* – known locally as the *Madan Sara* because of its “demand” for rice). This transition may have a detrimental impact on household food supply though both rice and plantains are consumed as staples.

Some farmers expressed concern that the anticipated increase in production might outstrip demand in the Limbé market. They are looking to AVANSE to provide marketing support.

Possible health issues related to agro-chemicals and water quality will be averted by providing training on the safe use of fertilizers. Treatment of plantain cuttings to control nematodes involves washing of the roots in warm water and will not create any health hazards.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

No IR 2 activities will be implemented in the Limbé watershed.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: IR 3 activities in the Limbé watershed will focus principally on marketing of cacao and plantains. We do not anticipate any significant impact on the physical environment other than those identified under IR 1.

Biological environment: the conversion to cacao will improve and expand habitats for endemic species and will reduce the use of agrochemicals that are used on many other crops. The conversion from rice to plantain will also reduce the use of chemical fertilizers and pesticides.

Socio-economic environment: increased production and commercialization of cacao and plantains will improve livelihoods of smallholder farmers.

NEGATIVE IMPACTS

Physical environment: it is anticipated mechanized equipment may be used for preparing fields for plantain production – particularly for excavating drainage ditches, which could result in soil compaction. We do not anticipate any significant negative impacts but AVANSE will monitor plantain fields for evidence of increased waterlogging resulting from soil compaction.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

INFRASTRUCTURE

POSITIVE IMPACTS

Physical environment: AVANSE will not implement any infrastructure activities in the Limbé watershed other than improving drainage from the two ravines and associated canals that discharge onto the floodplain in the proposed plantain growing areas (see Figure 34). These areas are usually flooded by overbank discharge from the Limbé River as well as by the two tributary ravines during the rainy season. The river meanders across the valley floor as evidenced by former channels on the floodplain. AVANSE does not plan on implementing any activities to protect the plantain fields from flooding by the river.

Peak flow from the ravines can be estimated using the equation:

$$Q \text{ (m}^3\text{/s)} = 0.0028CratIA$$

where Crat: rational runoff coefficient; I: rainfall intensity (mm/h) for a 10 year return period; A: drainage area (ha).

Assuming a hypothetical 10-year 2-hour rain of intensity 44 mm/h (PlanConsult, 2015), and a runoff coefficient of 0.52 (based on the topography, land use and intensity), the required peak flow can be estimated for the Corail Titou and Rivot drains at 12.6 m³/s and 24 m³/s respectively. This provides a rough estimate of the drain capacity that is needed to evacuate water from the ravines to the sea.

Biological environment: improving the drainage below the two ravines is unlikely to have any significant impact on the hydrological flows in the adjacent mangrove areas.

Socio-economic environment: improving drainage below the two ravines will reduce the risk of flooding of the plantain fields and thereby reduce potential crop losses.

NEGATIVE IMPACTS

Physical environment: the cleaning of Corail Titou and Rivot ravines and drainage canals will help alleviate the flooding caused by discharge from the ravines originating in the hills overlooking the plantain fields. However, flooding from the river will remain a problem since no engineering interventions are currently anticipated.

Biological environment: see above.

Socio-economic environment: the planned AVANSE investment in improving drainage from the ravines requires close monitoring since its beneficial impact on controlling flooding remains uncertain.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Limbé watershed comprise a package of interventions focused on improving plantain production in the lower watershed and cacao production in the middle and upper watershed. These activities will improve the livelihoods of smallholder farmers by increasing income from commercial production. Potential indirect impacts include reduced food production by smallholders that convert from rice production to plantain or from maize and bean production to cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in cacao nurseries in this watershed.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

Cumulative impacts of the AVANSE project activities have been assessed using the methodology described under the Jassa watershed above. As with the other watersheds, the overall result of the assessment for Limbé is a positive cumulative impact as depicted in Table 39 below. As with Trou du Nord, results of the discrete, paired activities is largely positive. The only exception are the activities associated with irrigated banana production. See discussion under Trou du Nord above regarding how AVANSE could alter its program and implement additional mitigation measures to further reduce the adverse impacts as well as improve and increase positive cumulative environmental impacts.

There are no known major development initiatives or investments planned for the Limbé watershed. The proposed improvements and expansion of the port facilities at Cap Haïtien should have a beneficial impact on cacao exports.

TABLE 40: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN LIMBE

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	LIMBE		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agroforestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/ Drainage Systems				
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	-1	2	1	1	1	0	0	1	1	-1	0	1	6	Soil erosion	PHYSICAL ENVIRONMENT	6
	GAP for Irrigated Banana Production	-1	-2	-1	-1	-1	-1	-2	-1	-2	-2	-1	-1	-1	-17	Effects of Agricultural Chemical		-17
	GAP for Cacao Production	2	-1	2	2	2	2	2	2	3	2	2	1	-1	20	Water Quality		20
	Institutional Collaboration to promote GAP	1	-1	2	1	1	1	1	1	1	1	-1	1	1	10	Water Quantity		10
	Support to Nurseries and Grafting	1	-1	2	1	1	1	1	1	1	1	1	1	1	12	Water Quantity		12
	Irrigation systems water Users Ass. Capacity Building	1	-1	2	1	1	1	1	1	1	1	1	1	2	13	Natural Vegetation	13	
	Small-Scale Irrigation projects	0	-2	2	1	1	1	0	0	1	1	-1	0	-1	3		3	
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	0	-1	2	1	1	1	0	0	1	1	-1	0	-1	4	Effects on Aquatic Species	BIOLOGICAL ENVIRONMENT	4
	Agro-forestry support to Cacao production	1	-2	3	1	1	1	1	1	3	1	1	1	1	14	Three Bay Marine Protected Area		14
AGRICULTURAL MARKETS STRENGTHENED	Facilitate Post Harvest handling, storage and processing	1	-2	2	1	1	1	1	1	1	1	1	1	1	11			11
	Promote the use of voucher as a market oriented subsidies mechanism	-1	-1	2	-1	1	1	-1	-1	1	1	2	2	-1	4	Increased Income	4	
INFRA	Well Fed Irrigation Systems	0	-1	1	1	1	1	0	0	1	1	2	0	1	8	Increased Access to Market	SOCIO-ECONOMIC ENV.	8
	Gravity based Irrigation/ Drainage Systems	1	-1	-1	1	1	2	-1	-1	1	1	-1	1	-1	2	Historical & Cultural Resources		2
INTER + ADD Cumulative IMPACTS		6	-17	20	10	12	13	3	4	14	11	4	8	2	90	TOTAL CUMULATIVE IMPACTS		90
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species	Three Bay Marine Protected Area	Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS		CONCLUSION				
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT								

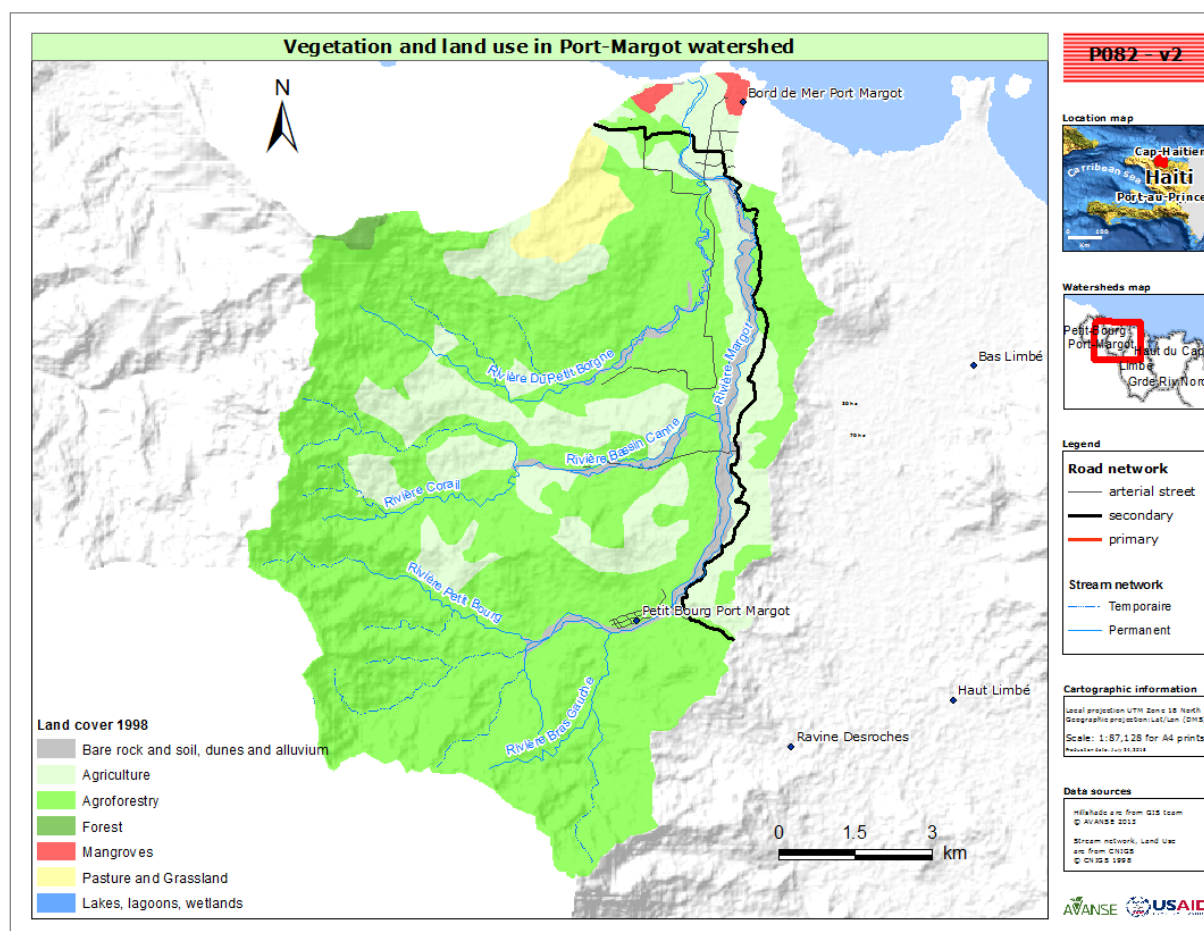
PORT MARGOT EXTENSION AREA

PHYSICAL ENVIRONMENT

At 110 km², Port Margot is the smallest of AVANSE's watersheds and extension zones. It is generally hillier and more mountainous than the majority of the project's intervention zones and has a relatively small area that can be classified as coastal plain or lowlands.

In addition to the cacao interventions in the Port Margot extension zone, AVANSE implements improved cacao production and marketing activities in adjacent areas to the south around Pilate. We will address these additional cacao production activities here.

FIGURE 35: LAND USE AND LAND COVER IN PORT MARGOT



TOPOGRAPHY

Most of the extension area is hilly to mountainous with gentle to steep slopes. There is some flatter land around the Margot River in northern half of the extension zone.

WATER RESOURCES

The Margot River is the main water resource in the extension zone. It has three main tributaries (see Figure 35 above).

BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

Part of the northern coast KBA falls within the Port Margot extension area. In addition, the far northwestern corner of Port Margot is one of the few areas within the AVANSE intervention zone that has some remaining natural forest cover.

TABLE 41: SUMMARY CHARACTERISTICS FOR PORT MARGOT EXTENSION ZONE

Characteristic	Statistic
Total area	110 km ²
Population	81,038
Population density	315 people/ km ²
Area of agriculture	23 km ²
Area of agroforestry	79 km ²
Area of pasture/grassland	3 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in the Port Margot extension area is approximately 81,000. The population density was approximately 315 people per km² in 2005 (IHSI, 2005).

LAND TENURE

Port Margot follows the trend of most of AVANSE's watersheds and extension zones with respect to farm size. The majority (47%) are between 1 and 3 ha, although there is a relatively high percentage (39%) of farms less than 1 ha. Access to land also follows the general trends with 11% rented or sharecropped and the vast majority owned. See Tables 6 and 7 for more information.

LAND USE

Port Margot has a very high percentage of agroforestry – 72% – compared to AVANSE's six watersheds. Agriculture and pasture and grassland are also comparatively low at 21 and 3%, respectively.

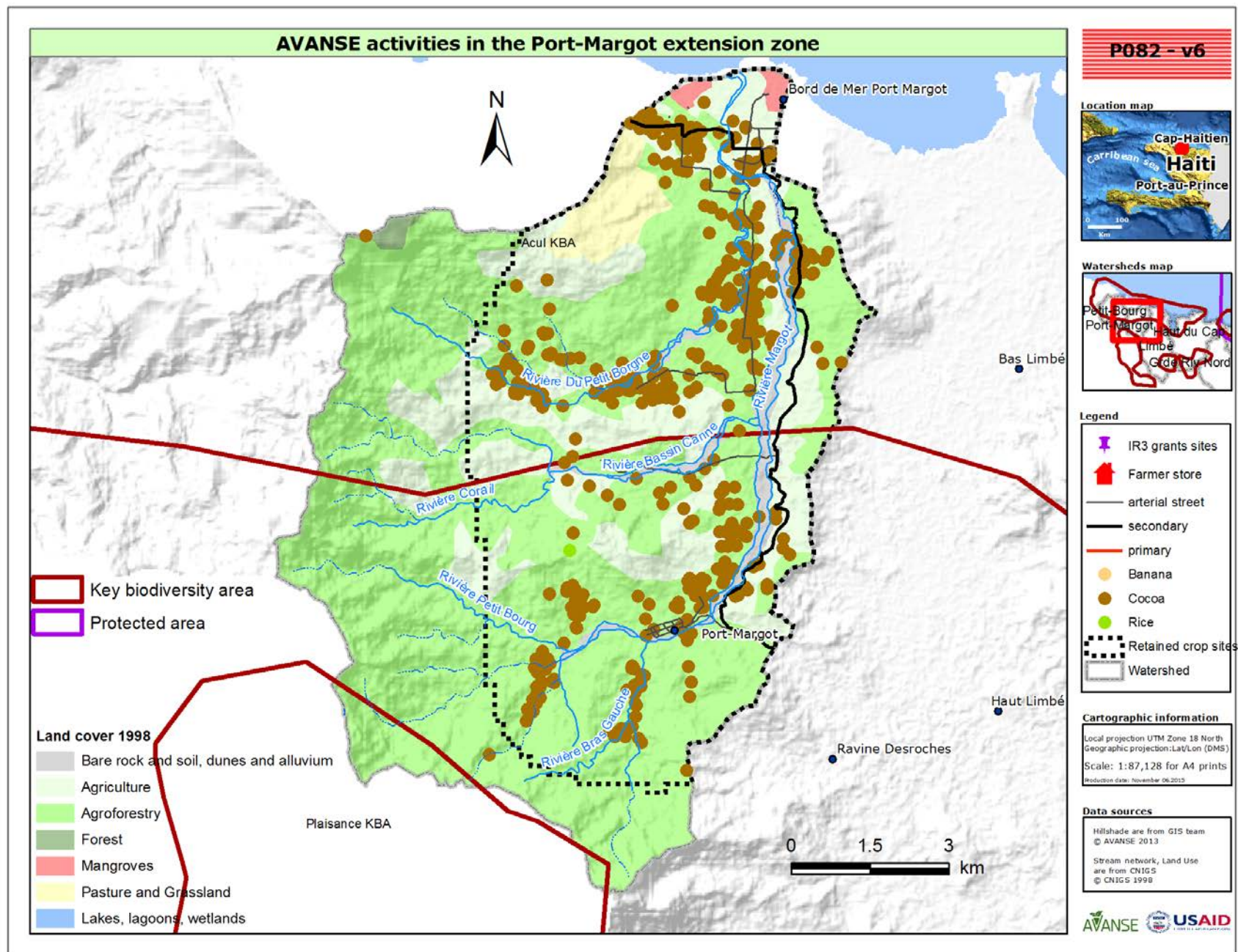
ECONOMIC ACTIVITIES

The main economic activities for people in the Port Margot extension area are animal husbandry, agriculture and commerce (IHSI, 2005).

HEALTH AND EDUCATIONAL FACILITIES

There are 53 primary schools, 7 secondary schools and 4 professional or vocational schools in Port Margot commune (IHSI, 2005). Regarding, health facilities, the commune has 8 clinics and health centers and 4 dispensaries.

FIGURE 36: AVANSE ACTIVITES IN THE PORT MARGOT CACAO EXTENSION ZONE



ENVIRONMENTAL CONSEQUENCES

AVANSE activities in the Port Margot cacao extension zone will be confined to improving cacao production and marketing. We do not anticipate any negative environmental or social consequences though expansion of cacao into natural forests is a potential issue as is conversion from food crops to commercial cacao if alternative sources of food are not available to farming households.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in Port Margot will focus principally on improving cacao production and marketing. By increasing the quality and quantity of cacao production through the introduction of new varieties of cacao, new propagation techniques such as grafting, expanding the area under cacao cultivation, and linking producers to lucrative markets, AVANSE will increase smallholder income and improve livelihoods.

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems.

Biological environment: by promoting cacao within an agroforestry system, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's activities provided improved incomes for an estimated 1,200 farming families in Port Margot and 600 families in Pilate and from increased cacao production over the period 2013 to 2015. These activities will be continued and expanded under the focused activity package alternative. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

NEGATIVE IMPACTS

Physical environment: cacao production is not likely to have any negative consequences on the physical environment in the watershed. The agroforestry systems include tree crops and ground cover that will reduce soil erosion and enhance the physical properties and nutrient status of the soil.

Biological environment: we do not anticipate any negative consequences. In many areas of northern Haiti, the main cacao pests are rodents – mainly rats and mice. Farmers do not typically use rodenticides but rather make a product out of salt that kills the rodents when they eat it. The product is not toxic to people. AVANSE will not support the use of toxic chemical products to control pests. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Instances of children working in cacao nurseries have been reported in Bas Limbé. AVANSE will use Farmer Field Schools to communicate to parents and others the

importance of discouraging the employment of children and encouraging their children to attend school rather than working.

WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

No IR 2 activities will be implemented in the Port Margot extension zone or adjacent Pilate area.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: since cacao production is part of an agroforestry system, we anticipate that conversion to cacao and expansion of the area under cultivation will have a beneficial impact on controlling soil erosion and conserving water.

Biological environment: provided the expansion of the area under cacao does not result in conversion of natural forest areas, we anticipate that cacao agroforestry will benefit endemic species and improve the areas biodiversity.

Socio-economic environment: IR 3 activities in Port Margot will focus on linking cacao farmers to buyers and markets. This will have a beneficial impact on smallholder livelihoods.

NEGATIVE IMPACTS

Physical environment: see above under IR 1 activities.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

INFRASTRUCTURE

AVANSE's will not implement any infrastructure activities in the Port Margot extension zone or the adjacent Pilate area.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Port Margot extension zone comprise a package of interventions focused on improving cacao production in the middle and upper watershed. These activities will improve the livelihoods of smallholder farmers by increasing income from commercial cacao production. Potential indirect impacts include reduced food production by smallholders that convert from maize and bean production to cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in tree nurseries.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

No significant development projects or investments have been identified in the Port Margot extension zone. With respect to AVANSE, cumulative impacts of the project activities have been assessed using the methodology described under the Jassa watershed above. The overall result of the assessment is a positive cumulative impact as depicted in Table 41 below. As with Trou du Nord, results of the discrete, paired activities are all positive. See discussion under Trou du Nord above regarding how AVANSE could alter its program and implement additional mitigation measures to further improve and increase positive cumulative environmental impacts.

TABLE 42: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN PORT MARGOT

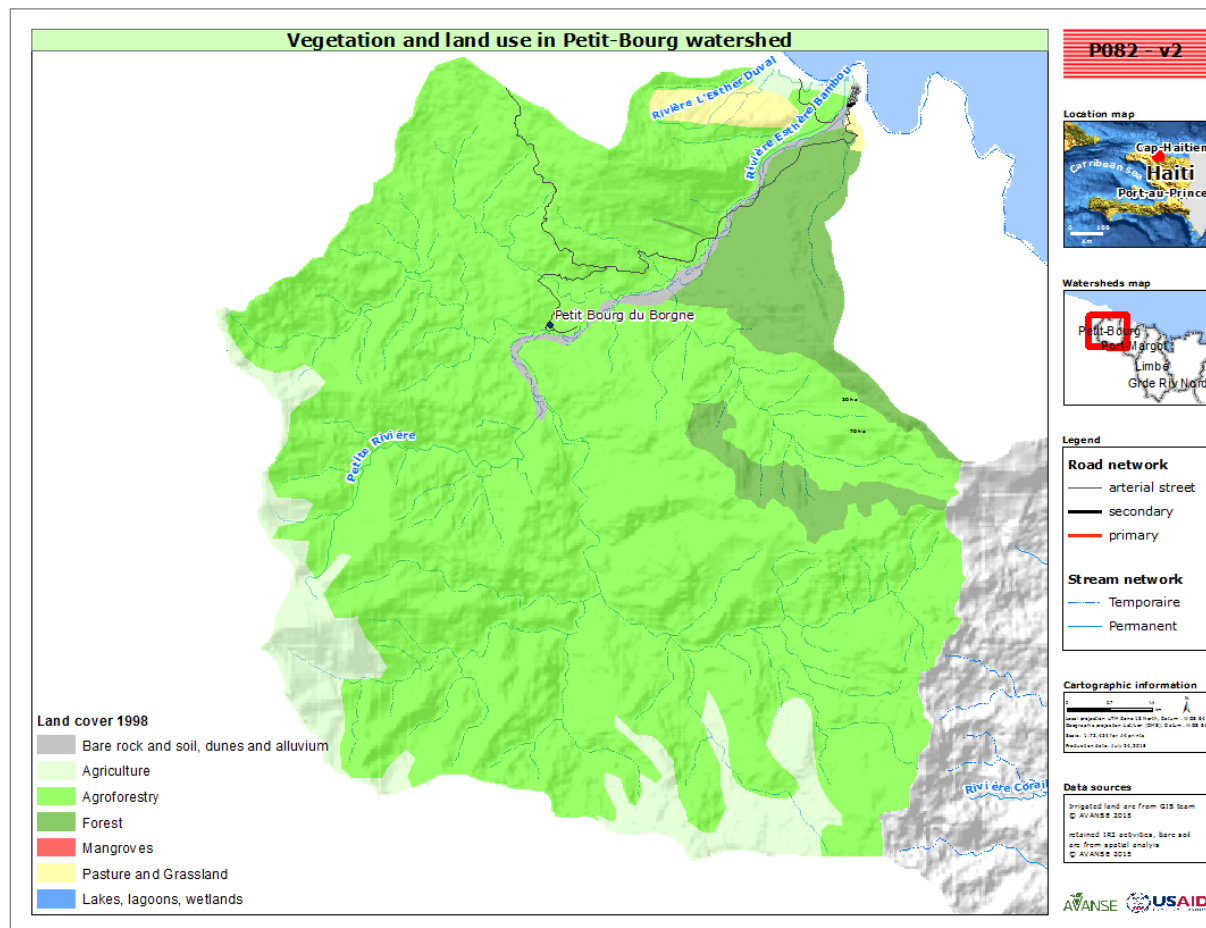
WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Port Margot		ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association Capacity Building	Small-Scale Irrigation projects	Agro-forestry /Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems	Gravity based Irrigation/Drainage Systems				
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Soil erosion	PHYSICAL ENVIRONMENT	7
	GAP for Irrigated Banana Production	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Effects of Agricultural Chemical		7
	GAP for Cacao Production	2	2	2	2	2	2	2	2	3	2	2	1	1	25	Water Quality		25
	Institutional Collaboration to promote GAP	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Water Quantity		14
	Support to Nurseries and Grafting	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Water Quantity		14
	Irrigation systems water Users Ass. Capacity Building	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Natural Vegetation	BIOLOGICAL ENVIRONMENT	7
	Small-Scale Irrigation projects	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Effects on Aquatic Species		7
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Three Bay Marine Protected Area		18
AGRICULTURAL MARKETS STRENGTHENED	Agro-forestry support to Cacao production	1	1	3	1	1	1	1	1	3	1	1	1	2	18		18	
	Facilitate Post Harvest handling, storage and processing	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Increased Income	SOCIO-ECONOMIC ENV.	14
INFRA	Promote the use of voucher as a market oriented subsidies mechanism	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Increased Access to Market		7
	Well Fed Irrigation Systems	0	0	1	1	1	0	0	0	1	1	1	0	0	6	Historical & Cultural Resources		
INTER + ADD Cumulative IMPACTS		7	7	25	14	14	7	7	7	18	14	14	6	7	147	TOTAL CUMULATIVE IMPACTS		147
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species	Three Bay Marine Protected Area	Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS		CONCLUSION				
		PHYSICAL ENVIRONMENT					BIOLOGICAL ENVIRONMENT					SOCIO-ECONOMIC ENVIRONMENT						

BORGNE EXTENSION AREA

PHYSICAL ENVIRONMENT

Borgne extension area is similar to port margot and limbé watershed in that much of the terrain is hilly or mountainous and very little is flat or gently sloping. The hydrological network is less developed than the other avanse watersheds and extension areas, with no large river flowing through the zone. With the exception of port margot, borgne is the smallest of avanse's watersheds and extension zones.

FIGURE 37: LAND USE AND LAND COVER IN BORGNE



TOPOGRAPHY

Similar to Port Margot, Borgne extension zone is dominated by hilly and mountainous terrain with gentle to steeply sloping land. There is very little flat land or lowlands.

WATER RESOURCES

The Esther Bamboo River is the main water resource in the extension zone. There are a number of other smaller water courses in the extension zone (see Figure 37 above).

BIOLOGICAL ENVIRONMENT

KEY BIODIVERSITY AREAS, PROTECTED AREAS AND VEGETATION

Part of the northern coast KBA is found within Borgne extension area. There is also a significant area of remnant natural forest cover in the northeastern corner and eastern portions of the zone.

TABLE 43: SUMMARY CHARACTERISTICS FOR BORGNE EXTENSION ZONE

Characteristic	Statistic
Total area	118 km ²
Population	83,867
Population density	197 people/ km ²
Area of agriculture	10 km ²
Area of agroforestry	96 km ²
Area of pasture/grassland	1 km ²

SOCIO-ECONOMIC ENVIRONMENT

DEMOGRAPHIC CHARACTERISTICS

The population in the Borgne extension area is approximately 83,900. The population density was about 200 people per km² in 2005 (IHSI, 2005). Borgne had the most people of the 2 communes that overlap with the extension area.

LAND TENURE

The land tenure context in Borgne mirrors that of the Port Margot extension area. The majority of farms (47%) are between 1 and 3 ha, although there is a relatively high percentage (39%) of farms less than 1 ha. Access to land follows the general trends with 11% rented or sharecropped and the vast majority owned. See Tables 6 and 7 for more information.

LAND USE

Similar to Port Margot, Borgne has a very high percentage of land under agroforestry: 81%. Borgne also has the highest percentage of land classified as forest (8%) among AVANSE's watersheds and extension zones. Agriculture and pasture and grassland are relatively small: 8 and <1%, respectively.

ECONOMIC ACTIVITIES

With respect to economic activities, the people in the Borgne extension area are engaged in fishing, agriculture and commerce (IHSI, 2005). Of the two communes that overlap with the extension area, fishing is more pronounced in Borgne commune.

HISTORICAL AND CULTURAL RESOURCES

There is one historical/cultural site in the Borgne extension zone: Margot cave.

HEALTH AND EDUCATIONAL FACILITIES

Borgne commune has 1 dispensary and 3 health centers (IHSI, 2005). With respect to educational facilities, the commune possesses 77 primary schools, 9 secondary schools, and 9 vocational or professional schools.

ENVIRONMENTAL CONSEQUENCES

AVANSE activities in the Borgne cacao extension zone will be confined to improving cacao production and marketing. We do not anticipate any negative environmental or social consequences though expansion of cacao into natural forests is a potential issue as is conversion from food crops to commercial cacao if alternative sources of food are not available to farming households.

IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

AVANSE's planned activities in Borgne will focus principally on improving cacao production and marketing. By increasing the quality and quantity of cacao production through the introduction of new varieties of cacao, new propagation techniques such as grafting, expanding the area under cacao cultivation, and linking producers to lucrative markets, AVANSE will increase smallholder income and improve livelihoods.

AGRICULTURAL PRODUCTIVITY INCREASED - IR 1 ACTIVITIES

POSITIVE IMPACTS

Physical environment: improving cacao production in agroforestry systems in the upper watershed will have a beneficial impact by reducing soil erosion in areas that were previously under open-field cropping systems.

Biological environment: by promoting cacao within an agroforestry system, AVANSE will expand and enhance habitats for wildlife including several endangered endemic species of birds and reptiles. Since cacao is grown without the use of agro-chemicals, there will be no adverse impact on biodiversity. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's activities provided improved incomes for an estimated 1,200 farming families from increased cacao production over the period 2013 to 2015. These activities will be continued and expanded under the focused activity package alternative. By introducing new varieties and new farming techniques, AVANSE will help farmers increase production and income.

NEGATIVE IMPACTS

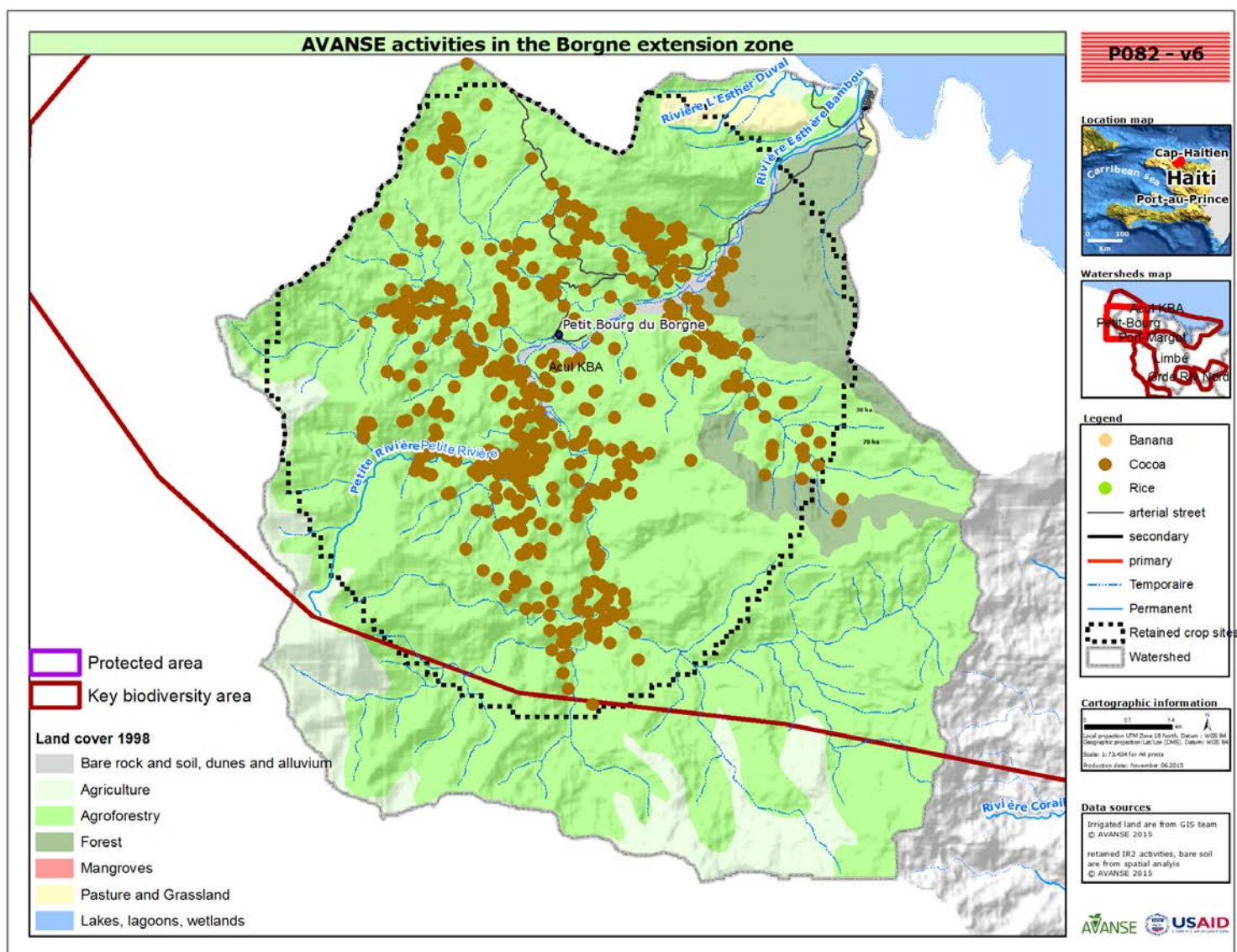
Physical environment: cacao production is not likely to have any negative consequences on the physical environment in the watershed. The agroforestry systems include tree crops and ground cover that will reduce soil erosion and enhance the physical properties and nutrient status of the soil.

Biological environment: we do not anticipate any negative consequences. In many areas of northern Haiti, the main cacao pests are rodents – mainly rats and mice. Farmers do not typically use rodenticides but rather make a product out of salt that kills the rodents when they

eat it. The product is not toxic to people. AVANSE will not support the use of toxic chemical products to control pests. (See text on cacao's biological impacts in the Trou du Nord section, above, for additional details.)

Socio-economic environment: AVANSE's IR 1 activities will not have a detrimental impact on people's livelihoods. Instances of children working in cacao nurseries have been reported in Bas Limbé. AVANSE will use Farmer Field Schools to communicate to parents and others the importance of discouraging the employment of children and encouraging their children to attend school rather than working.

FIGURE 38: AVANSE ACTIVITES IN THE BORGNE CACAO EXTENSION ZONE



WATERSHED STABILITY IMPROVED - IR 2 ACTIVITIES

No IR 2 activities will be implemented in the Borgne extension zone.

AGRICULTURAL MARKETS STRENGTHENED - IR 3 ACTIVITIES

POSITIVE IMPACTS

Physical environment: since cacao production is part of an agroforestry system, we anticipate that conversion to cacao and expansion of the area under cultivation will have a beneficial impact on controlling soil erosion and conserving water.

Biological environment: provided the expansion of the area under cacao does not result in conversion of natural forest areas, we anticipate that cacao agroforestry will benefit endemic species and improve the areas biodiversity.

Socio-economic environment: IR 3 activities in Borgne will focus on linking cacao farmers to buyers and markets. This will have a beneficial impact on smallholder livelihoods.

NEGATIVE IMPACTS

Physical environment: see above under IR 1 activities.

Biological environment: see above under IR 1 activities.

Socio-economic environment: see above under IR 1 activities.

INFRASTRUCTURE

AVANSE's will not implement any infrastructure activities in the Borgne extension zone.

INDIRECT IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

The planned AVANSE activities in the Borgne extension zone comprise a package of interventions focused on improving cacao production in the middle and upper watershed. These activities will improve the livelihoods of smallholder farmers by increasing income from commercial cacao production. Potential indirect impacts include reduced food production by smallholders that convert from maize and bean production to cacao. Also, AVANSE has noted some cases of school age children engaged in paid labor in tree nurseries.

CUMULATIVE IMPACTS OF THE FOCUSED ACTIVITY PACKAGE ALTERNATIVE

No significant development projects or investments have been identified in the Borgne extension zone. With respect to AVANSE, cumulative impacts of the project activities have been assessed using the methodology described under the Jassa watershed above. The overall result of the assessment is a positive cumulative impact as depicted in Table 43 below. As with Trou du Nord, results of the discrete, paired activities are all positive. See discussion under Trou du Nord above regarding how AVANSE could alter its program and implement additional mitigation measures to further improve and increase positive cumulative environmental impacts.

TABLE 44: CUMULATIVE IMPACT ASSESSMENT OF AVANSE ACTIVITIES IN BORGNE

WATERSHED BASED CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT MATRIX		AGRICULTURAL PRODUCTIVITY INCREASED							WATERSHED STABILITY IMPROVED		AGRICULTURAL MARKETS STRENGTHENED		INFRA		ADD + INTER Cumulative IMPACTS	Borgne	ADDITIVE + INTERACTIVE CUMULATIVE IMPACTS	
		GAP for Irrigated Rice Production	GAP for Irrigated Banana Production	GAP for Cacao Production	Institutional Collaboration to promote GAP	Support to Nurseries and Grafting	Irrigation systems water Users Association	Capacity Building	Small-Scale Irrigation projects	Agro-forestry Hillside Stabilization above Irrigation systems	Agro-forestry Systems Support to Cacao Production	Facilitate Post Harvest handling, storage and processing	Promote the use of voucher as a market oriented subsidies mechanism	Well / pumped Fed Irrigation Systems				Gravity based Irrigation/Drainage Systems
AGRICULTURAL PRODUCTIVITY	GAP for Irrigated Rice Production	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Soil erosion	PHYSICAL ENVIRONMENT	7
	GAP for Irrigated Banana Production	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Effects of Agricultural Chemical		7
	GAP for Cacao Production	2	2	2	2	2	2	2	2	3	2	2	1	1	25	Water Quality		25
	Institutional Collaboration to promote GAP	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Water Quantity		14
	Support to Nurseries and Grafting	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Water Quantity		14
	Irrigation systems water Users Ass. Capacity Building	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Natural Vegetation	BIOLOGICAL ENVIRONMENT	7
	Small-Scale Irrigation projects	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Effects on Aquatic Species		7
WATERSHED STABILITY IMPROVED	Hillside Watershed Stabilization above Irrigation systems	0	0	2	1	1	0	0	0	1	1	1	0	0	7	Three Bay Marine Protected Area	SOCIO-ECONOMIC ENV.	18
AGRICULTURAL MARKETS STRENGTHENED	Agro-forestry support to Cacao production	1	1	3	1	1	1	1	1	3	1	1	1	2	14	Increased Income		14
	Facilitate Post Harvest handling, storage and processing	1	1	2	1	1	1	1	1	1	1	1	1	1	14	Increased Access to Market	6	
INFRA	Promote the use of voucher as a market oriented subsidies mechanism	1	1	2	1	1	1	1	1	1	1	1	1	1	7	Historical & Cultural Resources	7	
	Well Fed Irrigation Systems	0	0	1	1	1	0	0	0	1	1	1	0	0	6			
	Gravity based Irrigation/Drainage Systems	0	0	1	1	1	0	0	0	2	1	1	0	0	7			
INTER + ADD Cumulative IMPACTS		7	7	25	14	14	7	7	7	18	14	14	6	7	147	TOTAL CUMULATIVE IMPACTS		147
RANKING : INTERACTIVE Cumulative IMPACTS -3 Strong Adverse Effect -2 Adverse Effect -1 Somewhat Adverse 0 Neutral or No Change +1 Somewhat Beneficial +2 Positive Effect/benefit +3 Strong Positive Effect/benefit		Soil Erosion	Effects of Agricultural Chemicals	Water Quality	Water Quantity	Natural Vegetation	Effects on Aquatic Species			Three Bay Marine Protected Area		Increased Income	Increased Access to Market	Historical & Cultural Resources	TOTAL CUMULATIVE IMPACTS	CONCLUSION		
		PHYSICAL ENVIRONMENT				BIOLOGICAL ENVIRONMENT				SOCIO-ECONOMIC ENVIRONMENT								

7. THRESHOLD RECOMMENDATIONS

As required by the amended IEE for AVANSE (LAC-IEE-14-17), this section of the PEA provides recommended threshold decisions for all AVANSE program activities (USAID 2014a, pp. 42-43). These recommendations are based on the analysis of Environmental Consequences presented in the preceding sections of the PEA.

CATEGORICAL EXCLUSION

The amended IEE identified the following categories of Categorical Exclusions:

- “(i) Education, technical assistance, or training programs except to the extent such programs include activities directly affecting the environment (such as construction of facilities, etc.)
- (v) Document and information transfers;
- (x) Support for intermediate credit institutions when the objective is to assist in the capitalization of the institution or part thereof and when such support does not involve reservation of the right to review and approve individual loans made by the institution.
- (xiv) Studies, projects, or programs intended to develop the capability of recipient countries to engage in development planning, except to the extent designed to result in activities directly affecting the environment (such as construction of facilities).

Capacity building of programs for Water User Associations (WUA).

Activities focusing on detailed physical/agricultural inventory of selected sub-watersheds.”

(USAID 2014a, pp. 41 and 42)

The following AVANSE activities fall into these categories and therefore are recommended for categorical exclusion:

- Intermediate Result 1: Agricultural Productivity Increased:
 - o Institutional Collaboration
 - o Capacitation and Creation of Water Users Associations
- Intermediate Result 2: Watershed Stability Improved:
 - o Protection of Critical Coastal Zones (Planning and Governance support)
 - o Environmental Education
 - o Health Insurance for Collaborating IR2 Farmers
- Intermediate Result 3: Agricultural Markets Strengthened:
 - o Provide Value Chain and Agro-Enterprise Analysis
 - o Improve Business Skills Training and Performance
 - o Improve Private Sector-Small Producer Linkages and Partnerships

- o Facilitate Market Linkages
 - o Increase Access to Financial Products
 - o Improve Market Information Systems
- All activities of Intermediate Result 4: Capacity Building Support to Implementing Partners.
- Information, Analysis, and Environmental Compliance Unit
 - o All activities except Weather Stations

NEGATIVE DETERMINATION

The following activities were assessed in this PEA and were found to have no potential for substantial adverse environmental effects and required no further environmental review; therefore they are recommended for Negative Determination.

- Intermediate Result 2: Watershed Stability Improved
 - o Procurement of Materials for Civil Protection Authorities
- Information, Analysis, and Environmental Compliance Unit
 - o Weather Stations

NEGATIVE DETERMINATION WITH CONDITIONS

The following activities were assessed in this PEA and were found to have minimal to medium adverse environmental impacts, but the impacts can be mitigated; therefore they are recommended for Negative Determination with conditions.

- Intermediate Result 1: Agricultural Productivity Increased
 - o Promoting Good Agricultural Practices through Farmer Field Schools
 - o Nursery and Grafting Support
 - o Establish small-scale irrigation projects
- Intermediate Result 2: Watershed Stability Improved
 - o Promoting Hillside Stabilization through Agroforestry
 - o Sub-Watershed Management and Governance
 - o Reforestation and Land Reclamation
 - o Nursery and Grafting Support
 - o Development of Pigeon Pea Value Chain
 - o Protection of Critical Coastal Zones (Mangrove Planting)
 - o Community Cisterns for Home Gardens
 - o Pilot Small-Scale Greenhouses
- Intermediate Result 3: Agricultural Markets Strengthened
 - o Facilitate Improved Post-Harvest Handling, Storage and Processing
 - o Promote the Use of Vouchers as a Market-Oriented Subsidy Mechanism
- Infrastructure
 - o Irrigation Projects not requiring increased surface water withdrawals (see site-specific EMPs and screening forms for the Dubré, Grison Garde, La Suisse and Ferrier/Bas Marihaboux irrigation systems in Annex J)

POSITIVE DETERMINATION

Two types of infrastructure activities were assessed in this PEA and were found to have potentially substantial or significant adverse environmental effects that could not be mitigated with generic mitigation measures. These activities require further analysis and assessment of alternatives before a conclusion can be formed on the significance of their impacts. They are recommended for Positive Determination:

- Irrigation projects requiring increased surface water withdrawals (see detailed assessments in the watershed chapter [chapter 6] as well as site-specific screening forms for the Robino, Chalopin, Garde Saline and La Suisse irrigation systems in Annex J)
- Major drainage construction that does not involve rehabilitation of existing drainage systems

At this time, we recommend that AVANSE does not proceed with any such initiatives.

8. ENVIRONMENTAL MANAGEMENT PLAN

AVANSE is a large and complex program, requiring numerous mitigation measures to address the potential impacts of all of its activities. The PEA proposes three general levels of environmental review with associated mitigation measures:

1. No site-specific environmental review, but application of mitigation measures in applicable umbrella EMPRs.
2. Site-specific in-house environmental review by AVANSE to determine if the location of the activity is environmentally acceptable and if the mitigation measures in the applicable umbrella EMPRs are sufficient. If the site is inappropriate, the activity will be withdrawn from consideration. If the mitigation measures in the applicable umbrella EMPR are insufficient to address the potential impacts, then the activity will fall into the third level of review (i.e., require a site-specific EMPR).
3. Site-specific EMPRs as per established USAID/LAC procedures.

Categories 1 and 2 will apply only in those cases where an approved umbrella EMPR exists. Category 1 will apply only to the following two types of activities:

- Non-infrastructure IR1 activities; and
- IR2 watershed stabilization activities.

The category 2 reviews will be conducted by the Environmental Compliance Team in coordination with the relevant IR Team. These reviews will be based on the USAID/LAC EMPR format, but will not require review or approval from USAID. The reviews will be kept in the AVANSE files and reported upon to USAID in the AVANSE quarterly reports.

The activities recommended for category 2 review are:

- IR3 processing facility grants for construction of less than 1,000 m² or for equipment installation
- Voucher program for fertilizer and other inputs and services (one-time, umbrella EMPR for each new input)
- Irrigation projects for less than 25 hectares reliant upon wells tapping the unconfined alluvial aquifer in the northern plain

The umbrella EMPRs for activities in Categories 1 and 2 are included in this PEA as annexes. The mitigation measures and monitoring requirements for these activities are included in the umbrella EMPRs. In addition, site-specific EMPRs for Grison Garde, Dubré and Bas Maribahoux irrigation systems and the Bas Limbé drainage site, as well as screening forms are included for some activities in categories 2 and 3 (see Annexes H-J). See the following Annexes for more information:

Annex F: Umbrella EMPR for IR1 Non-Infrastructure Activities

Annex G: Umbrella EMPR for IR2 Activities

Annex H: Umbrella EMPR for IR3 Grants (for construction of less than 1,000 m² or for equipment installation)

Annex I: Umbrella EMPR for IR3 Voucher Program for Fertilizer

The activities that will require site-specific EMPRs as per established USAID/LAC procedures are:

- Irrigation system rehabilitation that does not increase surface water diversions
- Any IR3 processing facility grants for construction greater than 1,000 m²
- The following types of activities if they occur within the boundaries of the Three Bays Marine Protected Area:
 - o Irrigation projects
 - o Road rehabilitation
 - o IR3 production and processing facility grants

Site-specific screening forms for 7 irrigation systems can be found in Annex J.

ANNEX A: LIST OF PREPARERS

Lane Krah, Team Leader

Lane Krah is an international environmental consultant, who for over 35 years has been providing leadership, technical expertise and training in natural resource and environmental management. During that time he has worked on projects in 31 countries in Central America, South America, Africa, Asia, Europe and the United States. Mr. Krah has experience in environmental impact assessment, natural resource management, water quality management, groundwater rights allocations, groundwater quality protection, environmental regulation development, solid waste management, hazardous waste management, and industrial pollution prevention and control. He has been involved in the preparation of environmental assessments for ten USAID projects as per 22-CFR-216. He holds a bachelor's degree in forest management from Northern Arizona University and a master's degree in public policy with an emphasis in environmental policy from Harvard University.

Tom Erdmann, Natural Resource Management Expert

Thomas K. Erdmann is an Agroforester, Community-Based Natural Resource Management and Forestry expert. He has worked overseas on environmental, conservation and agricultural projects and assignments in developing countries for most of the past 30 years. Countries of long-term experience include Guinea, Madagascar, Mali, Nigeria and Rwanda. From 1992 to 1996, Mr. Erdmann led the agroforestry component of USAID's Natural Resource Management Project in the Fouta Djallon highlands of Guinea. He worked for WWF from 1997 to 2004, first on a community forestry project in Madagascar and later as a member of WWF's Global Forest Program team. Before returning to DAI's home office in 2009, Mr. Erdmann managed conservation and development activities in the Ankeniheny-Zahamena landscape of Madagascar as part of USAID's Ecoregional Initiatives Program. Mr. Erdmann also served as COP on the USAID-funded Capitalizing Knowledge, Connecting Communities (CK2C) project from 2010 to 2013. He is currently a member of DAI's global Environment and Climate Change practice within the Technical Services unit. Mr. Erdmann holds a B.A. degree from the College of William and Mary and an M.S. from the University of Florida.

Pierre Rudolphe Leger, Engineer

Pierre Rudolphe Leger is a civil, sanitary, and environmental engineer who has worked in more than 50 countries in development projects. He earned his bachelor degree at City College of New York and his graduate and post graduate degrees at New York University and Delft Technical University in the Netherlands. He has held many posts including, President, Vice-President, and Senior Consultant in many firms in the US. As a civil engineer he has worked on many civil engineering projects in the US and abroad. He also worked as a consultant in many environmental projects including the preparation of Programmatic Environmental Assessments, Environmental Assessments, and the preparation of Environmental Mitigation and Monitoring Plans for the United States Agency for International Development, the InterAmerican Development Bank, the African Development, and the Government of Puerto Rico where he managed an environmental permitting section.

Yves-Francois Pierre, Sociologist, PhD

Yves-Francois Pierre over 30 years of experience designing and executing complex social, economic, agricultural and market research and surveys including land tenure, farming systems, farming communities, local governance, environment and commerce in rural and urban Haiti. He has provided these services for USAID, IDB, UN and other donor clients. Dr. Pierre has in depth knowledge and experience with M&E, and strong writing, communication, presentation and training skills. He is a problem solver and innovative thinker with strong analytical, team-leadership, planning and computer skills. He is experienced with information and analysis in Haiti's Northern Corridor and is at ease working and reporting in French, Creole and English..

Jean Marc Racine, Senior Environmental Officer, AVANSE

Jean Marc Racine is an environmental management and community planning professional with over 15 years of experience providing technical coordination and results-base project management services to inter-governmental and international organizations for countries of the Americas. He has experience in agricultural development and land tenure, social housing development, municipal wastes management, integrated coastal zone management, disaster risks reduction, climate change mitigation and adaptation, sustainable energy production, sound management of chemicals, integrated water resources management, environmental monitoring and evaluation, and environmental compliance requirements associated with USAID's 22-CFR-216. He has been involved in environmental assessment and M&E activities associated with housing and critical infrastructures interventions aimed at achieving resiliency against natural hazards. He holds an engineering degree in agricultural and environmental sciences with a focus in environmental management from Université Quisqueya, and a MS degree in Environmental Community Land Use Planning and Geographic Information Systems (GIS) from Syracuse University.

Ira Richards, Agronomist

Ira Richards is an agricultural development consultant with 30 plus years of experience in Latin and Central America, the Caribbean, Africa, the Trans Caucasus, and Central and South East Asia. He has worked for the USAID, FAO, IFAD, IDB and International NGO's for project design and evaluation, and project implementation, specializing in soil and water conservation, irrigation, and sustainable smallholder agriculture. He was involved in the preparation of an environmental assessment and of a PERSUAP for USAID. He has a B.Sc. and a M.Sc. degrees in Agronomy from New Mexico State University.

Jean Wiener, Biodiversity Expert

Jean Wiener has worked on environmental issues in general, and on coastal and marine issues in Haiti in particular for over 23 years. In 1992 Mr. Wiener founded Haiti's first coastal and marine environmental non-profit the Fondation pour la Protection de la Biodiversité Marine (FoProBiM) and retains his position at the head of the organization. As the director of FoProBiM he specializes in coastal and marine sciences, community development, and environmental management and has executed a wide range of projects including resource assessments, association building, environmental rehabilitation, community needs evaluations, as well as pure scientific research for institutions as diverse as the Ministry of Environment of Haiti, the UN (UNEP, UNDP, UNESCO, UNOPS), USAID, IDB, NOAA, and the OAS to name but a few. He

is also the national focal point in Haiti for the International Coral Reefs Initiative (ICRI), the Wider Caribbean Sea Turtle Network (WIDECAST), the Global Coral Reef Monitoring Network (GCRMN), NatureCaribe, and several International Union for the Conservation of Nature (IUCN) specialist groups. He has won environmental awards from Condé Nast, the Whitley Fund for Nature (2), and the Erick Eckman Award, one of Haiti's first ever environmental awards presented by the Ministry of Environment and the President. He holds a Bachelor's degree in biology from the University of Bridgeport in Connecticut, USA.

Jean Louis Charles Jolicoeur, Hydrologist, PhD

Jean Louis Charles Jolicoeur is a Hydrologist who has worked in Kenya, Afghanistan and in development projects for over 18 years. He earned his Bachelor's degree at the Ecole Nationale de Géologie Appliquée in Haiti. He obtained a post graduate diploma and a Master of Science degree at the Regional Meteorological Training Center in Israel and the International Institute for Aerospace Survey and Earth Science currently known as the Faculty of Geo-Information Science and Earth Observation of the University of Twente in the Netherlands. He obtained his PhD in Hydrology from the State University of New York at Binghamton. He was a post-doctoral associate at Florida International University conducting research on water-rock interactions associated with seawater intrusion into coastal carbonate aquifers. He has held many posts including, Water Resource Advisor and Water Team Leader in Afghanistan for the United States Agency for International Development, Consultant for the Caribbean Society for Water and Environment, and Lecturer at Broward College teaching Earth and Environmental Sciences.

Andrew Watson, Environmental Expert

Dr. Watson is a senior DAI staff member, has 30 years of experience in natural resource management (NRM), climate change adaptation, environmental policy and capacity building and, environmental impact assessment, and the use of remote sensing technology for environmental mapping. From 1999 to 2003, Dr. Watson was based in Malawi, where he managed USAID's Community Partnerships for Sustainable Resource Management (COMPASS) activity. COMPASS supported community-based natural resource management (CBNRM) in the forestry, fisheries, and wildlife sectors. The activity included facilitating policy reform and advocacy, building capacity through training and information services, improving coordination among CBNRM implementing agencies, and providing small grants to CBNRM practitioners. From 2010 to 2013, he managed USAID's Morocco Economic Competitiveness program – helping improve smallholder farmers' access to improve irrigation technologies and, thereby, enabling them to conserve water resources and reduce their vulnerability to climate change. The program also improved farmers' access to markets, strengthened regional business climate and helped women and youth find better jobs. Dr. Watson has also led two global initiatives: USAID's Prosperity, Livelihoods and Conserving Ecosystems (PLACE and REPLACE) and USAID's knowledge management initiative for NRM—Capitalizing Knowledge, Connecting Communities (CK2C)—which included management of the FRAME website connecting NRM practitioners worldwide. Dr Watson holds a D. Phil. in Geomorphology and a Masters of Arts in Geography.

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ANNEX C: SITES VISITED

The following table presents sites visited during the first iteration of the PEA (February and March 2015). Subsequent field visits were conducted by PEA team members during July 2015 but are not included in this table.

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Tom Erdmann, Lonège Ogisma	Feb.6	Jolitrou, Grande Rivière du Nord	2 soil conservation/ agroforestry plots	Esteval Pluvieuse	owner of 2nd plot was absent
Ira Richards Yves-François Pierre	Feb 16	Grison Garde Haut du Cap	Rice FFS	Group of farmers	
Ira Richards Lonège Ogisma	Feb. 16	Cayite, Haute du Cap	Banana FFS #3	Marie Claude Previl, Cineas Clovis, Renold Ome	
Ira Richards Lonège Ogisma	Feb. 17	Fage, Bas Limbé	Banana FFS Fage	Orne Leone, Altidor Price-Mars	
Ira Richards Lonège Ogisma	Feb. 17	Blain, Bas Limbé	Banana FFS Blain	Joseph Charles	
Ira Richards Lonège Ogisma	Feb. 18	Beaujoint, Grison Garde, Haut du Cap	Rice FFS Sa Change	Yranier Philistin, Felix Matthias, Placide Jean, Philistin Franclin	
Pierre Leger, Lane Krah, Ira Richards, Yves-François Pierre, Tom Erdmann	Feb. 18	Haut du Cap	Grison Garde Irrigation System	WUA members	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Pierre Leger, Lane Krah, Ira Richards, Yves-François Pierre, Tom Erdmann	Feb. 18	Haut du Cap	Grisson Garde Road	Road Association President	
Pierre Leger, Lane Krah, Tom Erdmann	Feb. 18	Haut du Cap	La Suisse Irrigation System	AVANSE Engineers	
Yves-François Pierre, PEA Team	Feb. 18	Haut du Cap	Irrigation canal and Rice Fields, Watershed Stabilization project	Association des Irrigants de Grison Garde (about 5 members)	
Ira Richards Pierre Leger	Feb. 19	Haut Madelaine, Marion	IR2 FFS in formation	Edouard Ivonie, Pierre Mei, Vincent Jackson Saint-Fleurs, Jean Claude Flomil	
Pierre Leger, Ira Richards	Feb. 19	Marion	Haut Madeleine Road	Farmers	
Pierre Leger, Ira Richards	Feb. 19	Trou du Nord	Juchereau Road	AVANSE Engineers	
Pierre Leger, Ira Richards	Feb. 19	Marion	Coicou Road	AVANSE Engineers	
Tom Erdmann, Jules Wilson	Feb.19	Les Perches, Marion	3 soil conservation/agroforestry plots; 1 demonstration small treated ravine (treated with gully plugs)	Aldoph Gezner	owner of 1st and 3rd plots were absent
Tom Erdmann, Jules Wilson	Feb.19	Acul Samedi, Marion	1 soil conservation/agroforestry plot	--	owner was absent
Ira Richards Lonège Ogisma	Feb. 23	Breda, Haut du Cap	Banana, FFS Breda	Yves Pierre (group of farmers)	
Ira Richards Lonège Ogisma	Feb. 23	Balen, Haut du Cap	Banana	Pierre Saint-Pierre	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Ira Richards, Michelet Amboise Banana Field Tech Lonège Ogisma	Feb. 23	Dubré, Haut du Cap	Rice (members of WUA) Irrigation system Dubré	Francisco Vixamar, Leo Jean, Yves Etienne	
Lane Krah, Jean-Osmy Chery	Feb. 23	Trou du Nord	Banana Chip Maker	Papita Pam, Edmond Janite, owner	
Lane Krah, Jean-Osmy Chery	Feb. 23	Trou du Nord	Artisanal Chocolate Producer	Choko Pam, Charles Edwin, owner	
Lane Krah, Jean-Osmy Chery	Feb. 23	Trou du Nord	Cacao Fermenter/ Exporter	PISA, Aline Etlicher, R&D Dept.	
Ira Richards Lonège Ogisma Lazarre Youvenex, Cacao Supervisor; Rodney Pierre, Cacao Supervisor; Ketline Benjamin Vixamar, Cacao Field Tech; Martial Marie-Therese, Cacao Field Tech	Feb. 24	Caré, Haut du Cap	Cacao FFS Care	Nicolas Wilson, Beaubouen Ylangilles, St.Hilaire, Laurent Antoine,; Laurent Eugene, ; Frisner Selmour,	
Pierre Leger	Feb. 24	Jassa	La Garègne to Latasse Road	AVANSE Engineers	
Pierre Leger	Feb. 24	Marion	Chalopin Irrigation System	AVANSE Agronomist	
Pierre Leger	Feb. 24 and Mar. 2	Jassa	Robino Irrigation System	WUA President	
Pierre Leger, Ira Richards	Feb. 24	Trou du Nord	Glaudine Pumping fields	AVANSE Engineers	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Ira Richards Lonege Ogisma Leosthene Joseph Beans & Maize Field Tech	Feb. 25	Le Chat, Caracol, Trou du Nord	Beans & Maize FFS Le Chat	Modes Emmanuel Nelson Jocelin Nelson Jose Nelson Antoine	
Romy Francois Beans & Maize Field Tech		Le Chat, Caracol, Trou du Nord	Beans & Maize FFS Koujol,	Pierre Claudin Rosnel Jousa Pierre DuSainvil	
Pierre Leger, Lane Krah, Ira Richards, Jean Wiener, Tom Erdmann	Feb. 25	Haut du Cap	Breda Ravine	AVANSE Engineers	
Hélène Kiremidjian, Lane Krah	Feb. 26	Quartier morin, Haut du Cap	Jaden lakay (distributor)	Doudy Pierre	
Hélène Kiremidjian, Lane Krah	Feb. 26	Vieux Bourg, Trou du Nord	Solisyon Agrikol (distributor)	Jasmine Pierre (not present)	
Hélène Kiremidjian, Lane Krah	Feb. 26	Ferrier, Jassa	Bel jaden (distributor)	Durosier Gérôme	
Hélène Kiremidjian, Lane Krah	Feb. 26	Ferrier, Jassa	Tout sezon Agrikol (distributor)	Francique Kendy	Bonne localisation; patente disponible; aménagement EC important a faire de la boutique pour respecter les bonnes pratiques EC recommandées par AVANSE

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Hélène Kiremidjian, Lane Krah	Feb. 26	Ouanaminthe, Jassa	Jaden lakay (distributor)	Doudy Pierre	
Hélène Kiremidjian, Lane Krah	Feb. 26	Malfety, Marion	Kay ti plantè (distributor)	Pierre Jean Mary	Bon candidat; patente disponible; effort d'aménagement fait depuis les dernières visites;
Hélène Kiremidjian, Lane Krah	Feb. 26	Fort-liberté, Marion	Erilien Multi service (distributor)	Bolivar Erilien	Localisation non adaptée; ne peut pas être affilié au SIBAT avec ce local (est située sur le toit d'une maison d'un particulier);
Ira Richards Lonege Ogisma	Feb. 26	Jalindor, Ft. Liberté, Marion	Rice, FFS	Adrien Pichen	
Jean Wiener	Feb. 26	Jassa	Lagon au Boeufs (Lago Bé)	Papito	Out on Lagoon in boat – Bohama in lake (<i>Tilapia mossambica</i>); shrimp also; Water salinity test = 5 PSU
Jean Wiener	Feb. 26	Jassa	Rice fields in Ferrier at lower Maribahoux	Mical, and Simon Ampner	Irrigation issues
Jean Wiener	Feb. 26	Jassa	Lac Won	Reno and 8+	Unidentified turtle in lake + Bohama/Tilapia nwa (<i>Tilapia mossambica</i>); Water level in lake is going down

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Jean Wiener	Feb. 26	Jassa	Lac Gabrielle - Near Robino	Henri Claude Noel, Bernard Noel	Water deviation upstream Anwo Maribaroux by AgroAction Alemand starting in 2005 has led to decreased water in the lake (lake level down approximately 2 m from normal according to Noels)...it has caused lack of water in lower Maribaroux while flooding other lands in upper Maribaroux and Maki Mara; Unidentified turtle in lake; <i>Tilapia mossambica</i> also found in lake
Ira Richards Tony Marcelli Tovar Michel Rudolph, Cacao Supervisor	Feb. 27	au Borgne	Cacao FFS Espoir de vivre	Louis Altidor, Osias Charles,	
Ira Richards Tony Marcelli Tovar Michel Rudolph, Cacao Supervisor	Feb. 27	Bois d'eau, Port Margot	FFS, OPBP (Organisation des Paysans de Bois d'eau Port-Margot)	Charles E. LiPhete, Charles Cuito, Jean Mari, Bernard Toussaint, Emmanuel Pierre, Jean Joydanis, Jean Charles Prelord, Daniel Dorsainvil, Joseph Damus, Pierre Francoeur	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Ira Richards Jean Bully Prophete, AVANSE Enqueteur Otilien Dade, Banana Field Tech	Mar. 2	Durohaut, Limonade, Grande Rivière du Nord	Banana, FFS Durohaut	Charles RoseMarie Thimothee Anoze Ivan Prophet	
Ira Richards Jean Bully Prophete, Enqueteur Jean Noel Jocelyn; Rice Field tech;	Mar. 3	Malfety, Ft. Liberte, Marion	Rice FFS Coucou 1, Rice FFS Chalopin	Victor Poline, Wilner Joseph, Adras Eugene,	
Ira Richards Jean Bully Prophete, Enqueteur	Mar. 5	Acul du Nord, Limbé	FFS Feb 2	Julnis Robert, Saintus Alberte,	
Tom Erdmann, Jules Wilson	Mar. 5	Savane Longue, Jassa	--	Dorvil Déjasma, Gilbert Julio, Saintélus St. Juste, Charles Jean-Claude	interview with members of PO that had applied for grant to expand IR2 soil conservation and agroforestry demonstrations
Tom Erdmann, Jules Wilson	Mar. 5	Gens de Nantes, Jassa	--	Merius Richard, Charles Rilma, Charles Mulion, Shilogene Delibert, Louisanne Polimus	interview with members of sub-watershed management body
Tom Erdmann, Jules Wilson	Mar. 5	Gens de Nantes, Jassa	--	--	visit to nursery of master grafter (did not record his name)

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Tom Erdmann, Jules Wilson	Mar. 5	Gens de Nantes, Jassa	3 soil conservation and agroforestry demonstrations	Milouse Pierre	owners/farmers at 1st and 3rd plots were absent
Ira Richards Jean Bully Prophete, Enqueteur Philippe Gonel Beans & Maize Field Tech Bonhomme Marie Velia Beans & Maize Field Tech	Mar. 6	Caracol, Trou du Nord	Beans & Corn FFS Group la Foumi	Jean Joseph, Group of farmers	
Ira Richards Jean Bully Prophete, Enqueteur Patrick Joseph Cacao Field Tech,	Mar. 6	Roche Plate, Trou du Nord	Cacao, FFS Fraternité	Ismajean Albense Pierre Thetandieu, Group of farmers	
Tom Erdmann, Rolande Pierre	Mar. 6	Camp Coq, Limbé	3 contiguous soil conservation and agroforestry demonstrations	Patrique Pierre, Therèse Pierre, Selondieu Pierre	
Tom Erdmann, Rolande Pierre	Mar. 6	Camp Coq, Limbé	--	Elnaud Bafaille, Luc Pierre	interview with members of SOLCAMA (sub-watershed management body)
Tom Erdmann, Rolande Pierre	Mar. 6	Camp Coq, Limbé	nurseries of master grafters	Jorel St. Hilaire, Gesner St. Hilaire, Ronel Cadet	
Tom Erdmann, Rolande Pierre	Mar. 6	outskirts of Cap Haitien, Haut du Cap	commercial nursery	Luc Sylvestre	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Ira Richards Dorilas Nixon, Beans & Maize Field Tech; Jacque Bony, Beans &Maize Field Tech;	Mar. 9	Bois du Lance, Grande Rivière du Nord	Beans and Maize, FFS Men Nan Men	Alcius Gilles dit Amos	
Ira Richards Jean Bully Prophete, Enqueteur Dorilas Nixon, Beans & Maize Field Tech; Jacque Bony, Beans &Maize Field Tech;	Mar. 9	Pichon, Bois du Lance, Grande Rivière du Nordf	Beans & Maize, FFS Fol Kole Le Pol	Jean Claude Altinador, Joseph Maliece Group of farmers	
Tom Erdmann, Rolande Pierre	Mar. 9	Grison Garde, Haut du Cap	3 soil conservation and agroforestry demonstrations; small ravine stabilization demonstration treated with gully plugs in area	Bastien Auriol, Jacques Ducette Fite	1st owner/farmer absent
Tom Erdmann, Rolande Pierre	Mar. 9	Grison Garde area, Haut du Cap	--	Devenique Elie Tiréus, Elie Walex Tiréus, Jacques Donat Lifaie	interview with members of PO (APABAM) that had applied for grant to expand soil conservation and agroforestry demonstrations
Tom Erdmann, Rolande Pierre	Mar. 9	Acul du Nord, Haut du Cap	--	Daniel Florival, Jean Jose, Lainé Schoubert Nicolas, Delius Denoyé, Dagobert Fernande	interview with members of sub-watershed management body
Tom Erdmann, Rolande Pierre	Mar. 9	Plaine du Nord, Haut du Cap	commercial nursery	Jernet Stanio	

Who was present (you and other team members)	Date of Visit	Watershed and/or Site	What was visited	Who did you see on-site	Other
Yves-François Pierre, Vilbert Félix	Mar. 9	Dubré, Haut du Cap	Irrigation canal	Association des Irrigants de Dubré (about 12 members)	
Yves-François Pierre, Vilbert Félix	Mar. 9	Grison Garde, Haut du Cap	--	Association des Irrigants de Grison Garde (about 8 members)	
Tom Erdmann, Jules Wilson	Mar. 10	Ste. Suzanne, Grande Rivière du Nord	--	David Laurin, Roseline Guerrier, Jacques Antoine	interview with members of sub-watershed management body
Tom Erdmann, Jules Wilson	Mar. 10	Ste. Suzanne, Grande Rivière du Nord	3 soil conservation and agroforestry demonstrations	Roseline Guerrier, Simon Yvon Pierre, Daniel Jean-Baptiste	
Tom Erdmann, Jules Wilson	Mar. 10	Ste. Suzanne, Grande Rivière du Nord	site proposed for reforestation with Communal Deputy	Daulman Pierrogene	
Tom Erdmann, Jules Wilson	Mar. 11	outskirts of Cap Haitien, Haut du Cap	commercial nursery	Carl-Heinz Loriston	
Tom Erdmann, Jules Wilson	Mar. 11	outskirts of Cap Haitien, Haut du Cap	(CTEAD) proposed for small greenhouse	--	owner/manager of site was absent
Yves-François Pierre, Vilbert Félix, Pierre Léger	Mar. 11	Haut du Cap	Irrigation Canal	Association des Irrigants de Dubré (about 12 members)	
Yves-François Pierre	Mar. 13	Gens de Nantes, Jassa	A Konbit of 15 working on an area where stabilization actions have taken place	Agronomist, a committee of 5 responsible for stabilization of watershed	
Pierre Leger, Yves-François Pierre	Mar. 17	Haut du Cap	Dubré irrigation System	WUA members	

ANNEX D: THREATENED SPECIES IN THE KBAS IN THE AVANSE PROJECT AREA

THREATENED ANIMALS AND PLANTS OF CÔTES DU NORD KBA. CR = CRITICALLY ENDANGERED, EN = ENDANGERED, VU = VULNERABLE ACCORDING TO THE IUCN RED LIST

CLASS	SPECIES	STATUS
AMPHIBIANS	<i>Hypsiboas heilprini</i> Noble, 1923	VU
	<i>Osteopilus pulchrilineatus</i> Cope, 1869	EN
	<i>Osteopilus vastus</i> Cope, 1871	EN
BIRDS	<i>Aratinga chloroptera</i> Souancé, 1856	VU
	<i>Corvus leucognaphalus</i> Daudin, 1800	VU
TREES	<i>Cedrela odorata</i> L.	VU
	<i>Cinnamomum triplinerve</i> (Ruiz & Pav.) Kosterm.	VU
	<i>Guaiacum officinale</i> L.	EN
	<i>Guaiacum sanctum</i> L.	EN
	<i>Hurtea cubensis</i> Griseb.	VU
	<i>Magnolia domingensis</i> Urb.	EN
	<i>Magnolia emarginata</i> Urb. & Ekm.	EN
REPTILES	<i>Senna domingensis</i> (Spreng.) H. S. Irwin & Barneby	VU
	<i>Caretta caretta</i> L., 1758	EN
	<i>Celestus warreni</i> Schwartz, 1970	CR
	<i>Chelonia mydas</i> L., 1758	EN
	<i>Cyclura cornuta</i> Bonnaterre, 1789	VU
	<i>Dermochelys coriacea</i> Vandelli, 1761	CR
	<i>Eretmochelys imbricata</i> L., 1766	CR
CRUSTACEANS	<i>Epilobocera haytensis</i> Rathbun, 1893	VU
FISH	<i>Balistes vetula</i> L., 1758	VU
	<i>Epinephelus striatus</i> Block, 1792	EN
	<i>Hippocampus erectus</i> Perry, 1810	VU
	<i>Hyporthodus flavolimbatus</i> Poey, 1865	VU
	<i>Hyporthodus nigritus</i> Holbrook, 1855	CR
	<i>Lachnolaimus maximus</i> Walbaum, 1792	VU
	<i>Lutjanus analis</i> Cuvier, 1828	VU
	<i>Lutjanus cyanopterus</i> Cuvier, 1828	VU
	<i>Mycteroperca interstitialis</i> Poey, 1865	VU
	<i>Thunnus obesus</i> Lowe, 1839	VU
SHARK	<i>Isurus oxyrinchus</i> Rafinesque, 1810	VU
CORAL	<i>Acropora cervicornis</i> Lamarck, 1816	CR
	<i>Acropora palmata</i> Lamarck, 1816	CR
	<i>Agaricia lamarcki</i> Edwards & Haime, 1851	VU
	<i>Dendrogyra cylindrus</i> Ehrenberg, 1834	VU
	<i>Dichocoenia stokesii</i> Edwards & Haime, 1848	VU
	<i>Montastraea annularis</i> complex ¹	VU
	<i>Mycetophyllia ferox</i> Well, 1973	VU
	<i>Oculina varicosa</i> Leseuer, 1821	VU
Endemic Species: Several live-bearing fish species of the <i>Limia</i> genus are Hispaniola island endemics that occur in fresh and brackish water bodies including <i>L. dominicensis</i>, <i>L. melanoagaster</i>, <i>L. melanotata</i>, <i>L. nigrofasciata</i> and <i>L. tridens</i>. These have not been assessed by IUCN. The purple copepod, <i>Mastigodiptomus purpureus</i> Marsh, 1907, VU, is found in freshwater systems of Haiti, but the extent of its range remains uncertain. <i>Eleutherodactylus limbensis</i>, the Haitian Streamside Frog, has not been assessed by IUCN, but is endemic to this area of North Haiti. ¹ Comprised of 3 species: <i>Montastraea annularis</i>, <i>M. faveolata</i> and <i>M. franksi</i>.		

THREATENED ANIMALS AND PLANTS OF LAGONS DU NORD-EST KBA. CR = CRITICALLY ENDANGERED, EN = ENDANGERED, VU = VULNERABLE ACCORDING TO THE IUCN RED LIST.

CLASS	SPECIES	STATUS
BIRDS	<i>Dendrocygna arborea</i> L., 1758	VU
TREES	<i>Guaiacum officinale</i> L.	EN
	<i>Guaiacum sanctum</i> L.	EN
CRUSTACEANS	<i>Epilobocera haytensis</i> Rathbun, 1893	VU
REPTILES	<i>Caretta caretta</i> L., 1758	EN
	<i>Chelonia mydas</i> L., 1758	EN
	<i>Crocodylus acutus</i> Cuvier, 1807	VU
	<i>Dermochelys coriacea</i> Vandelli, 1761	CR
	<i>Eretmochelys imbricata</i> L., 1766	CR
FISH	<i>Balistes vetula</i> L., 1758	VU
	<i>Epinephelus striatus</i> Block, 1792	EN
	<i>Hippocampus erectus</i> Perry, 1810	VU
	<i>Hyporthodus flavolimbatus</i> Poey, 1865	VU
	<i>Hyporthodus nigritus</i> Holbrook, 1855	CR
	<i>Lachnolaimus maximus</i> Walbaum, 1792	VU
	<i>Lutjanus analis</i> Cuvier, 1828	VU
	<i>Lutjanus cyanopterus</i> Cuvier, 1828	VU
	<i>Mycteroperca interstitialis</i> Poey, 1865	VU
	<i>Thunnus obesus</i> Lowe, 1839	VU
SHARK	<i>Isurus oxyrinchus</i> Rafinesque, 1810	VU
CORAL	<i>Acropora cervicornis</i> Lamarck, 1816	CR
	<i>Acropora palmata</i> Lamarck, 1816	CR
	<i>Agaricia lamarcki</i> Edwards & Haime, 1851	VU
	<i>Dendrogyra cylindrus</i> Ehrenberg, 1834	VU
	<i>Dichocoenia stokesii</i> Edwards & Haime, 1848	VU
	<i>Montastraea annularis</i> complex ¹	VU
	<i>Mycetophyllia ferox</i> Well, 1973	VU
	<i>Oculina varicosa</i> Leseuer, 1821	VU
Endemic Species: Several live-bearing fish species of the <i>Limia</i> genus are Hispaniola island endemics that occur in fresh and brackish water bodies including <i>L. dominicensis</i> , <i>L. melanoanogaster</i> , <i>L. melanotata</i> , <i>L. nigrofasciata</i> and <i>L. tridens</i> . These have not been assessed by IUCN. The purple copepod, <i>Mastigodiatomus purpureus</i> Marsh, 1907, VU, is found in freshwater systems of Haiti, but the extent of its range remains uncertain. ¹ Comprised of 3 species: <i>Montastraea annularis</i> , <i>M. faveolata</i> and <i>M. franksi</i> .		

THREATENED ANIMALS AND PLANTS OF PLAISANCE KBA. CR = CRITICALLY ENDANGERED, EN = ENDANGERED, VU = VULNERABLE ACCORDING TO THE IUCN RED LIST

CLASS	SPECIES	STATUS
AMPHIBIANS	<i>Eleutherodactylus sommeri</i> Schwartz, 1977	EN
	<i>Hypsiboas heilprini</i> Noble, 1923	VU
	<i>Osteopilus pulchrilineatus</i> Cope, 1869	EN
	<i>Osteopilus vastus</i> Cope, 1871	EN
BIRDS	<i>Aratinga chloroptera</i> Souancé, 1856	VU
	<i>Corvus leucognaphalus</i> Daudin, 1800	VU
TREES	<i>Cedrela odorata</i> L.	VU
	<i>Cinnamomum triplinerve</i> (Ruiz & Pav.) Kosterm.	VU
	<i>Magnolia domingensis</i> Urb.	EN
CRUSTACEANS	<i>Epilobocera haytensis</i> Rathbun, 1893	VU
REPTILES	<i>Celestus warreni</i> Schwartz, 1970	CR
Endemic Species: The purple copepod, <i>Mastigodiatomus purpureus</i> Marsh, 1907, VU, is found in freshwater systems of Haiti, but the extent of its range remains uncertain. <i>Eleutherodactylus limbensis</i> , the Haitian Streamside Frog, has not been assessed by IUCN, but is endemic to this area of North Haiti.		

THREATENED ANIMALS AND PLANTS OF MORNE BAILLY KBA. CR = CRITICALLY ENDANGERED, EN = ENDANGERED, VU = VULNERABLE ACCORDING TO THE IUCN RED LIST.

CLASS	SPECIES	STATUS
AMPHIBIANS	<i>Eleutherodactylus poolei</i> Cochran, 1938	CR
	<i>Eleutherodactylus schmidtii</i> Schwartz, 1923	CR
	<i>Eleutherodactylus somneri</i> Schwartz, 1977	EN
	<i>Hypsiboas heilprini</i> Noble, 1923	VU
	<i>Osteopilus pulchrilineatus</i> Cope, 1869	EN
	<i>Osteopilus vastus</i> Cope, 1871	EN
BIRDS	<i>Aratinga chloroptera</i> Souancé, 1856	VU
	<i>Corvus leucognaphalus</i> Daudin, 1800	VU
TREES	<i>Cedrela odorata</i> L.	VU
	<i>Cinnamomum triplinerve</i> (Ruiz & Pav.) Kosterm.	VU
CRUSTACEANS	<i>Epilobocera haytensis</i> Rathbun, 1893	VU
REPTILES	<i>Celestus warreni</i> Schwartz, 1970	CR
Endemic Species: The purple copepod, <i>Mastigodiptomus purpureus</i> Marsh, 1907, VU, is found in freshwater systems of Haiti, but the extent of its range remains uncertain. <i>Eleutherodactylus limbensis</i> , the Haitian Streamside Frog, has not been assessed by IUCN, but is endemic to this area of North Haiti.		

THREATENED ANIMALS AND PLANTS OF CITADELLE – GROTTES DONDON KBA. CR = CRITICALLY ENDANGERED, EN = ENDANGERED, VU = VULNERABLE ACCORDING TO THE IUCN RED LIST.

CLASS	SPECIES	STATUS
AMPHIBIANS	<i>Eleutherodactylus poolei</i> Cochran, 1938	CR
	<i>Eleutherodactylus schmidtii</i> Schwartz, 1923	CR
	<i>Eleutherodactylus somneri</i> Schwartz, 1977	EN
	<i>Hypsiboas heilprini</i> Noble, 1923	VU
	<i>Osteopilus pulchrilineatus</i> Cope, 1869	EN
	<i>Osteopilus vastus</i> Cope, 1871	EN
BIRDS	<i>Amazona ventralis</i> Müller, 1776	VU
	<i>Aratinga chloroptera</i> Souancé, 1856	VU
	<i>Corvus leucognaphalus</i> Daudin, 1800	VU
TREES	<i>Cedrela odorata</i> L.	VU
	<i>Cinnamomum triplinerve</i> (Ruiz & Pav.) Kosterm.	VU
	<i>Guaiacum officinale</i> L.	EN
	<i>Guaiacum sanctum</i> L.	EN
CRUSTACEANS	<i>Epilobocera haytensis</i> Rathbun, 1893	VU
REPTILES	<i>Celestus warreni</i> Schwartz, 1970	CR
Endemic Species: <i>Limia pauciradiata</i> is endemic to Grand Rivière du Nord. Several other Hispaniola island endemics of the same genus may occur in fresh water bodies of the area including <i>L. dominicensis</i> , <i>L. melanoanogaster</i> , <i>L. melanotata</i> , <i>L. nigrofasciata</i> and <i>L. tridens</i> . Neither the local endemic nor the island endemics have been assessed by IUCN. The purple copepod, <i>Mastigodiptomus purpureus</i> Marsh, 1907, VU, is found in freshwater systems of Haiti, but the extent of its range remains uncertain. <i>Eleutherodactylus limbensis</i> , the Haitian Streamside Frog, has not been assessed by IUCN, but is endemic to this area of North Haiti.		

ANNEX E: CONSULTATION WORKSHOP

Introduction and context

On March 4th, AVANSE and the PEA team organized a consultation workshop to present the PEA process and obtain feedback on perceived environmental impacts and the activities of other organizations in the AVANSE project zone. A total of 42 participants from 36 organizations attended the workshop (for details, see the list of participants at the end of this Annex). After presentations on the AVANSE project (overview and results to date) by Bertrand Laurent, AVANSE COP, and on the PEA process by Jean-Marc Racine, AVANSE Environmental Compliance Officer, the participants divided into four groups to consider the following questions:

- Identify the potential environmental impacts (of AVANSE activities) that the PEA must consider, and
- Identify current activities in the AVANSE project zone that should be considered in the PEA's evaluation of cumulative impacts.

Results of group work

After approximately 45 minutes of discussion, each group presented the results of their deliberations in plenary. The results are presented below.

Group 1:

Potential impacts

Agriculture (impact in parentheses):

- Water (availability), soil (erosion – negative; conservation – positive), biodiversity (agro-biodiversity – positive or negative), climate (CO₂ and water by trees, methane from animal husbandry – both can be positive or negative)

Irrigation (impact in parentheses):

- Water (management), climate (water management)

Chemical inputs (impact in parentheses):

- Water (quality), soil (quality), biodiversity (reduction or elimination of species), climate (increased greenhouse gases)

Road rehabilitation (impact in parentheses):

- Water (drainage), soil (conservation), biodiversity (habitat), noise (increase)

Current activities

- Irrigation (Action Agro Allemande, PPTA [rice])

- Beekeeping (SAE [Ministry of Commerce])
- Training of coffee cooperatives, Northeast Dept. (IRATAM, AFDI)
- Agroecology (Agrisud, Limbé watershed)
- Protection and management of the marine environment, including research and education, North and Northeast Depts. (Reef Check and FoProBiM)
- Mangrove protection (FoProBiM, Village Planète)
- Organic fertilizer (SOIL)
- Green Charcoal (Carbon Roots)
- Cacao (AVSF)
- Animal husbandry and nutrition (Veterimed)
- Fish farming (FAO)

Group 2:

Potential impacts

Increased agricultural production:

- Change in water availability
- Risk of deforestation
- Lower prices
- Food security
- Reduced rural exodus
- Environmental contamination (risk for humans)

Tenure security:

- Tenure conflicts

Training for entrepreneurs:

- Reduced unemployment
- Strengthened organizational capacity
- Technological knowledge transfer

Soil conservation:

- Added value to land
- Reduced flooding risk
- Reduced erosion

Current activities

- Marine and coastal protection, including mangroves, marine species, coral reefs (FoProBiM)
- Coastal zone protection (Village Planète)
- Seismic prevention plan, including soil mapping, evaluation of buildings (PNUD)
- Support for organic cacao production (AVSF/LMR)
- Soil conservation (Agro Action Allemande)
- Tenure security, land tenure conflict management (INARA)
- Groundnut cultivation, farmer training (MEDS and Food for Kids)

- Training for agricultural entrepreneurs (CTEAD)
- Promotion of touristic sites (Guahaba Museum)

Group 3:

Potential impacts

- Activities with potential negative impacts (impact in parentheses)
 - o Irrigation (drainage, soil salinization, increased pollution, community conflict)
 - o Roads (increased deforestation, rill erosion, pollution, road security, decreased biodiversity)
 - o Nurseries (use of plastic bags, pollution, lack of provenance and seed quality monitoring, use of pesticides)
- Activities with potential positive impacts (impact in parentheses)
 - o Irrigation (increased productivity, production spaced out over time, increased revenue)
 - o Roads (market access, reduced losses, improved economy, transport of food/food products)
 - o Nurseries (increased vegetative cover, seedlings available, increased revenue, promotion of entrepreneurial culture, contact with producers)

Key actors/initiatives in AVANSE project zone

- Agrisud International
- Gran No Pi Djam/American Red Cross
- Roi Henri Christophe University
- Veterimed
- PNUD
- Oxfam
- MARNDR/DDAN-DDANE
- Mayor's Offices/TPTC
- MDE
- FAO

Group 4:

Potential impacts

Agricultural production:

- Activities with potential negative impacts (impact in parentheses)
 - o Use of chemical fertilizer (Contamination of the water table from chemical products, salinization of soils over the long term, contamination of water resources from runoff coming from fertilized surfaces)
 - o Use of pesticides (Contamination of the water table from chemical products, contamination of water resources from runoff from treated surfaces)
 - o Mechanical soil preparation and maintenance (soil compaction, release of greenhouse gases into atmosphere (CO₂, CO, etc.))
- Activities with potential positive impacts (impacts in parentheses)

- o Use of compost (Reduction of dependence on chemical fertilizers and their negative environmental effects)

Agroforestry:

- Activities with potential negative impacts (impact in parentheses)
 - o Transformation facilities/activities, e.g., cassava transformation (poor solid waste management that could cause environmental pollution)
- Activities with potential positive impacts (impact in parentheses)
 - o Planting fruit trees (increased plant cover, increased farmer revenue, reduction of erosion, soil protection)
 - o Planting forestry trees (increased plant cover, increased farmer revenue, reduction of erosion, soil protection)
 - o Yam cultivation (increased plant cover, increased farmer revenue, reduction of erosion, soil protection)

Infrastructure:

- Activities with potential positive impacts (impact in parentheses)
 - o Rehabilitation of irrigation systems (improved use and availability of water resources)
 - o Ravine treatment/stabilization (reduced erosion)
 - o Road rehabilitation (transport facilitated)

Current activities

- Activities/initiatives that are underway and impacts (impacts in parentheses)
 - o Construction and operations of Caracol industrial park (significant use of water table/groundwater, significant solid and liquid waste production [including dangerous wastes])
 - o AgriTrans banana plantation, Trou du Nord (increased vegetative cover, creation of a micro-climate)
 - o Mangrove rehabilitation by Village Planète along coast of North and Northeast Departments (increased vegetative cover, increased marine products, increased agricultural production behind/inland from mangroves, protection of coastal housing, reduced risk of climate change, considerable reduction of marine intrusion, decreased migration of coastal bird species to other regions)

List of participants

1. Nelta Jean-Louis, American Red Cross
2. Diene Diouf, American Red Cross
3. Sibille Buehlmann, Haiti Hospital Appeal
4. Dolcé Obei, Village Planète
5. Denis Vincent, WFP
6. Maria Noisin, URHC
7. Ulysse Gerard, Mayor's Office, Cap Haitien
8. Erika Pierre-Louis, Reef Check

9. Wesley Toussaint, Resilience, Nord-NE
10. Alteon Yvon, Mayor, Cap Haitien
11. Snarly Colas, Veterimed
12. Frantz Estimable, Coord./Reg.
13. Rixamar Yvon, Fondation Vincent
14. Cherenfanz Wisner, Techn. MDENE
15. Myrtha Louisant, P.M. CRH
16. Sainvil Fritz, Mayor, Limbé
17. Widlin Florvil, FoProBiM
18. Jean Harald Lindor, CTEAD
19. Nadine Modestin, PIC/SONAPI
20. Fritz Prophete, Mayor, Milot
21. Regis H. Claude, OPAM
22. Juto Louis-Charles, SONAPI
23. Stéphanie Pierre, Ayiti Nexus
24. Kasia Szewcayk, Chamber of Commerce
25. Manasse Eliphete, Mayor's Office, Caracol
26. Charles Winshell, Agricultural Technician
27. Marion Duffieux, AFDI
28. Louis Juste Charles, Agrisud
29. Béothie Raphael, RFIC, INARA
30. Nicolas Salaon, Agrisud
31. Auguste Erice, DPANE
32. Edouard Noisin, URHC
33. Gina Fleurantin, BID
34. Charlito Louissaint, PNUD
35. Gregor Hodgson, Reef Check
36. Adele Bernard, MFK Haiti
37. Max Joseph Mesedor, DDARE
38. Donatien Djimps, PTTA/MARNDR
39. Hugues Mac-Henri Eyma, Agritech
40. Destiné Techlet, Church Pastor
41. Francko Riku Jean, Ministry of the Environment
42. Joseph Ruth Courtois, CCIPNE

ANNEX F: UMBRELLA EMPR FOR IR1 NON- INFRASTRUCTURE ACTIVITIES

Note: The narrative for this EMPR is embedded in the AVANSE Programmatic Environmental Assessment.

Activities Included

- Agricultural production technical assistance:
 - o SRI rice production techniques as previously implemented in USAID projects, or elsewhere;
 - o Cacao farmer field schools on previous USAID projects;
 - o Agricultural extension activities of NGOs, local educational institutions and private input supply houses;
 - o Use of remote cell-phone agricultural advice.
- Integrated Pest Management (IPM).
- Pesticide procurement, use, or recommendation on use in any project crop or coffee.
- Fertilizer use: use, procurement or recommendation of fertilizer use.
- Seed production:
 - o Nurseries/multiplication centers for rice, bananas/plantains, and cacao on less than 10 ha;
 - o Implementing partner seed multiplication;
 - o Tissue culture facility for bananas;
 - o Vegetative reproduction of cacao & fruit trees outside of tissue culture facility;
 - o Rapid multiplication techniques for selected banana varieties.

Table 1. Environmental Screening Form

Name of Activity:	IR1 Agricultural Activities (not including Infrastructure)	Column A	Column B	Col C	
Type of Activity:	Technical assistance, supply of inputs and training associated with demonstration plots				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	March 30, 2015				
IEE/ETD #:	LAC-IEE-14-17			High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?	X			X
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?		X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		X		
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?	X (cacao)			X
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?		X		
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	N/A	N/A	N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?	X			X
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Table 2. Identification of Mitigation Plan

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
3, 5, 9, 14, 19, 21	Agriculture production technical assistance	Project recommends agricultural technology with attendant risk resulting in contamination of waterways, degradation of soil quality, and erosion from agricultural land.	1. Write and distribute good agricultural practices (GAP) for each principal AVANSE crop (rice, bananas/plantains, and cacao) in two versions: technical sheet for staff, implementing partners (IPs), and extension agents; and farmer sheet for distribution to producers. 2. Incorporate into GAP and technical assistance: a. appropriate land use; b. agronomy practices; c. compliance with Rural Code land use restrictions; d. least-risk practices for each technology compatible with farmers short and long-term interests including land preparation (no till where appropriate); pest control (no pesticides or reduced reliance on pesticides, employing IPM whenever possible; compliance with Mission-wide PERSUAP and approved amendments) and production; and e. soil and water conservation measures (retaining natural vegetation, tree cover, planting trees, agro-forestry, and other conservation farming measures).
3	Pest control including pesticide procurement, use or recommendation.	Project staff or IP uses or procures pesticides not covered by PERSUAP with resulting environmental contamination.	1. All pesticide use shall be in the context of IPM. 2. Use and procurement of pesticides and technical assistance and training in the use of pesticides shall comply with the Mission-wide PERSUAP and approved amendments. 3. Pesticides Procurement Clearance Document provided in this EMPR shall be used prior to any procurement of pesticide with project funds.
3	Fertilizer procurement, use or recommendation.	Project recommends fertilizer use with attendant risk and nutrient level increase in local water courses.	1. Write and distribute GAP for Fertilizer Use in technical and extension forms to train farmers, implementing partners, and participating vendors covering: a. types of fertilizers, dosage levels, timing of applications and application techniques, b. decision to use or not use fertilizers for different types of farmer and crop (cost, benefit, risk), c. nutrient demands of principal crops, advantages of soils testing, and avoiding over-fertilizing, d. known highest risk practices, e. alternatives to synthetic fertilizers (organic manure, residues, household waste, crop rotation, use of legume cover crops or intercropping, choice of low-demand crops), f. complementary practices (soil cultivation, conservation tillage where appropriate, crop rotation, water harvesting, agroforestry, composting), g. Integrated Fertility Management practices to reduce need for synthetic fertilizers (with a goal of elimination of synthetic fertilizers in the rice value chain), h. how to read and use labels, i. proper handling, mixing, application, storage and disposal according to labels or GAP, j. prevention of fertilizer runoff and eutrophication of waterways, and k. no re-use of fertilizer containers and proper disposal of containers. 2. Incorporate information from the GAP for Fertilizer Use into technical assistance and training. 3. Conduct soil fertility survey and testing to ensure need for fertilizer use.

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
3, 5, 9, 14, 19, 21	Seeds production and farmer multiplication	Project recommends agricultural technology with attendant risk, including misuse of fertilizers and pesticides, incorrect selection of seeds.	1. Write and distribute GAP for Nurseries and Seed Multiplication in two versions: technical sheet for staff, IPs, and extension agents; and participant sheet for participating farmers and vendors. 2. Cover storage and use of agrochemicals in GAP. 3. At AVANSE-supported nurseries and seed multiplication, any pesticide procurement, use or recommendation shall be done in accordance with the mitigation measures for the "Pest control including pesticide procurement, use or recommendation" activity of this EMPR. 4. Training shall be provided in proper fertilizer use/application at AVANSE-supported nurseries and seed multiplication, in accordance with the mitigation measures for the "Fertilizer procurement, use or recommendation" activity of this EMPR. 5. No genetically modified organisms (GMOs) shall be procured, used, or recommended unless separately approved by USAID. 6. Each seed multiplier and nursery operator receiving financial assistance from AVANSE shall sign agreement to produce using GAP and complying with mitigation measures stated in the sub-contract or grant agreement. 7. Each seed multiplier shall agree to maintain records of distribution of all seed produced with project assistance.
31	Technical assistance and supply of inputs and training associated with demonstration plots	Project disproportionately favors men. Women involved unequally in project's activities.	1. AVANSE shall recruit women in project activities, by targeting 20-25% women's participation in focus crop FFSs and WUAs and will ensure that 40% of the investment in undeveloped dry lands benefits women.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Write and distribute GAP Agriculture for each principal AVANSE crop (rice, bananas/ plantains, cacao) in two versions: technical sheet for staff, IPs, extension agents and farmer sheet for distribution to producers.	Implementation IR1 Team Monitoring EC Team	GAPs produced and distributed. Technical Staff and Farmers in possession of GAPs.	Survey of Technical staff and farmers' knowledge of GAPs.	As GAPs and revisions/ refinements are produced, thereafter bi-annually.	GAPs produced by AVANSE staff crop specialists, only minimal cost for printed GAP sheets.	1 2 3 4			
2	Incorporate into GAP, technical assistance and training items a. through e.	Implementation IR1 Team Monitoring EC Team	GAPs applied; Farmers' incomes increased, no detrimental effects to environment or health of rural residents.	Survey of adoption rates by farmers, environmental impact, and farm family incomes	Bi-annually	No cost, normal obligation of salaried staff	1 2 3 4			
3	All pesticide use is in the context of IPM.	Implementation IR1 Team Monitoring EC Team	IPM in pesticide use GAP, applied in practice; level of non-compliance	Review of Pesticide GAP; Field survey of pesticide use practices	Monthly during crop cycle	No cost, normal obligation of salaried staff	1 2 3 4			
4	Use and procurement or pesticides and technical assistance and training in the use of pesticides shall comply with the Mission-wide PERSUAP and approved amendments.	Implementation IR1 Team Monitoring EC Team	Level of compliance with PERSUAPs; number of incidents of non-compliance	Review of FFS pesticide training curriculum; field inspections	Monthly during crop cycle	No cost, normal obligation of salaried staff	1 2 3 4			
5	Pesticides Procurement Clearance Document provided in this EMPT shall be used prior to any procurement of pesticide with project funds.	Implementation IR1 Team Monitoring EC Team	Pesticide procurement clearance document used	Examination of procurement records.	Bi annually	No cost, normal obligation of salaried staff	1 2 3 4			
6	Write and distribute GAP for Fertilizer Use in technical and extension forms to train farmers,	Implementation IR1 Team Monitoring	Fertilizer Use GAPs compliant with mitigations,	Examination of Fertilizer Use GAP, review of	When GAP is produced; whenever	No cost, normal obligation of	1			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	implementing partners, and participating vendors covering items a. through k.	EC Team	including IPM practices, written and distributed in two versions, for Farmers, and for vendors and technicians; Level of compliance.	FFS curriculum	revisions are made	salaried staff	2			
							3			
							4			
7	Incorporate information from the GAP for Fertilizer Use into technical assistance and training.	Implementation IR1 Team Monitoring EC Team	Training material includes information from Fertilizer use GAP; incidents of non-compliance	Visit FFS training sessions, inspection of training materials, fertilizer use GAP sheet for distribution to farmers	At beginning of training sessions, at monthly intervals through first crop cycle.	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
8	Conduct soil fertility survey and testing to ensure need for fertilizer use.	Implementation Auburn U Monitoring EC Team	Soil Fertility Maps produced; level of completion.	Soil Fertility Survey.	At completion of soil survey,	No additional cost for survey, activity underway.	1			
							2			
							3			
							4			
9	Write and distribute GAP for Nurseries and Seeds Multiplication in two versions: for use in technical and in extension version to train farmers, implementing partners, and participating vendors.	Implementation IR1 Team Monitoring EC Team	GAPs produced in two versions and distributed; Nurseries, seed multipliers in possession of GAPs.	Survey of targeted parties' knowledge of GAPs.	As GAPs, revisions/ refinements are produced, thereafter bi-annually.	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
10	Cover storage and use of agrochemicals in GAP.	Implementation IR1 Team	Coverage of PERSUAP agrochemicals	Inspection of nurseries and seed	As GAPs, revisions/	No cost, normal obligation of	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		Monitoring EC Team	storage and use norms in GAP; Presence in GAP	multiplication GAP	refinements are produced, bi-annually thereafter.	salaried staff	4			
11	At AVANSE-supported nurseries and seed multiplication, any pesticide procurement, use or recommendation shall be done in accordance with the mitigation measures for the "Pest control including pesticide procurement, use or recommendation" activity of this EMPR.	Implementation	Level of compliance with PERSUAP; number of incidents of non-compliance	Inspection of nurseries; inspection of nursery owner's records.	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			
12	Training shall be provided in proper fertilizer use/application at AVANSE-supported nurseries and seed multiplication, in accordance with the mitigation measures for the "Fertilizer procurement, use or recommendation" activity of this EMPR.	Implementation	Level of compliance with Fertilizer Factsheet; number of incidents of non-compliance	Inspection of nurseries and of nursery owner's records.	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			
13	No genetically modified organisms (GMOs) shall be procured, used, or recommended unless separately approved by USAID.	Implementation	Non-use of GMO's	Inspection of procurement records, interview field tech staff.	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			
14	Each seed multiplier and nursery operator receiving financial assistance from AVANSE shall sign agreement to produce using GAP and complying with mitigation measures stated in the sub-contract or grant agreement.	Implementation	GAP applied in seed production; number of incidents of non-compliance	Field survey of crop production practices, interview seed producer	Follow through crop cycle once a month	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			
15	Each seed multiplier shall agree to maintain records of distribution of all seed produced with project assistance.	Implementation	Records of seed sales and distribution; level of non-compliance	Examination of records	Bi annually	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
16	AVANSE shall recruit women in project activities, by targeting 20-25% women's participation in focus crop FFSs and WUAs and will ensure that 40% of the investment in undeveloped dry lands benefits women.	Implementation	Number of women participants/ beneficiaries; Level of change in participation demonstrated	Inspect lists of FFS and WUA participants, beneficiaries of pump irrigation systems, survey of farmers in AVANSE programs	Monthly during period of organization; bi-annually thereafter.	No cost, normal obligation of salaried staff	1			
		IR1 Team					2			
		Monitoring					3			
		EC Team					4			

Pesticide Procurement Clearance Form
(To be filled out by technical staff with procurement staff)

For what crop is the pesticide being procured?	
Is there a completed IPM plan for the crop or system for which the pesticide is being used or procured?	☐ Yes (If yes, where is it?) ☐ No (If no, stop.)
What pesticide, active ingredient and concentration are proposed?	
Where and when will the pesticide be used (be specific)?	
Are the crop, pesticide and use covered in the list of recommended pesticides in the approved PERSUAP or approved amendments?	☐ Yes ☐ No (If no, stop.)
Explain the Project use of the pesticide (research, demonstration, seed multiplication, voucher, etc.):	
Quantity being purchased:	
Area on which the quantity is to be used?	____ hectares
Is the quantity being purchased appropriate for the area to be treated?	☐ Yes ☐ No (If no, explain.)
Will safety equipment such as personal protective equipment be on site prior to use?	☐ Yes ☐ No (If no, stop.)
Will safe application training be done prior to use?	☐ Yes (If yes, by whom or how?) ☐ No (If no, stop.)
Is there provision for an activity log covering the use of the pesticide?	☐ Yes ☐ Not applicable (not under control of AVANSE or IPs) ☐ No (If no, stop.)
How will training, safe use and issues be monitored?	Explain: Who will review the activity log?
Clearances:	Name, date and sign:
Person filling this form and date	
Project technical staff supervisor	
Project Environmental Officer or COP and date	
Procurement manager: information provided and procurement may proceed	

ANNEX G: UMBRELLA EMPR FOR IR2 ACTIVITIES

Note: The narrative for this EMPR is embedded in the AVANSE Programmatic Environmental Assessment.

Activities Included

- Agroforestry demonstration blocks
- Sub-watershed management and governance
- Reforestation and land reclamation
- Nursery support
- Grafting support

Table 1. Environmental Screening Form

Name of Activity: IR2 Watershed Stabilization		Column A	Column B	Col C	
Type of Activity: Technical assistance, supply of inputs and training associated with demonstration plots				If answered yes to Col. A. is it a--?	
Contractor/Grantee: DAI		Yes	No	High Risk	Medium-Risk
Date: March 30, 2015					
IEE/ETD #: LAC-IEE-14-17					
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?	X			X
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?		X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)		X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		X		
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?	X			X
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?		X		
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?		X	N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Table 2. Identification of Mitigation Plan

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
5, 14, 15, 19, 21	Agroforestry demonstration blocks Expansion of soil conservation and agroforestry systems	Contour structures and associated agroforestry plots may pose erosion risk if not technically correct. Increased erosion if converting pasture/fallow to agroforestry demonstration or with excessive soil disturbance when installing agroforestry demonstrations, especially on steepest slopes (> 30%), or when reforesting a degraded area. Increased sediment load in water resources due to increased erosion.	1. Continue to promote and implement integrated soil conservation package 2. Ensure vetiver is planted along every other contour bund (alternating) on steepest slopes (> 30%) plots 3. Minimum tillage and minimum soil disturbance when installing agroforestry plots on steepest slopes (> 30%) or when planting trees in reforestation efforts 4. Avoid conversion of plots used for pasture or plots with 2 or more years of fallow remaining to agroforestry demonstrations 5. Keep soil covered, especially on steepest slopes (> 30%) when installing agroforestry plots or planting trees for reforestation, using crop residue, weeds, or other biodegradable mulch 6. Plant agroforestry tree seedlings directly into old fallow plots
		Reduction of land available to grow food crops	1. Avoid installing agroforestry plots with farmers who only own one agricultural field or ensure that such farmers either have an additional income source or a strategy to continue producing full sun food crops on agroforestry plot 2. When expanding soil conservation and agroforestry systems, ensure that adequate land remains for food crop production
5, 14, 15, 19, 21	Sub-watershed management and governance	Watershed plans misidentify proper land use/inappropriate zoning and/or increase pressure on vestige natural ecosystems or mature agroforests. Improperly conceived and implemented small projects might cause erosion, reduction of vestige natural forests or mature agroforests, or creation of land use conflict.	1. Training in land use planning, environmentally- and socially-sound zoning, and environmentally-sound small projects (identified from SWMPs) 2. Supervision and technical oversight of sub-watershed management plan development and implementation 3. Supervision and technical oversight regarding identification and implementation of small projects (derived from SWMPs) 4. Goals, actions, training of SWMBs must recognize environmental conditions, risks, biodiversity hot spots, mangroves, forests (if any), conflict, common property resources and land tenure issues that may be affected by zoning
5, 14, 15, 19, 21	Reforestation	Species planted are mismatched to site conditions. Tree ownership may not concord with land ownership.	1. Develop, promote and implement a technically sound package for reforestation (similar to good agricultural practices or GAPs under IR1) 2. Ensure species planted are suitable to site conditions; hardy species (e.g., <i>Acacia auriculiformis</i>) must be planted on heavily degraded sites 3. Clear ownership of trees established in design phase of each reforestation site
5, 14, 15, 19, 21	Development of Pigeon Pea value chain	Increased erosion due to harvesting methods of pure Pigeon Pea stands.	1. Intercrop Pigeon Pea or avoid harvesting pure stands simultaneously

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
3, 5, 19	Nursery support; small-scale greenhouses	Improper use/application of pesticides; use of non-approved pesticides; improper use/application of fertilizers.	1. Write and distribute good agricultural practice (GAP) for nurseries and greenhouses in two versions: technical sheet for staff, IPs, and extension agents; and participant sheet for participating farmers and vendors. 2. Cover storage and use of agrochemicals in GAP. 3. At AVANSE-supported nurseries and small-scale greenhouses, any pesticide procurement, use or recommendation shall be done in accordance with the mitigation measures for the "Pest control including pesticide procurement, use or recommendation" activity of the IR1 Agrigultural Activities (non-infrastructure) EMPR. 4. Training shall be provided in proper fertilizer use/application at AVANSE-supported nurseries and small-scale greenhouses, in accordance with the mitigation measures for the "Fertilizer procurement, use or recommendation" activity of the IR1 Agrigultural Activities (non-infrastructure) EMPR. 5. No genetically modified organisms (GMOs) shall be procured, used, or recommended unless separately approved by USAID. 6. Each nursery and greenhouse operator recieving financial assistance from AVANSE shall sign agreement to produce using GAP and complying with mitigation measures stated in the sub-contract or grant agreement.
5	Grafting	Diseases introduced into grafted trees and seedlings	1. Train grafters on proper cleaning and sterilization of grafting tools (knives, pruning shears, etc.)

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Continue to promote and implement integrated soil conservation package	Implementation	# of training sessions with local communities or farmers based on integrated package; # of complete demonstration plots established	Inspection of IR2 records; Field inspections of demonstration plots	Bi-annual	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
2	Ensure vetiver is planted along every other contour bund (alternating) on steepest slopes (> 30%) plots	Implementation	# of vetiver culms planted; survival rate of vetiver culms; # of breaches observed in vetiver hedgerows	Inspection of IR2 records; field inspections	Quarterly	\$5,000 (Cost of additional vetiver culms); No capital costs foreseen	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
3	Minimum tillage and minimum soil disturbance when installing agroforestry plots on steepest slopes (> 30%) or when planting trees in reforestation efforts	Implementation	# of rills and gullies observed in agroforestry plots or reforestation sites ¹²	Field inspections	Quarterly	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
4	Avoid conversion of plots used for pasture or plots with 2 or more years of fallow remaining to agroforestry demonstrations	Implementation	# of incidents of conversion of pasture or fallow land ¹³	Inspection of IR2 records	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			

¹² This is both an implementation and effectiveness indicator.

¹³ This is both an implementation and effectiveness indicator.

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
5	Keep soil covered, especially on steepest slopes (> 30%) when installing agroforestry plots or planting trees for reforestation, using crop residue, weeds, or other biodegradable mulch	Implementation	# of observations of bare soil; # of observations of crop residue, weeds or mulch covering soil	Field inspection	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
6	Plant agroforestry tree seedlings directly into old fallow plots	Implementation	# of seedlings planted into fallow plots; # of incidents of cleared fallow	Field inspection	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
7	Avoid installing agroforestry plots with farmers who only own one agricultural field or ensure that such farmers either have an additional income source or a strategy to continue producing full sun food crops on agroforestry plot	Implementation	# of agricultural plots of participating farmers; # of incidents of farmers with single field (and no supplemental income or strategy)	Inspection of IR2 records; surveys of beneficiaries	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
8	When expanding soil conservation and agroforestry systems, ensure that adequate land remains for food crop production	Implementation	Area of land available for food crop production (within IR2 expansion zone) ¹⁴	Inspection of IR2 records and geo-spatial data	Bi-annually	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
9	Training in land use planning, environmentally- and socially-sound zoning, and environmentally-sound small projects (identified from SWMPs)	Implementation	# of trainees; # of environmentally-sound small project proposals developed	Inspection of IR2 records; inspection of small project proposals (to be scored on environmental	Bi-annually	\$5,000 (Cost of training materials); no other capital costs foreseen	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			

¹⁴ This is both an implementation and an effectiveness indicator.

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
				soundness)						
10	Supervision and technical oversight of sub-watershed management plan development and implementation	Implementation IR2 Team Monitoring EC Team	# of supervisory assessments of plans during development; # of environmentally-sound plans developed	Inspection of IR2 records; inspection of plans (to be scored on environmental soundness)	Bi-annual	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
11	Supervision and technical oversight regarding identification and implementation of small projects (derived from SWMPs)	Implementation IR2 Team Monitoring EC Team	# of supervisory assessments of plans during small project development; # of environmentally-sound small project proposals developed	Inspection of IR2 records; inspection of small project proposals (to be scored on environmental soundness)	Bi-annual	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
12	Goals, actions, training of SWMBs must recognize environmental conditions, risks, biodiversity hot spots, mangroves, forests (if any), conflict, common property resources and land tenure issues that may be affected by zoning	Implementation IR2 Team Monitoring EC Team	# of environmental and social issues included in training modules; # of environmentally-sound SWMPs developed	Inspection of training module content; inspection of SWMPs (to be scored on environmental soundness)	Bi-annual	\$5,000 (costs of training materials); no other capital costs foreseen	1			
							2			
							3			
							4			
13	Develop, promote and implement a technically sound package for reforestation (similar to good agricultural practices or GAPs under IR1)	Implementation IR2 Team Monitoring EC Team	# of training sessions with local communities or farmers based on reforestation package; % of seedling survival in reforestation plots	Inspection of IR2 records; field inspections of species survival	Bi-annual	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
14	Ensure species planted are suitable to site conditions; hardy species (e.g., <i>Acacia auriculiformis</i>) must be planted on heavily degraded sites	Implementation	# of species-site evaluations; # of inappropriate species planted on heavily degraded sites	Inspection of IR2 records; field inspections of planted species (list of species appropriate for different sites to be developed)	Bi-annual	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
15	Clear ownership of trees established in design phase of each reforestation site	Implementation	# of reforestation site designs with tree tenure clauses; # of incidents of tree tenure conflicts	Inspection of IR2 records; beneficiary surveys	Bi-annual	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
16	Intercrop Pigeon Pea or avoid harvesting pure stands simultaneously	Implementation	# of intercropped and pure stands of Pigeon Pea; # of incidents of simultaneous harvesting of pure stands	Inspection of IR2 records; beneficiary surveys	Bi-annual	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
17	Write and distribute good agricultural practice (GAP) for nurseries and greenhouses in two versions: technical sheet for staff, IPs, and extension agents; and participant sheet for participating farmers and vendors.	Implementation	GAPs produced in two versions and distributed; nursery and greenhouse operators in possession of GAP.	Survey of targeted parties' knowledge of GAP	As GAP, revisions/ refinements are produced, thereafter bi-annually.	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			
18	Cover storage and use of agrochemicals in GAP.	Implementation	Coverage of PERSUAP agrochemicals storage and use norms in GAP; Presence in GAP	Inspection of nurseries and greenhouses GAP	As GAPs, revisions/ refinements are produced, bi-annually thereafter.	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
19	At AVANSE-supported nurseries and small-scale greenhouses, any pesticide procurement, use or recommendation shall be done in accordance with the mitigation measures for the "Pest control including pesticide procurement, use or recommendation" activity of the IR1 Agrigultural Activities (non-infrastructure) EMPR.	Implementation IR2 Team Monitoring EC Team	Level of compliance with PERSUAP; # of incidents of non-compliance with PERSUAP	General inspection; inspection of nursery owner and greenhouse operator records	Quarterly	\$5,000 (Cost of materials to be used in training (including personal protection equipment)); No other capital costs foreseen	1 2 3 4			
20	Training shall be provided in proper fertilizer use/application at AVANSE-supported nurseries and small-scale greenhouses, in accordance with the mitigation measures for the "Fertilizer procurement, use or recommendation" activity of the IR1 Agrigultural Activities (non-infrastructure) EMPR.	Implementation IR2 Team Monitoring EC Team	Level of compliance with procedures learned during training ¹⁵	General inspection; inspection of nursery owner and greenhouse operator records	Bi-annually	\$5,000 (Cost of materials to be used in training); No other capital costs foreseen	1 2 3 4			
21	No genetically modified organisms (GMOs) shall be procured, used, or recommended unless separately approved by USAID.	Implementation IR2 Team Monitoring EC Team	Non-use of GMO's	Inspection of procurement records, interview field tech staff.	Bi-annually	No cost, normal obligation of salaried staff	1 2 3 4			
22	Each nursery and greenhouse operator receiving financial assistance from AVANSE shall sign agreement to produce using GAP and complying with mitigation measures stated in the sub-contract or grant agreement.	Implementation IR2 Team Monitoring EC Team	GAP applied at nurseries and greenhouses; Number of incidents of non-compliance	Field survey of nursery and greenhouse practices	Bi-annually	No cost, normal obligation of salaried staff	1 2 3 4			

¹⁵ This is both an implementation and an effectiveness indicator.

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
23	Train grafters on proper cleaning and sterilization of grafting tools (knives, pruning shears, etc.)	Implementation	Training materials developed and delivered Grafters applying techniques	Review of material and spot visits at training Observation of grafters	When materials are developed Periodic spot checks	No cost, normal obligation of salaried staff	1			
		IR2 Team					2			
		Monitoring					3			
		EC Team					4			

ANNEX H: UMBRELLA EMPR FOR IR3 GRANTS

Notes: The narrative for this EMPR is embedded in the AVANSE Programmatic Environmental Assessment. The EMPR begins with 13 site-specific screening forms (Table 1) which were completed by the PEA team in collaboration with AVANSE staff. Please see the comments box at the end of each form for specific details on each site. These forms correspond to sites that are already planned or known. It is possible that additional sites will be identified after the approval of the present PEA. Any and all additional sites will be subjected to the same screening process, which will identify the required mitigation measures.

Activities Included

- Small-scale construction of less than 1,000 m² for processing or storage.
- Existing structure rehabilitation for processing or storage.
- Processing equipment procurement and installation within structures (e.g., rice milling equipment, cacao fermenting and sorting equipment, artisanal chocolate milling equipment, equipment for washing and packing bananas, and packaging labelling equipment).
- Equipment and material (e.g., seed, fertilizer, and pesticides) for nurseries and grafting operations that support IR1 and IR2 activities (as presented above in the IR1 and IR2 descriptions).
- Equipment for agro-production service providers.
- On-site (preliminary) processing equipment for producers (e.g., cacao drying tables for cacao farmers).

Table 1. Environmental Screening Form

Name of Activity:	AFCJBC Cacao & Fruit Processing, Grande Rivière du Nord, Grande Rivière du Nord Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The activity consists of processing cacao beans into raw chocolate bars, cacao liquor and processing fruits into jams and jellies. The enterprise is an association of women cacao producers (50 members) named “Association Femmes Coopérative Jean-Baptiste Chavanne” (AFCJBC). The activity will take place in an existing building of less than 100 m². AVANSE intends to subsidize some of the equipment required for this project (i.e., cacao roaster, cacao grinder, cooking materials and accessories for fruit processing, and a 10 kw generator). This equipment is valued at USD \$67,000 (approximately). The approximate footprint of the equipment (at ground level) is 8 m².

Key environmental mitigation actions:

- Proper siting of generator to reduce noise and exposure of workers to exhaust.
- Proper ventilation of facility to reduce effects of dust and heat.
- Proper disposal of organic waste via a reduce, reuse and recycle program.

Table 1. Environmental Screening Form

Name of Activity:	Agrotech Cacao & Peanut Processing, Perches, Marion Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing			Yes	No
Contractor/Grantee:	DAI	High Risk	Medium-Risk		
Date:	April 20, 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?		X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		X		
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?		X		
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is Agrotech. Agrotech is a private enterprise owned by Pascal Desorme and is involved in the processing of peanut and cacao as well as banana, maize and honey. The project consists of increasing the production capacity of the company with the purchase of new equipment. AVANSE plans to assist with investments in the following equipment: cacao grinder, cacao roaster, cacao oil extractor, cacao sorter, peanut grinder, generator and other production accessories. This equipment is valued at USD \$46,000 (approximately). The approximate footprint of the equipment (at ground level) is 10 m².

Key environmental mitigation actions:

- Proper siting of generator to reduce noise and exposure of workers to exhaust.
- Proper ventilation of facility to reduce effects of dust and heat.
- Proper disposal of organic waste via a reduce, reuse and recycle program.

Table 1. Environmental Screening Form

Name of Activity:	Delasol Cacao Processing, Plaisance, Borgne Cacao Extension Area (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is Delasol. Delasol is a private enterprise owned by Stephanie Reynolds and Thelisma Gracia and focused on cacao processing for chocolate production. The purpose of the present project is to increase production capacity and quality by purchasing new equipment and production infrastructure improvements for processing cacao into chocolate. AVANSE plans to assist with investments in the following equipment: cacao roaster, cacao press, cacao bean cracker, air conditioner, and generator. This equipment is valued at USD \$50,000 (approximately). The approximate footprint of the equipment (at ground level) is 15 m². Some production infrastructure improvements are also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper disposal of organic waste via a reduce, reuse and recycle program.

Table 1. Environmental Screening Form

Name of Activity:	Erilien MS Ploughing & Irrigation Services, Fort Liberté, Marion Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?	X			X
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is Erilien Multiservices. This is a private enterprise owned by Bolivar Erilien and focusing on sales of seeds, fertilizer and ploughing services. The current project consists of acquiring equipment to offer ploughing and irrigation services. AVANSE plans to assist with investments in the following equipment: motorized water pumps, motorized cultivators, and a tractor. This equipment is valued at USD \$50,000 (approximately). The approximate footprint of the equipment (at ground level) is 22 m².

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Proper management of noise levels and exhaust associated with use of motorized equipment.

Table 1. Environmental Screening Form

Name of Activity:	G&G Rice Milling, Ferrier, Jassa Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is G&G Agroentreprise. This is a private enterprise owned by Gerald Nelson and focused on rice processing. The current project consists of increasing the processing capacity of an existing rice mill by purchasing new equipment and some infrastructure improvements to the building. AVANSE plans to assist with investments in the following equipment: rice mill, rice sorter, rice grader, rice polisher, silos, and generator. This equipment is valued at USD \$186,000 (approximately). The approximate footprint of the equipment (at ground level) is 20 m². Warehouse improvements are also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper siting of generator and ventilation of facility to reduce noise and exposure of workers to exhaust, dust and heat.
- Proper disposal of organic waste via a reduce, reuse and recycle program.

Table 1. Environmental Screening Form

Name of Activity:	GRADES Ploughing Equipment Manufacturing, Quartier Morin, Haut du Cap Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is Groupe de Recherche et d'Action pour le Développement Economique et Social (GRADES). The organization is an association directed by Jude Regis and focusing on small agricultural machinery production. The current project consists of purchasing additional machinery for the fabrication of small animal traction ploughing equipment. AVANSE plans to assist with investments in the following equipment: metal work machinery. This equipment is valued at USD \$100,000 (approximately). The approximate footprint of the equipment (at ground level) is 10 m². Extension of the warehouse is also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	OFASO Banana Flour Production, Cap Haitien, Haut du Cap Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)		X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?	X		N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is a women's organization (association) called OFASO. The association is focused on cassava processing and marketing of beans. The goal of the present project is to increase production capacity for production of banana flour and chips. AVANSE plans to assist with investments in the following equipment: small banana processing equipment, mill, and generator. This equipment is valued at USD \$70,000 (approximately). The approximate footprint of the equipment (at ground level) is 14 m². Warehouse construction for banana storage is also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	PISA Cacao Fermentation, Acul du Nord, Haut du Cap Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	April 20, 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?		X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		X		
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?		X		
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?	X		N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is Produits des Iles S.A. (PISA). This is a private enterprise owned by REBO S.A. and focused on coffee export and cacao fermentation and export. The present project consists in increasing the cacao fermentation capacity of PISA by building a new 50m² fermentation warehouse and purchasing wooden fermentation crates. AVANSE plans to assist with investments in the following equipment: wooden fermentation crates. This equipment is valued at USD \$58,000 (approximately).

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	RAFAVAL Cacao Processing, Limonade, Grande Rivière du Nord Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?		X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?		X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		X		
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?		X		
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is a women's organization (association) named Rasambleman Fanm Vayan Limonad (RAFAVAL). The association has approximately 300 members and is focused on processing cacao into raw chocolate, as well as fruit processing for jams and jellies. The current project consists of increasing the processing capacity and quality of their cacao products. AVANSE plans to assist with investments in the following equipment: cacao roaster, cacao huller, cacao grinder, cacao powder machine, and cacao powder packaging. This equipment is valued at USD \$100,000 (approximately). The approximate footprint of the equipment (at ground level) is 15 m².

Key environmental mitigation actions:

- Proper disposal of organic waste via a reduce, reuse and recycle program.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	SANDIDI Cacao Processing, Cap Haitien, Haut du Cap Watershed (IR3 Grants for construction of <1,000 m ² and/or installation of equipment)	Column A	Column B	Col C			
Type of Activity:	Small-scale construction and equipment installation for agricultural product handling, storage and processing			Yes	No	If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI					High Risk	Medium-Risk
Date:	April 20, 2015						
IEE/ETD #:	LAC-IEE-14-17						
IMPACT ON NATURAL RESOURCES & COMMUNITIES							
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X				
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X		
4	Involve the construction of repair of irrigation systems?		X				
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X				
6	Involve the construction or repair of fish ponds?		X				
7	Involve the disposal of used engine oil?	X			X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X				
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X		
12	Will the activity create objectionable odors?		X				
13	Will the activity violate air standard?		X				
14	Will the activity occur on steep slopes (Greater than 15%)?		X				
15	Will the activity contribute to erosion?	X			X		
16	Is the activity incompatible with existing land use in the vicinity?		X				
17	Will the activity contribute to displacement of people (housing) or businesses?		X				
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X				
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X		
20	Will the activity contribute to change in the amount of surface water in any water body?		X				
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X		
22	Will the activity expose people or property to flooding?		X				
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X				

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring.		
² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.		
³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.		
⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).		
⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this short-listed grant is a private enterprise named Sandidi. The enterprise is owned by Sandra Prosper and focuses on processing cacao into raw chocolate. The objective of the present project is to increase the processing capacity and quality of cacao products. AVANSE plans to assist with investments in the following equipment: cacao roaster, cacao huller, cacao grinder, cacao powder machine, cacao powder packaging, and cacao oil extractor. This equipment is valued at USD \$64,000 (approximately). The approximate footprint of the equipment (at ground level) is 15 m². Warehouse repair is also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	Bonnefil/Banamiel Banana Export, Limonade, Grande Rivière du Nord Watershed (IR3 Grants under Collaboration Agreement)	Column A	Column B	Col C			
Type of Activity:	Small-scale construction (<1,000 m ²) and equipment installation for agricultural product handling, storage and processing			Yes	No	If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI					High Risk	Medium-Risk
Date:	April 20, 2015						
IEE/ETD #:	LAC-IEE-14-17						
IMPACT ON NATURAL RESOURCES & COMMUNITIES							
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X				
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X		
4	Involve the construction of repair of irrigation systems?	X			X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?	X			X		
6	Involve the construction or repair of fish ponds?		X				
7	Involve the disposal of used engine oil?	X			X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X				
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X		
12	Will the activity create objectionable odors?		X				
13	Will the activity violate air standard?		X				
14	Will the activity occur on steep slopes (Greater than 15%)?		X				
15	Will the activity contribute to erosion?	X			X		
16	Is the activity incompatible with existing land use in the vicinity?		X				
17	Will the activity contribute to displacement of people (housing) or businesses?		X				
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X				
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X		
20	Will the activity contribute to change in the amount of surface water in any water body?		X				
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X		
22	Will the activity expose people or property to flooding?		X				
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?	X			X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?	X		N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this grant under a Collaboration Agreement is a private investor, Reynold Bonnefil, in collaboration with a Dominican banana export firm. The partners are focused on banana production and export. The goal of the present project is to set up a 50 ha, proof-of-concept, farm in the Limonade area for the production, packaging and export of Haitian fairtrade bananas. AVANSE plans to assist with investments in irrigation, technical assistance, and construction of a packing plant (shed, warehouse and water basins). The investments are valued at USD \$1.4 M (approximately).

Key environmental mitigation actions:

- Proper management of water use, including standing water, wastewater and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

NB: Production aspects of this project are covered under the U-EMPR for IR 1 activities. See Annex G of the PEA.

Table 1. Environmental Screening Form

Name of Activity:	FECCANO Cacao Fermentation, Petit Bouc and Port Margot, Borgne & Port Margot cacao extension zones (IR3 Grants under Collaboration Agreement)	Column A	Column B	Col C	
Type of Activity:	Small-scale construction (< 1000m ²) and equipment installation for agricultural product handling, storage and processing				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015			High Risk	Medium-Risk
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?	X		N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this grant under Collaboration Agreement is the Federation des Coopératives Cacaoyeres du Nord (FECCANO). The members of the Federation comprise six cooperatives; they are focused on cacao fermentation and export. The present project consists of building 2 cacao fermentation centers (at Petit Bouc in the Borgne extension zone, and at Port Margot in the Port Margot extension zone). These centers, approximately 100 m² in size each, will target new member associations in order to increase production capacity. AVANSE also plans to assist with investments in the following equipment: wooden fermentation crates.

Key environmental mitigation actions:

- Proper management of water use, including standing water, wastewater and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

Table 1. Environmental Screening Form

Name of Activity:	Novella Cacao Fermentation, Grande Rivière du Nord, Grande Rivière du Nord Watershed (IR3 Grants under Collaboration Agreement)	Column A	Column B	Col C			
Type of Activity:	Small-scale construction (<1,000 m ²) and equipment installation for agricultural product handling, storage and processing						
Contractor/Grantee:	DAI			Yes	No	If answered yes to Col. A. is it a--?	
Date:	April 20, 2015						
IEE/ETD #:	LAC-IEE-14-17					High Risk	Medium-Risk

IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X			X
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?	X			X
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?			N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The owner/implementer of this grant under a Collaboration Agreement is Novella. This is a private enterprise owned by Daniel and Nonce Zephyr that focuses on cacao and bitter orange peel export. The purpose of the present activity is to rehabilitate an old coffee mill in Grande Rivière du Nord into a cacao fermentation center. AVANSE plans to assist with investments in the following equipment: wooden fermentation crates. This equipment is valued at USD \$40,000 (approximately). The approximate footprint of the crates (at ground level) is 40 m². Warehouse repairs are also planned.

Key environmental mitigation actions:

- Proper management of water use, including standing water, wastewater and runoff.
- Temporary drainage, erosion control and sediment retention measures (for rainy season construction/rehabilitation)
- Safety and health instruction for construction/rehabilitation workers and provision of personal protective equipment.
- Proper ventilation of facility to reduce exposure of workers to exhaust, dust and heat.

The following tables (2 and 3) are based upon construction mitigation measures and requirements for input/output analysis of materials and wastes and use of cleaner production concepts.

Mitigation Measures for Small-Scale Construction

- Prohibit construction on sites that are not already used or designated for commercial buildings.

Table 2. Identification of Mitigation Plan

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
1, 3, 7, 9, 10, 11, 12, 15, 16, 18, 19, 21, 27	Initial environmental review of proposed IR3 grants	If site-specific characteristics of a particular grant are not considered, identification of relevant mitigation measures will not be possible. This could lead to unanticipated and unmitigated environmental impacts.	1. AVANSE's IR3 and the Environmental Compliance Teams shall work together to conduct an internal environmental review for each proposed IR3 grant to determine which of the impacts marked as "Yes" in Column A in Table 1 are relevant for the specific grant based upon its location and activities. The internal review shall also determine which of the mitigation measures in this table are relevant for the specific grant. 2. If the internal environmental review identifies potential impacts to important habitats or ecosystems or cultural or historical sites that will not be mitigated by the mitigation measures in this table, AVANSE shall prepare a site-specific EMPR for the proposed grant for review and approval by USAID. 3. The results of the internal environmental review shall be documented in AVANSE's files and reported in AVANSE's quarterly progress reports. 4. AVANSE shall incorporate the relevant mitigation measures (as identified in the internal review) in the sub-contract or grant agreement.
10	Input/output analysis of materials and wastes and use of cleaner production concepts	If sources and types of pollution discharges are not identified and addressed, unanticipated and unmitigated environmental impacts to air, water and land may result.	1. AVANSE's Environmental Compliance Team shall work with the grant recipient to conduct an input/output analysis of materials and wastes including a flow diagram showing material inputs and waste and product outputs. 2. A waste management plan shall be developed and implemented for each waste output identified in the input/output and approved by AVANSE. 3. If the AVANSE grant will purchase equipment, consideration shall be given to purchasing equipment that reduces, recycles, or reuses potential wastes.
1, 3, 7, 9, 10, 11, 15, 27	Small-scale construction activities (less than 1,000 m ²) Mitigation measures based on USAID small-scale construction guidelines, USAID 2014c ¹⁶	Localized disturbances associated with construction that may cause: altered drainage, sedimentation, and contamination of soil and water from construction materials (paints, solvents, etc.).	1. AVANSE shall incorporate the following mitigation measures in the sub-contract or grant agreement. 2. Mark construction site boundary and control access. 3. Establish, announce to nearby residents, and adhere to construction timetables that minimize disruption to the normal activities in the construction area and the surrounding community. 4. Concentrate noisiest types of work into as short a period as possible and during least disruptive times of the day. 5. Take measures to keep dust to a minimum. 6. Manage water use and runoff at the construction site so that no on-site standing water persists more than 4 days. 7. Develop and implement appropriate sanitation, occupational health and worker safety measures during construction, including the following: a. Provide all workers with a safety and health induction that explains safe work practices and the proper use of personal protective equipment. b. Provide all workers with appropriate personal protective equipment.

¹⁶ USAID. 2014c. Sector Environmental Guidelines: Small-Scale Construction. 44pp. <http://www.usaidgems.org/Sectors/construction.htm>

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
			c. Develop and implement an internal system for (1) regular self-inspection of site against occupational health and worker safety standards and (2) tracking violations and accidents. d. Prohibit or restricted smoking to designated smoking area well away from flammable materials. e. Provide a first aid kit on-site, as well as someone familiar with its use and trained in basic first aid. f. Provide workers with drinking water and sanitary facilities, including a hand-wash station. 8. Avoid subsidence and building stabilization problems through proper foundation excavation, fill placement and borrow pit management. a. Maintain spoils at least 1 meter back from the edge of any excavation. b. Shore up or slope back the wall of any excavation 1.75 meters or deeper and provide a means of exit (ladder, stair, ramp) at least every 10 meters. c. Use well graded material for fill, avoid pockets of segregated materials in fill, and insure that fill is compacted to recognized standards. d. Backfill and/or restore borrow areas before abandonment unless alternative uses for those sites are planned. 9. If construction will occur during the rainy season, install temporary drainage, erosion control and sediment retention measures and cover stockpiled construction materials. 10. Segregate waste which can be salvaged, re-used or recycled. 11. Provide on-site containers for solid waste and dispose of solid waste in a manner approved by local authorities. 12. Place solvents, lubricants, oils, and other hazardous liquids over a lined area with appropriate secondary containment (e.g., bermed perimeter) to contain spillage. 13. Handle, store, use and process branded materials in accordance with manufacturer's instructions and recommendations. 14. Avoid the use of materials containing asbestos. 15. Use lead-free paint, primers, varnishes, stains, sealants and glazing and water-based paints wherever practical. 16. Return drainage patterns disturbed during construction to their original (or better) condition.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	AVANSE's IR3 and the Environmental Compliance Teams shall work together to conduct an internal environmental review for each proposed IR3 grant	Implementation IR3 Team & EC Team Monitoring Grant Team	Report on internal environmental review	Review of grant proposal Site visit Report approved and filed	At time of grant proposal	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
2	If the internal environmental review identifies potential impacts to important habitats or ecosystems or cultural or historical sites that will not be mitigated by the mitigation measures in this table, AVANSE shall prepare a site-specific EMPR for the proposed grant for review and approval by USAID.	Implementation EC Team Monitoring Grant Team	Site-specific EMPR	Review of grant proposal. Site visit Literature review Report approved and filed	At time of grant proposal	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
3	The results of the internal environmental review shall be documented in AVANSE's files and reported in AVANSE's quarterly progress reports.	Implementation EC Team Monitoring M&E Team	Inclusion in quarterly reports	Report approved and filed Results reported	Quarterly	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
4	AVANSE shall incorporate the relevant mitigation measures (as identified in the internal review) in the sub-contract or grant agreement.	Implementation IR3 Team and Grant Team Monitoring EC Team	Language included in sub-contract or grant	Contract/grant review	Sub-contract or grant development	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
5	AVANSE's Environmental Compliance Team shall work with the grant recipient to conduct an input/output analysis of materials and wastes including a flow diagram showing material inputs and waste and product outputs.	Implementation Sub-contractor or grant recipient & EC Team Monitoring Grant Team	Flow diagram showing input/output analysis	Review of grant and internal environmental review report Site visit	Sub-contract or grant development	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
6	A waste management plan shall be developed and implemented for each waste output identified in the input/output and approved by AVANSE.	Implementation Sub-contractor or grant recipient Monitoring EC Team	Waste management plans prepared and approved Waste management plans implemented	Review of plans Site visit	Sub-contract or grant development Annually	No cost, normal obligation of salaried staff	1 2 3 4			
7	If the AVANSE grant will purchase equipment, consideration shall be given to purchasing equipment that reduces, recycles, or reuses potential wastes.	Implementation Sub-contractor or grant recipient & IR3 Team Monitoring EC Team	Documentation of decision for the purchase of equipment	Document review	Procurement development	Could be additional capital costs, but can only be determined on a site-by-site basis	1 2 3 4 2 3 4			
8	AVANSE shall incorporate the following mitigation measures in the sub-contract or grant agreement.	Implementation IR3 Team Monitoring EC Team	Language included in sub-contract or grant agreement	Document review	At time of agreement development	No cost, normal obligation of salaried staff	1 2 3 4			
9	Mark construction site boundary and control access.	Implementation Sub-contractor or grant recipient	As indicated in the Monitoring Log for Commercial Construction Activities provided in this EMPR	Site inspection using the Monitoring Log for Commercial Construction Activities	Weekly, during construction	No cost, normal obligation of salaried staff	1 2 3 4			
10	Establish, announce to nearby residents, and adhere to construction timetables that minimize disruption to the normal activities in the construction area and the surrounding community.	Monitoring EC Team					1 2 3 4			
11	Concentrate noisiest types of work into as short a period as possible and during least disruptive times of the day.						1 2 3 4			
12	Take measures to keep dust to a minimum.						1 2 3 4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
13	Manage water use and runoff at the construction site so that no on-site standing water persists more than 4 days.						1 2 3 4			
14	Develop and implement appropriate sanitation, occupational health and worker safety measures during construction including components a through f.	Implementation Sub-contractor or grant recipient Monitoring EC Team	Measures developed Measures implemented	Review and approval of proposed measures Site inspection using the Monitoring Log for Commercial Construction Activities	Before construction begins Weekly, during construction	No cost, normal obligation of salaried staff	1 2 3 4			
15	Avoid subsidence and building stabilization problems through proper foundation excavation, fill placement and borrow pit management as per items a through d.	Implementation Sub-contractor or grant recipient Monitoring EC Team	As indicated in the Monitoring Log for Commercial Construction Activities provided in this EMPR	Site inspection using the Monitoring Log for Commercial Construction Activities	Weekly, during construction	No cost, normal obligation of salaried staff	1 2 3 4			
16	If construction will occur during the rainy season, install temporary drainage, erosion control and sediment retention measures and cover stockpiled construction materials.						1 2 3 4			
17	Segregate waste which can be salvaged, re-used or recycled.						1 2 3 4			
18	Provide on-site containers for solid waste and dispose of solid waste in a manner approved by local authorities.						1 2 3 4			
19	Place solvents, lubricants, oils, and other hazardous liquids over a lined area with appropriate secondary containment (e.g., bermed perimeter) to contain spillage.						1 2 3 4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
20	Handle, store, use and process branded materials in accordance with manufacturer's instructions and recommendations.						1			
							2			
							3			
							4			
21	Avoid the use of materials containing asbestos.						1			
							2			
							3			
							4			
22	Use lead-free paint, primers, varnishes, stains, sealants and glazing and water-based paints wherever practical.						1			
							2			
							3			
							4			
23	Return drainage patterns disturbed during construction to their original (or better) condition.	Implementation Sub-contractor or grant recipient Monitoring EC Team	Drainage pattern returned to original condition	Final site inspection	Conclusion of construction	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

Monitoring Log for Small-Scale Commercial Construction Activities

Site Name:		Date	Name of Inspector
Implementing Partner:			
Contract Number:			
Type of Activity:			

Mitigation Measure	Date	Yes	No	If No, Action Taken
Are construction site boundaries marked and access controlled?				
Have construction timetables that minimize disruption to the normal activities in the construction area and the surrounding community been established, announced to nearby residents, and adhered to?				
Are the noisiest types of work concentrated into as short a period as possible and during least disruptive times of the day?				
Have measures been taken to keep dust to a minimum?				
Is water use and runoff managed at the construction site so that no on-site standing water persists more than 4 days?				

Mitigation Measure	Date	Yes	No	If No, Action Taken
Are records available of regular self-inspection of site against occupational health and worker safety standards and tracking violations and accidents?				
Have all workers been provide with appropriate personal protective equipment as per the proposed sanitation, occupational health and worker safety measures?				
Is smoking prohibited or restricted to designated smoking area well away from flammable materials?				
Is a first aid on-site, as well as someone familiar with its use and trained in basic first aid?				
Are workers provided with drinking water and sanitary facilities?				

Mitigation Measure	Date	Yes	No	If No, Action Taken
Are spoils maintained at least 1 meter back from the edge of any excavation?				
Are the walls of any excavation 1.75 meters or deeper shored up or sloped back and provided a means exit (ladder, stair, ramp) at least every 10 meters?				
Are materials for fill, well graded and placed to avoid pockets of segregated materials in fill, and compacted to recognized standards?				
If it is the rainy season, are temporary drainage, erosion control and sediment retention measures installed to avoid fouling or flooding public by-ways and adjacent properties or contaminating waterways?				
If it is the rainy season, are stockpiled construction materials covered?				
Is waste which can be salvaged, re-used or recycled segregated?				
Are on-site containers for solid waste provided?				

Mitigation Measure	Date	Yes	No	If No, Action Taken
Are waste materials being taken to an appropriate, designated local disposal area?				
Are solvents, lubricants, oils, and other hazardous liquids placed over a lined area with appropriate secondary containment (e.g., bermed perimeter) to contain spillage?				
Are branded materials handled, stored, used and processed in accordance with manufacturer's instructions and recommendations?				
Is the use of asbestos containing material being prohibited?				
Are the paints, primers, varnishes, stains, sealants and glazing being used lead free and are water-based paints being used wherever practical?				

ANNEX I: UMBRELLA EMPR FOR IR3 VOUCHER PROGRAM FOR FERTILIZERS AND PLOWING SERVICES

Notes: The narrative for this EMPR is embedded in the AVANSE Programmatic Environmental Assessment. The EMPR begins with 6 site-specific screening forms (Table 1) which were completed by the PEA team in collaboration with AVANSE staff. Please see the comments box at the end of each form for specific details on each site. These forms correspond to sites that are already planned or known. It is possible that additional sites (boutiques) will be identified after the approval of the present PEA. Any and all additional sites will be subjected to the same screening process, which will identify the required mitigation measures. These are followed by an EMMP for tractor services,

Activities Included

- Storage and retail sales of fertilizers
- Interior modifications of existing buildings for safe storage of fertilizers
- Support for the provision of tractor services for rice and banana farmers

Table 1. Environmental Screening Form

Name of Activity:	Bel Jaden, Ferrier, Jassa Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17			High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments:

Bel Jaden is a firm specialized in the sales of fertilizers, pesticides and agricultural equipment. This firm is own by Mr. Gerome Durosier and is situated in Ferrier. Its storage capacity is 19 m² for fertilizers.

Key environmental mitigation actions:

- Be located away from public drinking water sources.
- Be well ventilated to ensure the quality of the fertilizers.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets to provide access to all stacks.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.

Table 1. Environmental Screening Form

Name of Activity:	COMAG, S.A., Ouanaminthe, Jassa Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Comments:

COMAG, S.A. is a specialized firm in the import and distribution of fertilizers, pesticides and agricultural equipment. This firm's headquarter is in Port au Prince; in 2014, they opened a distribution outlet in Ouanaminthe. This firm is own by Mr. Rose Luce Desir and Jean Michel Cherubin and has a storage capacity of 39 m² for fertilizers.

Key environmental mitigation actions:

- Be well ventilated to ensure the quality of the fertilizers.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets to provide access to all stacks.
- Fertilizer bags shall be stacked in a criss-cross way (for stability) and the stacks shall be no more than 10 bags high. The tops of all bags should lie towards the center of the stack (not exposed to the outside of the stack), in order to protect the seams. Bags of ammonium nitrate should be stacked with an empty space in the middle to serve as a chimney for off-gassing.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.



Table 1. Environmental Screening Form

Name of Activity:	Dieu Le Sait Boutique, Grison Garde, Haut du Cap Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques			Yes	No
Contractor/Grantee:	DAI				
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Comments:

Dieu Le Sait Boutique is a firm specialized in the sale of fertilizers and occasionally of pesticides. This firm is owned by Mr. Telcide Lamour and is situated in Grison-Garde. Its storage capacity is of 15.5 m² for fertilizers.

Key environmental mitigation actions:

- Be located away from public drinking water sources.
- Be well ventilated to ensure the quality of the fertilizers.
- Have a hand-washing station.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets to provide access to all stacks.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.





Table 1. Environmental Screening Form

Name of Activity:	Jaden Lakay, Bas Limbé, Limbé Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques				
Contractor/Grantee:	DAI	Yes	No	If answered yes to Col. A. is it a--?	
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17			High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Comments:

Jaden Lakay is a firm specialized in the sales of fertilizers, pesticides and agricultural equipment. Started in 2001, this firm is owned by Mr. Pierre Doudi. In 2014, the firm opened a new input store in Bas Limbe with a storage capacity of 32 m² for fertilizers.

Key environmental mitigation actions:

- Be well ventilated to ensure the quality of the fertilizers.
- Have a hand-washing station.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets to provide access to all stacks.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.



Table 1. Environmental Screening Form

Name of Activity:	Jaden Lakay, Ouanaminthe, Jassa Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Comments:

Jaden Lakay is a firm specialized in the sales of fertilizers, pesticides and agricultural equipment. Started in 2001, this firm is owned by Mr. Pierre Doudi. The firm's headquarters are situated in Ouanaminthe and it has now opened two branches in Bas Limbé and Quartier Morin. Jaden Lakay/Ouanaminthe has a storage capacity of 41 m² for fertilizers.

Key environmental mitigation actions:

- Be well ventilated to ensure the quality of the fertilizers.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets to provide access to all stacks.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.





Table 1. Environmental Screening Form

Name of Activity:	Jaden Lakay, Quartier Morin, Haut du Cap Watershed (Voucher Program for Fertilizers)	Column A	Column B	Col C	
Type of Activity:	Financial subsidy for fertilizer inputs through vouchers with participating boutiques			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X (interior only)			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?	X (fertilizer only)			X
4	Involve the construction or repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?		X		
8	Will the project involve implementation of timber management, extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)?	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?	X			X
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?		X		
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geological, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	N/A	N/A	N/A	N/A
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):				(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.				
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.				X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.				
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).				
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.				
Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.				

Comments:

Jaden Lakay is a firm specialized in the sales of fertilizers, pesticides and agricultural equipment. Started in 2001, this firm is owned by Mr. Pierre Doudi. In 2014, the firm opened a new input store in Quartier Morin with a storage capacity of 6 m² for fertilizers.

Key environmental mitigation actions:

- Be well ventilated to ensure the quality of the fertilizers.
- Have a hand-washing station.
- Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.
- The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.





Table 2. Identification of Mitigation Plan (Based on FAO fertilizer guidelines, FAO 1985¹⁷ and IFA/FAO 2002¹⁸)

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
1, 3, 9, 10, 11, 12, 19	Selection of boutiques to participate in the program	Improper selection of boutiques to participate in the program could lead to emissions to the environment from storage of fertilizers at the boutique.	1. AVANSE's SIBA Team and the Environmental Compliance Team shall work together to conduct an internal environmental review of all boutiques seeking to be included in the voucher program to ensure that they meet the following location/building condition requirements: a. located away from public drinking water sources, b. be in good general condition, c. have a roof that does not leak, d. have non-flammable walls and roof covering, e. have a cement floor that is sealed to the walls, f. be well-ventilated (e.g., have doors and windows that can be opened for ventilation), g. have windows and doors that can be closed and locked, and h. have a hand-washing station. The results of the internal environmental review shall be documented in AVANSE's files and reported in AVANSE's quarterly progress reports. 2. Include the mitigation measures in the sub-contract or grant agreement.
3, 10, 12	Control of ventilation, humidity and direct sunlight	Improper ventilation can cause a buildup of fumes (some of which can be explosive) and unpleasant odors. Improper control of humidity and sunlight can cause product deterioration.	1. Doors and windows should be open when it is warm and dry outside and closed when it rains and during the evening when the humidity is highest; however, they should also be managed in such a way as to prevent long periods of direct sunlight on the stored fertilizer. 2. Smoking shall not be permitted in the fertilizer storage area.
3, 9, 11, 19	Storage practices	Improper storage of fertilizer can lead to product deterioration and spills and associated releases to the environment.	1. All fertilizer products shall be stored and distributed in original, sealed packaging. Do not break open original packaging to repackage the contents for sale. 2. Fertilizer bags shall be handled carefully. Do not move bags with hooks. Bags should always be carried, not dragged along the floor. Bags should be let down to the ground gently, not dropped. 3. Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets. 4. Each stack of fertilizer bags shall contain only one type of fertilizer. 5. There shall be half a meter between stacks (pallets) and a one meter corridor between rows of pallets of one meter to provide

¹⁷ Food and Agriculture Organization (FAO). 1985. Manual on Fertilizer Distribution. FAO Fertilizer and Plant Nutrition Bulletin #8, Food and Agriculture Organization of the United Nations. Rome, Italy. 126pp.

¹⁸ International Fertilizer Industry Association (IFA) and Food and Agriculture Organization (FAO). 2002. Fertilizer Retailing Guide. First publication by FAO, Rome, 1990, revised version published by IFA and FAO, Paris, April 2002. 47pp.

# of the Question from Table 1	Activity or Component	Description of Impact	Mitigation Measures
			an access to all stacks. 6. Fertilizer bags shall be stacked in a criss-cross way (for stability) and the stacks shall be no more than 10 bags high. The tops of all bags should lie towards the center of the stack (not exposed to the outside of the stack), in order to protect the seams. Bags of ammonium nitrate should be stacked with an empty space in the middle to serve as a chimney for off-gassing. 7. The floor shall be swept regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices. 8. The boutique shall maintain an inventory record so it knows the types and amounts of fertilizer in storage.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	AVANSE's SIBA Team and the Environmental Compliance Team shall work together to conduct an internal environmental review of all boutiques seeking to be included in the voucher program to ensure that they meet the location/building condition requirements specified in paragraphs a through h.	Implementation SIBA Team & EC Team Monitoring EC Team	Compliance with paragraphs a through h.	Site visit	At time of application Annually thereafter	No cost, normal obligation of salaried staff	1 2 3 4			
2	Include the mitigation measures in the sub-contract or grant agreement.	Implementation SIBA Team and Grant Team Monitoring SIBA Team	Language included in sub-contract or grant	Document review	Sub-contract or grant development	No cost, normal obligation of salaried staff	1 2 3 4			
3	Doors and windows should be	Implementation	Area ventilated when	Site visit	Bi-Annually, during	No cost, normal obligation	1 2 3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	open when it is warm and dry outside and closed when it rains and during the evening when the humidity is highest; however, they should also be managed in such a way as to prevent long periods of direct sunlight on the stored fertilizer.	Boutique manager <u>Monitoring</u> EC Team	visited		cultivation season	of salaried staff	4			
4	Smoking shall not be permitted in the fertilizer storage area.	<u>Implementation</u> Boutique manager <u>Monitoring</u> EC Team	No smoking signs No evidence of smoking	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
5	All fertilizer products shall be stored and distributed in original, sealed packaging. Do not break open original packaging to repack the contents for sale.	<u>Implementation</u> Boutique manager <u>Monitoring</u> EC Team	No evidences of repackaging	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
6	Fertilizer bags shall be handled	<u>Implementation</u>	Observed handling of	Site visit	Bi-Annually, during	No cost, normal obligation	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	carefully. Do not move bags with hooks. Bags should always be carried, not dragged along the floor. Bags should be let down to the ground gently, not dropped.	Boutique manager <u>Monitoring</u> EC Team	bags No evidence of bag handling damage		cultivation season	of salaried staff	4			
7	Fertilizer bags shall be stored in a manner such that they do not come into contact with the floor, walls (at least a 25 cm space) or ceiling. The stacks should be raised off the floor on pallets.	<u>Implementation</u> Boutique manager <u>Monitoring</u> EC Team	Bags stored on pallets and no contact with floor or ceiling	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1 2 3 4			
8	Each stack of fertilizer bags shall contain only one type of fertilizer.	<u>Implementation</u> Boutique manager <u>Monitoring</u> EC Team	No evidence of mixed bags on pallets	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1 2 3 4			
9	There shall be half a meter between stacks (pallets) and	<u>Implementation</u> Boutique manager <u>Monitoring</u>	Proper spacing	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1 2 3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	a one meter corridor between rows of pallets of one meter to provide an access to all stacks.	EC Team					4			
10	Fertilizer bags shall be stacked in a criss-cross way (for stability) and the stacks shall be no more than 10 bags high. The tops of all bags should lie towards the center of the stack (not exposed to the outside of the stack), in order to protect the seams. Bags of ammonium nitrate should be stacked with an empty space in the middle to serve as a chimney for off-gassing.	Implementation	Evidence of proper stacking	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1			
		Boutique manager					2			
		Monitoring					3			
		EC Team					4			
11	The floor shall be swept	Implementation	Observed cleanliness	Site visit	Bi-Annually, during	No cost, normal obligation	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	regularly, and any spilled fertilizer should be applied to agricultural land using good agricultural practices.	Boutique manager <u>Monitoring</u> EC Team			cultivation season	of salaried staff	4			
1	The boutique shall maintain an inventory record so it knows the types and amounts of fertilizer in storage.	<u>Implementation</u> Boutique manager <u>Monitoring</u> EC Team	Inspection of records	Site visit	Bi-Annually, during cultivation season	No cost, normal obligation of salaried staff	1			
2							2			
							3			
							4			

II. NARRATIVE Plowing services EMMP

Context. AVANSE has four technical teams focused on rice, bananas, cocoa and NRM. LOP goals are to improve productivity in a sustainable manner for 20,000 households. One of AVANSE's activities is agricultural extension, where they work with farmers groups to demonstrate and extend improved techniques, another is the distribution of subsidized inputs. The subsidy is applied through a voucher system, with the intent of progressively reducing the subsidy over time, to help ensure sustainability and stimulate the local market to supply improved inputs. This Système d'Incitation via les Bons d'Achat (SIBA) works with local suppliers of goods and services, farmers purchase vouchers at local financial institutions and redeem them at the supplier. Each intervention has a different subsidy rate, once redeemed, the project pays the balance of the costs through the financial institution.

Because of the importance of good and timely land preparation, AVANSE is adding plowing services to the voucher system. AVANSE is running a pilot for improving the success of its banana planting campaign during November 2015, with plans to expand to rice in 2016.

AVANSE made an economic analysis of this activity; (Plowing services for Increased and

Improved agricultural Production in North and North-East Haïti”; DAI, James WEBER, September 2014); which showed more than 80% of the Northern zone farmers were interested in tractor services and in a comparison of hand labor, animal traction, motor cultivators and tractors found that tractor-based services, effective only in the plains areas, are the most productive option. They also provide the least expensive services to farmers, the best quality service, and the fastest service.

A number of firms willing to participate in a voucher program have been identified and because of a shortage of manual labor to prepare land and the cost of this activity, it became clear that land preparation was one impediment to expanding the area of improved bananas cultivated, one of AVANSE’s objectives.

1) Baseline information /existing conditions

AVANSE plans to increase the demand for tractor services by providing a subsidy and by identifying local firms interested in expanding their businesses.

Currently there is a limited supply of services, particularly in the areas away from the DR border, By reducing the risk and thus expanding the demand for tractor services, SIBA encourages investment in equipment and the supply of tractor services will expand over time.

While animal traction for levelling is used in certain zones and is cheaper, it is neither as quick or as effective as mechanical plowing. Nor are sufficient animals in good condition available across the northern corridor. The net revenue from mechanical traction exceeds animal plowing.

Working with a selected number of local firms, with equipment inspected and found to be good condition. AVANSE will run a small trial in November 2015 for a sample of banana producers participating in the larger banana improvement program. Table 1 shows the location and the number of hectares in the larger program.

Table 1 – Estimated demand for plowing services in the banana zones (Autumn 2015)

Financial institutions	Production Zone	# ha available
Fonkoze Limbé	Camp Louise, Limbe, Bas Limbe	68.7
Fonkoze Trou du Nord	Trou du Nord	69.57
Fonkoze Ouanaminthe, CPD Ferrier/Fort Liberte	Haut et Bas Maribaroux	407.54
CPF Plaine du Nord	Plaine du Nord, Grison Garde, Acul du Nord	69.58
CPF Limonade	Bois de Lance, Limonade et Bord de Mer, Quartier Morin	452.05
Kès Popilè Leve Kanpe Milot	Milot	83.06

Total		1150.5
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Five firms, with nine tractors and associated equipment are available in these zones. Table 2 above shows the details and their capacity per day

Note: GRADES and Pensee Verte both rent tractors at the *Direction Departementale Agricole (DDA)*; so three of these machines are the same.

Contractor	# of Tractors	Capacity/Tractor	Location
GRADES	4	3 ha/day	DDA Vertières
Maribahoux Agricole Entreprise	1	3 ha/day	Ferrier
Ferme Production la Renaissance	1	3 ha/day	Terrier rouge
Pensée Verte	2	3 ha/day	Plaine du nord Limonade Grison Garde
PRODEV	1	3 ha/day	Caracol
TOTAL	7	27 ha/day	

2) Description of Activities

The tractor services supported by AVANSE through the SIBA voucher mechanism are as follows: motorized tillage to a maximum of 30 cm depth followed by harrowing on a ¼ of a hectare, the latter including: (i) the breaking of clods after plowing; (ii) the preparation of the seed bed; (iii) the admixture of the tilled soil and organic materials.

A memorandum of understanding has been signed between the various plowing service companies and AVANSE, that specifies the roles and responsibilities of each party. The company agrees to respect Good Agricultural Practices as defined by the Avanse. Training will be provided as necessary by AVANSE. Also their tractors and equipment have been inspected.

The good environmental practices (GAP) have been defined as follows by the Department of Environmental Compliance of AVANSE:

Plan of Operations and maintenance of the equipment

The Contractor will develop a maintenance plan for the tractors including the management of waste oil and maintenance of equipment in order to avoid contamination of the soil and alluvial aquifers

An operational plan must be developed by the Contractor in collaboration with AVANSE and made available; this operation plan will be used to establish the plan for monitoring and evaluation;

Contractor Affiliate must not create new roads to access the fields; it is also recommended to avoid moving with the machinery during the hours of darkness in order to reduce the risk of accidents/injury.

Noise nuisances

It is recommended that the tillage does not proceed during the night because of noise pollution that can be caused, especially where the fields are close to houses;

Climate change

Mechanical plowing should not be done on slopes greater than $< 3\%$;

Plowing should be done ideally under optimum conditions of soil moisture. Waterlogged soils should not be plowed to avoid compaction and conversely dry soils avoided to reduce soil erosion by wind;

Personnel risks

The contractor will select a suitable transit area in order to safely park the equipment when it remains in any one area for several days;

When plowing close to households, the contractor will put in place warning measures and any security necessary to ensure that the plowing activity is done in such a way as to avoid any accidents to workers and passersby.

The contractor will define the measures to be taken to ensure the safety of workers during the operations. If the equipment stays more than a day at any site, precautions shall be taken to collect rubbish, keep the area clean, avoid pollution etc ;

The contractor will train their operators on these measures.

Gender Considerations

Female banana producers are estimated at approx. 28%, 620 women out of 2,145 producers in the autumn banana campaign 2015. AVANSE also encourages contractors to include women in the provision of services.

Climate Change Integration

AVANSE will work with beneficiaries so that they incorporate more organic matter (compost, manure, etc.) into their plot so as to improve soil structure and water retention capacity...

AVANSE will work with beneficiaries to test no-till and cover crop options in a small portion of their fields to promote climate smart agricultural techniques...

AVANSE will work with beneficiaries to cover the plowed soil with mulch so as to retain moisture, increase organic matter and protect the soil against wind erosion and rill erosion (if the land contains any slopes).

In areas prone to floods and waterlogging, if feasible, AVANSE will encourage beneficiaries to dig drainage ditches around the perimeters of their fields and use animal or hand labor for land preparation.

III-A. Environmental Screening Form (Table 1)

Name of Activity : AVANSE Vouchers for tractor services to banana and rice farmers. Type of Activity: ___ Financial subsidy for tractor services through vouchers with participating firms _____ Contractor/Grantee: _____ DAI AVANSE _____ Date: _____ November 5 th , 2015 _____ IEE/ETD # ___ LAC-IEE-14-17 _____		Column A	Column B	Column C	
		Yes	No	If answered yes to Col. A. is it a--?	
			High Risk	Medium Risk	
INFRASTRUCTURE					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of infrastructure? For new construction, if less than 1000 m2 = medium risk, if greater than 1000 m2 = high risk		X		
2	Will the project involve work on roads? If new construction/rerouting= high risk, if repair/reconstruction (widening, improving drainage, resurfacing of existing roads or trails = medium risk		X		
3	Will the project construction cost more than US \$500,000? If YES, then a cost benefit analysis and approval of a USAID Engineer are required as mitigation measures in Table 2.		NA		
4	Is an operations and maintenance plan required? (for all type of infrastructure, road rehabilitation, or water and sanitation action = Yes)	X			X
5	Will the activity increase existing noise levels?	X			X
6	Does the activity, require local planning permission(s) (i.e., infrastructure improvements)?		NA		
7	Does the activity require adherence to national building code or other national regulatory standard?		X		
BIOPHYSICAL					
8	Will the project involve the use, plans to use, or training in the use of pesticides ³ (including bio pesticides like neem)?		X		
9	Will the project involve changes or impacts in the uses of water (such as irrigation, storage, potable water, water harvesting)		X		
10	Will the project impact surface water (rivers, lakes, wetlands and ponds) or ground water?		X		
11	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		

12	Will the project involve aquaculture systems?		X		
13	Will the project involve the use or disposal of hazardous materials (used engine oil, paint, varnish, lead-based products, or other hazardous or special management waste)?	X			X
14	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land ?		X		
15	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat (including nesting areas), and threatened or endangered species?		X		
16	Will the activities proposed generate airborne particulates (dust), greenhouse gas emissions, liquids, or solids (i.e. discharge pollutants) or potentially violate local air standards?	X			X
17	Will the activity create objectionable odors?		X		
18	Will the activity occur on steep slopes (greater than 15%)?		X		
19	Will the activity contribute to erosion?	X			X
20	Will the activity change existing land use in the vicinity?		X		
21	Is the proposed activity incompatible with land type (i.e., annual crops on steep slopes, infrastructure on poorly drained soils)?	X			X
22	Will the activity affect unique geologic or physical?		X		
23	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?		X		
24	Will the activity have a direct or indirect impact, or include actions with mangroves, coral reefs and other marine/coastal ecosystems?		X		
GLOBAL CLIMATE CHANGE					
25	Are project activities or outcomes vulnerable to changes in the weather or climate such as changes in precipitation patterns, increased temperatures or sea level rise?	X			X
26	Does the project's activities exacerbate climate change vulnerabilities (i.e., drought, flooding, decrease water supply)?		X		
SOCIO ECONOMIC					
27	Will the activity contribute to displacement of people, housing or businesses?		X		
28	Will the activity affect unique cultural, indigenous peoples and/or historic features?		X		
29	Will the activity expose people or property to flooding?		X		
ENVIRONMENT & HEALTH					
30	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
31	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
32	Will the project involve the use, storage, handling or disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
33	Will the activity expose workers to occupational hazards?	X			X
GENDER⁵					
34	Does the project activity inhibit the equal involvement of men and women?		X		
35	Do the project results disproportionately benefit/impact men and women?	X			X
OTHER					
36	Does the project/Activity involve a sub-grant component?		X		

RECOMMENDED ACTION <i>(Check Appropriate Action):</i>		<i>(Check)</i>
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No further action required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but environmental effects can be mitigated. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMMP Required.	X
(c)	The project has potentially substantial or significant adverse environmental effects, therefore, an EA is required before activity implementation (Positive Determination). NOTE: if any question is marked as High Risk, an EA is required and Tables 2 and 3 of the EMMP do not need to be completed.	
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and adverse environmental effects that cannot be mitigated. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	

¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 meters² or 10,000 feet² is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigation measures whereas larger buildings will require more extensive review and monitoring.

² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archaeological site are considered a high risk.

³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.

⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).

⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMMP is developed.

⁶ If the Project/Activity includes a sub-grant component, each sub-grantee shall be required to prepare an EMMP prior to implementation of the sub-grant.

III-B. Identification of Mitigation Plan (Table 2)

Enter the Question/Row # of the potential negative impacts with check marks in Column A (Table 1) and complete table below for mitigation measures to reduce or eliminate the issue. In the Sub-Activity or Component Column, list the main actions to be implemented. Under each action, list the tasks (Steps) that are needed to implement this action.

	Name of Activity: Tractor services for banana and rice farmers in the northern plains Type of Activity: Financial subsidy for tractor services through vouchers with participating firms Contractor/Grantee: _____ DAI AVANSE _____ Date: _____ November 5 th , 2015 _____ IEE/ETD # LAC-IEE-14-17 _____		
# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
35	Component I – Selection of the Plowing Firms		
	a- Pre-selection / Selection	Lack of transparency in the selection process could negatively impact the project beneficiaries' support to the activity.	Ensure that procurement process integrates transparent and verifiable selection mechanisms for the selection of the tractor plowing firms;
	b- Contracting	The overwhelming presence of male workers , male plowing firms owners and male farmers/ beneficiaries will exacerbate the disparities in the access to benefits by male over females.	Language and incentives aimed at increasing female access to plowing benefits – e.g. female truck drivers; female farmers beneficiaries; female plowing firms owners- will be integrated into the contract services as and when possible.
4, 5, 13, 16,19, 21, 25, 33	Component II – Plowing Activity		
	a- Training of plowing firm owners, workers and beneficiaries	Lack of understanding of the potential	Provide tailored (adapted to education level and culturally sensitive) training in

		environmental consequences associated with the plowing activity might hinder the firms compliance ability	environmental compliance associated to plowing activities to plowing firms owners, workers and plowing beneficiaries as framed into their plowing activity's Operation Plan
	<i>b- Plowing Operations : Trucks Maintenance Schedule</i>	The plowing tractors if not properly maintained and serviced (oil change) might end up leaking oil capable of contaminating the soil and the water table ;	Establish and maintain a Maintenance Schedule for the tractors (oil change, safety brakes) which should be synchronized with the plowing Activity Operation Plan (descriptive and detailed timeline of the plowing activity successive tasks - what, where, how, how much, etc...).
	<i>Plowing Operations : Health & Sanitary</i>	Extended period - over 18 hours - of plowing of large area requiring the establishment of temporary staging area for tractors, tractor drivers workers and service providers (spontaneous food sellers) could negatively impact the area by accumulation of domestic wastes, improper sanitation – hence creating breeding ground for human health diseases.	Establish sanitary / public health guidelines for the plowing firms/ workers to follow – ref : waste collection, sanitary facilities (mobile toilets) during plowing sessions in general and especially extended ones (over 12 hours to + days) so as to avoid the emergence of unsanitary conditions in the beneficiaries lands following those plowing sessions;
	<i>Plowing Operations : Site Safety</i>	Plowing tractors while moving over the land could attract by standers esp.- curious children, hence potentially result in injuries to both workers and by standers.	Safety guidelines calling for the establishment – whenever applicable - of a buffer zone delimiting an area between the area being plowed and other neighboring areas – during plowing session - will be established as a precaution so as to keep all persons/individuals not involved in the activity away from the machines.
	<i>Plowing Operations : Wind Erosion Control</i>	In period of extended drought, the plowing of land may result in	Undertake the plowing session preferably following a drizzle or light rain so as to facilitate

		fragmented soil leading to erosion of soil's fine particles in windy weather conditions and creating dusty condition for neighboring houses.	the maintenance of and cohesion of the soil particles - and /or should irrigation capabilities exist, pre-irrigate with very low volume of water so as to reinstate the soil particles cohesion prior to plowing, hence reducing wind erosion in windy and drought conditions.
	<i>Plowing Operations : Workers Occupational & Safety</i>	Tractor drivers and accompanying workers (helpers) will be exposed to health and safety risks while manipulating and caring for the plowing machines with the risks of getting injured.	Occupational and Safety guidelines and training should be established/held for the plowing firms workers in the manipulation and daily maintenance of the plowing engines and the wearing of appropriate gears whenever applicable (ear protection, nose filter for windy conditions – bright reflector shirt for workers delimitating the buffer area –along with flags, boots, and hard hat.
	<i>Plowing Operations : Soil Erosion & Water Saturated Soil Control</i>	Plowing in waterlogged ground, flooded plains (or areas with high flood risks conditions linked to global climate variability) and poorly drained / and water saturated soils (clay conditions hence low to zero infiltration capabilities) could lead to soil erosion, soil saturation and damage to soil..	Plowing of banana soils while very wet, especially soil under water saturated or conditions (flooding) should not be done. Plowing of rice soils should be done in a way to avoid possible compaction, adjustment of the plow, use of cage wheels, plowing depth, duration, speed, gearing etc. In severely waterlogged soils animal traction or hand labor should be used.
	<i>Plowing Operations : Soil Compaction Control</i>	Sporadic and disparate land parcels increase the risk of soil compaction due to an increase in tractors passing over the fields (as opposed to contiguous parcels). Compaction from tractor tires leading	Opt where possible, for contiguous parcels for mechanical plowing activity so as to reduce the risk of increasing soil compaction and reduction in the aeration of agricultural lands. In areas prone to floods and waterlogging, if feasible AVANSE will encourage beneficiaries to dig drainage ditches around the perimeters

		to a loss in the soils capacity to maintain the soil's ecosystems that support agriculture production (porosity, micro-bio organisms, ease of root expansion etc..)	of their fields.
	<i>Plowing Operations : Maintenance of Soil Structure</i>	Plowing at the wrong time can reduce soil moisture holding capacity and cause the soil structure to deteriorate.	AVANSE will work with beneficiaries so that they incorporate more organic matter (compost, manure, etc.) into their plot so as to improve soil structure and water retention capacity.
	<i>Plowing Operations : Climate smart practices</i>	Plowing exposes the soil surface to wind and water erosion. Plowing also has a number of different impacts on greenhouse gases.	AVANSE will work with beneficiaries to test no-till and cover crop options in a small portion of their fields to promote climate smart agricultural techniques.
	<i>Plowing Operations : Increase in soil organic matter and reduction in mineral fertilizer use.</i>	A number of farming practices contribute to low soil organic matter, including the removal of crop residues from the field, excessive tillage, lack of mulching, and lack of manuring. Insecure land ownership may be a constraint, as building of soil organic matter is a long-term process requiring serious investment over time.	AVANSE will work with beneficiaries to understand the importance of soil organic matter, encouraging them to cover the plowed soil with mulch so as to retain moisture, increase organic matter and protect the soil against wind erosion and rill erosion (if the land contains any slopes). This in turn will reduce the need for inorganic fertilizers.

* provide overview of measures used from the USAID Sector Environmental Guidelines or other pertinent guidelines, details on exact monitoring plan are illustrated in Table 3, Environmental Monitoring and Evaluation Tracking Table.

III-C. Environmental Monitoring and Evaluation Tracking Table (Table 3).

Type of Project:										
Project Name: Subsidized tractor services										
Implementing Partner:										
Location Name:										
Project Size:										
Nearby Communities:										
Senior Project Manager:										Date:
Monitoring Period:										
#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Implementation indicators and effectiveness of indicators	Methods	Frequency	Dates	Problems Encountered	Mitigation Effectiveness		
1	Ensure that procurement process integrates transparent and verifiable selection mechanisms for the selection of the tractor plowing firms;	<u>Implementation</u> SIBA, IR1 Team Procurement team <u>Monitoring</u> EC Team			At selection time	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
2	Language and incentives aimed at increasing female access to plowing benefits – e.g. female tractor drivers; female farmers beneficiaries; female plowing firms owners- will	<u>Implementation</u> SIBA, IR1 Team Procurement team <u>Monitoring</u> EC Team SIBA	Measurement of female participation. Disaggregate statistics collected by sex.	Review of contracts, voucher records	During each campaign	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

	be integrated into the contract services as and when possible.									
3	Provide tailored (adapted to education level and culturally sensitive) training in environmental compliance associated to plowing activities to plowing firms owners, workers and plowing beneficiaries as framed into their plowing activity's Operation Plan	<u>Implementation</u> SIBA, IR1 Team <u>Monitoring</u> EC Team M&E team	Training materials developed and delivered	Review of material and spot visits at training Observations	When materials are developed Periodic spot checks	No cost, normal obligation of salaried staff				
4	Establish and maintain a Maintenance Schedule for the tractors (oil change, safety checks, brakes) which should be synchronized with the plowing Activity Operation Plan (descriptive and detailed timeline of the plowing activity	<u>Implementation</u> Contractor SIBA, IR1 Team <u>Monitoring</u> SIBA, M&E team	General guidelines developed	Review of operational plans	At start of campaign, with spot checks	No cost, normal obligation of contractor and salaried staff				

	successive tasks - what, where, how, how much, etc);									
5	Establish sanitary / public health guidelines for the plowing firms/ workers to follow – ref : waste collection, sanitary facilities (mobile toilets) during plowing sessions in general and especially extended ones (over 12 hours to + days) so as to avoid the emergence of unsanitary conditions in the beneficiaries lands following those plowing sessions;	<u>Implementation</u> Contractor <u>Monitoring</u> SIBA, M&E team	General guidelines developed	Review of field activities	At start of campaign, with spot checks	Cost, obligation of contractor				
6	Safety guidelines calling for the establishment – whenever applicable - of a buffer zone delimiting an area between the	<u>Implementation</u> Contractor SIBA, IR1 Team <u>Monitoring</u> SIBA, M&E team	General guidelines developed	Review of field activities	At start of campaign, with spot checks	No, or minimal cost				

	area being plowed and other neighboring areas – during plowing session - will be established as a precaution so as to keep all persons/individuals not involved in the activity away from the machines,									
7	Undertake the plowing session preferably following a drizzle or light rain so as to facilitate the maintenance of and cohesion of the soil particles - and /or should irrigation capabilities exist, pre-irrigate with very low volume of water so as to reinstate the soil particles cohesion prior to plowing, hence reducing	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, SIBA, M&E team	General guidelines developed GAP	Review of field activities	Periodic spot checks	No, or minimal cost				

	wind erosion in windy and drought conditions;									
8	Occupational and Safety guidelines and training should be established/ held for the plowing firms workers in the manipulation and daily maintenance of the plowing engines and the wearing of appropriate gears whenever applicable (ear protection, nose filter for windy conditions – bright reflector shirt for workers delimitating the buffer area –along with flags, boots, and hard hat;	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, SIBA, M&E team	General guidelines developed	Review of field activities	At start of campaign, with spot checks	Normal obligation of salaried staff				
9	Plowing of banana soils while very wet, especially soil under water saturated or conditions	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, M&E team	General guidelines developed GAP	Review of field activities	Principles at start of campaign, with periodic spot checks during	Additional costs obligation of contractor, paid for via contract for services				

	(flooding) should not be done. Plowing of rice soils should be done in a way to avoid possible compaction, adjustment of the plow, use of cage wheels, plowing depth, duration, speed, gearing etc. In severely waterlogged soils animal traction or hand labor should be used.				campaign					
10	Opt where possible, for contiguous parcels for mechanical plowing activity so as to reduce the risk of increasing soil compaction and reduction in the aeration of agricultural lands. In areas prone to floods and waterlogging, if feasible AVANSE will encourage beneficiaries to dig	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, M&E team	General guidelines developed GAP	Review of field activities	Principles at start of campaign, with periodic spot checks during campaign	Additional costs obligation of farmers				

	drainage ditches around the perimeters of their fields.									
1 1	AVANSE will work with beneficiaries so that they incorporate more organic matter (compost, manure, etc.) into their plot so as to improve soil structure and water retention capacity.	Technical teams	General guidelines developed GAP	Review of field activities	Principles at start of campaign, plus training during and periodic spot checks during campaign	Additional training costs obligation of salaried staff, and farmers, contractor, paid for via contract for services				
1 2	AVANSE will work with beneficiaries to test no-till and cover crop options in a small portion of their fields to promote climate smart agricultural techniques.	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, M&E team	General guidelines developed GAP	Review of field activities	Principles at start of campaign, plus training during and periodic spot checks during campaign	Additional training costs obligation of salaried staff, and farmers,				
1 3	AVANSE will work with beneficiaries to understand the importance of soil organic matter, encouraging them to cover the plowed soil with mulch	<u>Implementation</u> Contractor <u>Monitoring</u> IR Team, M&E team	General guidelines developed GAP	Review of field activities	Principles at start of campaign, plus training during and periodic spot checks during campaign	Additional demonstration and training costs obligation of salaried staff, and farmers,				

	so as to retain moisture, increase organic matter and protect the soil against wind erosion and rill erosion (if the land contains any slopes). This in turn will reduce the need for inorganic fertilizers.									

ANNEX J: SITE-SPECIFIC EMPRS AND SCREENING FORMS FOR IRRIGATION AND DRAINAGE PROJECTS

Notes: The narrative for this Annex is embedded in the AVANSE Programmatic Environmental Assessment. With respect to the irrigation projects, this Annex begins with 3 site-specific EMPRS, followed by 4 site-specific screening forms (Table 1) which were completed by the PEA team in collaboration with AVANSE staff. Please see the comments box at the end of each form for specific details on each site. Three of these sites (Dubré, Ferrier/Bas Marihaboux and Grison Garde) require no additional surface water withdrawals and received a negative with conditions threshold determination. The other 4 sites (La Suisse, Chalopin, Garde Saline and Robino) require additional surface water withdrawals and/or do not have sufficient water resources and received a positive threshold determination. The site-specific EMPR for the Bas Limbé drainage site is also included at the end of this Annex.

Activities Included

- Irrigation system rehabilitation and construction.
- Drainage system rehabilitation.

Table 1. Environmental Screening Form

Name of Dubre Irrigation Sytem, Haut du Cap Watershed Activity:___(irrigation system not requiring additional surface water withdrawals)_____ Type of Activity:___Infrastructure_____ Contractor/Grantee: DAI _____ Date: _05 August 2015_____ IEE/ETD # _____LAC-IEE-14-17_____		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc?		X		
4	Involve the construction or repair of irrigation systems?	X			X
5.	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land ?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas,wetlands, critical wildlife habitat or nesting areas.?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic,physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any waterbody?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		

23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		
OTHER					
34	Does the project/Activity involve a sub-grant component? ⁶				

RECOMMENDED ACTION <i>(Check Appropriate Action):</i>	<i>(Check)</i>
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more	

extensive review and monitoring.

² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.

³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.

⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).

⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.

⁶ If the Project/Activity includes a sub-grant component, each sub-grantee shall be required to prepare an EMPR prior to implementation of the sub-grant.

Table 2: Identification of Mitigation Plan

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
1	Rehabilitation of intake system (design, location, operation, maintenance)	Use of unreliable stream flow data leading to excessive intake Poor design due to lack of data leading to overuse and/or loss of water	Stream flow monitoring Development of system's operation and management (O&M)
4	Construction or repair of irrigation network	Earthworks will contribute to a large amount of soil movement causing erosion and sedimentation Non-maintenance of irrigation canals will lead to recurring operational and productivity problems Material cleaned or dredged from canals not disposed of or used properly	Bring awareness to project engineers for the design, construction and supervision of work related to soil movement and erosion Strengthen the capacity of WUAs so that they become operational and sustainable and able to maintain the irrigation system on an ongoing basis Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the berms separating the rice parcels

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
7	Disposal of used engine oil	Oil and fuel spills from trucks or their improper disposal	Promote the limitation of heavy machinery and equipment during the construction phase
9	Sensitive terrestrial or aquatic areas near the project site	Siltation and other pollutants will enter the water body and may harm aquatic fauna and flora	Reduce use of chemicals and monitoring of water quality
10	Generation of airborne gases, liquids, or solids	Harmful exhaust smoke, fumes, and dust from construction in surrounding communities	Promote the limitation of vehicles and machines during construction phase; reduce use of airborne chemicals
11	Waste generation and surface and groundwater	Improper disposal of solid waste during construction causing contamination and pollution	Establishment of comprehensive waste management program monitored by AVANSE
15	Contribution to erosion	Earthworks contribution to large amount of soil movement leading to erosion, sedimentation	Bring awareness to project engineers for the design, construction and supervision of work related to soil movement and soil erosion

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
19	Impacts to inhabitants, natural landscape	Establishment of worker camps and other work facilities causing pollution, erosion, social unrest Exploitation of borrow pits causing loss of vegetation, farmland, dust, health & public safety problems, wildlife decline	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition Request AVANSE's approval prior to exploitation of borrow pits
24	Increase of waterborne diseases	Use of irrigation water for drinking, bathing, and washing of clothes (laundry) leading to pollution, sickness	Discourage people from using reservoir or canal water Encourage local authorities to provide safe drinking water to population
27	Increasing existing noise levels	Noise becomes unbearable nuisance to workers; vehicles and machines will produce noise unpleasant to communities	Promote the limitation of heavy machinery and equipment during the construction phase

* provide overview of measures used from the USAID LAC Environmental Guidelines or other pertinent guidelines, details on exact monitoring plan are illustrated in Table 3, Environmental Monitoring and Evaluation Tracking Table.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Stream flow and weather monitoring Development of system's O&M	Implementation: AVANSE Technical Team Monitoring: AVANSE Technical Team	Establish hydro-meteorological stations Develop system's O&M	Hydrometeorological stations are in operations Regular flow measurement O&M plan is operational	Weekly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
2	Bring awareness to project engineers for the design, construction and supervision of work	Implementation: AVANSE Technical Staff Monitoring: AVANSE Technical Team	Design includes mitigation measures Request for authorization filed and approved No excessive destruction of	Review of documentation Site visits	During design (documents reviewed) At time of requests Weekly/periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
			vegetation							
3	Strengthen the capacity of WUAs so that they become operational and sustainable and able to maintain the irrigation system on an ongoing basis	Implementation: AVANSE rice team Monitoring: AVANSE Technical Team	Canals cleaned on a regular basis or schedule	Site visits	Quarterly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
4	Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to	Implementation: AVANSE rice team Monitoring: AVANSE Technical Team	Sediment used to build canal slopes; debris used to reinforce berms	Site visits	Quarterly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	farmers to reinforce the berms separating the rice parcels									
5	Promote the limitation of heavy machinery and equipment during the construction phase to reduce fuel spills	Implementation: Subcontractor Monitoring: AVANSE Technical Team	No spill is recorded Fuels and lubricants are stored	Site visits	Periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
6	Reduce use of chemicals and monitoring of water quality	Implementation: Subcontractor Monitoring: AVANSE	Separate car wash facilities No spill is recorded Water tested	Site visits Water sampling and testing	regular	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		Technical Team	below threshold levels							
7	Promote the limitation of vehicles and machines during construction phase; reduce use of airborne chemicals	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Dust generation and emissions from machines and vehicles are minimal No Complaints from workers and the community	Document complaint book kept by liaison officer Site visits	periodic	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
8	Establishment of comprehensive waste management program monitored by AVANSE	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Waste and hazardous substances management plan has been approved and is operational No spill is recorded Solid wastes are properly handled	Document plan approval	Subcontract or mobilization weekly	No cost, normal obligation of staff salaries				
9	Bring awareness to project engineers for	Implementation: Subcontractor	Erosion controls are in place	Erosion management plan approval	During design (document review)	No cost, normal obligation of staff				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	the design, construction and supervision of work related to soil movement and soil erosion	Monitoring: AVANSE Technical Team			periodic	salaries				
10	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Toilet and hand-washing facilities available and properly supplied	Review of training materiel Spot attendance	Subcontractor mobilization as presented Daily supervision	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
11	Request AVANSE's approval prior to exploitation of borrow pits.	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Borrow pits are being properly managed according to approved plans Proper closure and contouring of borrow pits	Site visits Final closure inspection	Borrow pit closure	No cost, normal obligation of staff salaries				
12	Discourage people from using reservoir or canal water Encourage	Implementation: Subcontractor Monitoring: AVANSE	Meeting with local authorities Awareness campaign about the	Other drinking water sources are identified or provided to the population Less people are	Before the start of the project periodic	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	local authorities to provide safe drinking water to population	Technical Team	quality of the canal and reservoir water	using reservoir or canal water Site visits						
13	Promote the limitation of heavy machinery and equipment during the construction phase	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Noise level is kept below 50 dB during the day No complaints on excessive noise by workers and community	Document complaint book kept by liaison officer Site visits	Periodic	No cost, normal obligation of staff salaries				

Comment: The Dubré perimeter is located in the Haut du Cap watershed. At present, about 82 hectares are irrigated. AVANSE proposes to irrigate another 58 hectares and bring the total irrigated area to about 140 hectares. Currently, water from the river **Anba Lanmè** is used to irrigate the 82 ha perimeter. The low flow of the river has been estimated at 150 liters per second (lps). In order to protect the environment only 120 lps will be used for irrigation purpose leaving 30 lps to flow downstream. The principal crops that are grown in the area are: rice, banana, beans, and manioc.

The problems that have been identified with the system are as follows:

- Multiplicity of outlets on banks along the river due to the poor placement of the dam around the perimeter;
- No maintenance and no decision-making body, despite the absence of coarse sediment;
- Very poor water management on the perimeter (lack of distribution and control gates);
- The primary canals are built in earth and very porous;
- There are deposits of sediment throughout the system;
- Obstruction of the natural outlet impeding the natural drainage of salt;
- Excessive use of fertilizer for crops;
- Absence of adequate drainage to drain salts which will cause long-term groundwater salinization;
- The canals are too low to be able to easily irrigate the plots;
- Conflicts among water users during the low-flow period;
- Silting of the river bed;
- Overflow of the river and saturation of the dam by flood water during high flow periods; and
- The system is not connected to a formal drainage system.

The proposed actions to address these problems are the following :

- At the level of the inlet, a masonry retaining wall is to be built to consolidate the river bank; the bottom of the riverbed will be stabilized downstream of the inlet with gabion soles; dredge the river to a length of 3 meters, a width of 5 meters and a depth of 0.8 meters upstream of the inlet to reduce sediment; repair the 3 existing gate valves and grill.
- At the level of the canals, raise the canals, fix the canal walls, repair canal counter slopes, retrofit canals, and repair the gate valves on the system.
- At the drainage level, retrofit some drains and improve the drainage system outlet.
- At the level of the road network, improve access by rehabilitating 1.5 km of the path located along the Montalibord river.
- In the expansion area, build a water inlet and build the canal system to cover the expansion area.

Given this context and the planned work, the environmental impacts that have to be considered are:

1. **Soil Erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas and agricultural plots are being worked on. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils will equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.
2. **Soil Pollution:** It is anticipated that the sub-contractor will bring vehicles and equipment to be used during construction. These may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being moved to and from a work site may pass through agricultural fields and impact agricultural soil with oil and fuel spills. In addition, areas where the contractor will store fuels, lubricants and chemicals are stored or where vehicles and equipment are fueled or serviced will be sources of hazardous substance releases to the soil. Improper disposal of concrete wastes

resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.

3. **Erosion and ecosystem damage at construction material borrow pits:** There are a few places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the sub-contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.
4. **Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if proper drainage is not installed and the drainage system is not well maintained.
5. **Loss of Top Soil:** Construction of irrigation and drainage structures will require fill material which will generally be taken from canal and drain excavations or off-site locations. During the construction of secondary and tertiary canals, however, some fill material may be taken from adjacent fields, particularly if the field is in need of land leveling. In these cases, the potential exists for the destruction of top soil.
6. **Water Contamination:** If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:
 - Washing construction vehicles or equipment in or nearby the river;
 - Use of the rivers and canals for the maintenance of the personal hygiene of the population;
 - Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
 - Surface run-off from on-site stockpiled sand and gravel; and
 - Inadequate disposal of solid wastes and wastewater generated during construction from workers.
7. **Waste Generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. These will include solid waste from packaging materials, wood and steel crates, cardboard, wrapping materials, boxes, sacks, drums, cans and chemical containers and any other unused materials. Workers will also generate domestic solid waste. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
8. **Dust and Air Pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes and dust that may be unpleasant to the surrounding communities.
9. **Noise Pollution:** The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area.
10. **Exploitation of Borrow Pits:** The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and becomes breeding ground for disease vectors and with inadequate consultation with land owners, borrow pits can become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the approval of AVANSE.
11. **Establishment and use of other worksites:** There is the need for the sub-contractors to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for their equipment, storage for materials to be used for the works, and includes siting of offices and/or residences. This entails:
 - Land acquisition/Lease,
 - Clearing,

- Erection of structures, and
 - Provision of sanitary facilities.
- The establishment of worker camps and other work facility locations in the area may bring a number of negative impacts on the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.
- 12. Community – Worker – Sub-contractor relations:** Friction may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STIs and Increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, bad relations may exist between members of the community and the sub-contractors caused by community complaints not been properly addressed by the sub-contractors.
 - 13. Hydrology and hydrologic monitoring:** The lack of hydrologic data is a problem that may contribute to poor irrigation design. When hydrologic data is lacking, engineers attempt to correlate site hydrology with data from the nearest available catchment, with a considerable loss in precision. Hydrologic data is also required in monitoring and mitigation. An example is the impact of the irrigation construction and use on stream flow and depth of the water table. The project will have to be designed with the understanding that data development will be part of the system's O&M.
 - 14. Irrigation engineering:** Irrigation engineering includes the design, construction, operation and maintenance of an irrigation system. Traditionally, small irrigation systems are designed based on the hydrology and geomorphology of an area. The lack of appropriate information combined with modern engineering solutions developed for larger systems, could lead to problems when applied to the redesign of traditional systems.
 - 15. Effect on Fauna and Flora:** Where the project is located, the only animals that could be impacted by its activities are fish and amphibians. As the system drains to the nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on these coastal waters.
 - 16. Displacement of Economic Activities:** Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the flood flows into the area, on which the farmers rely for their crops.
 - 17. Water Rights:** Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It can be a major source of conflict among beneficiaries of the system.
 - 18. Conflict resolution:** Conflict often arises between upstream users, who begin to use or increase their use of water, and downstream users, who may have prior appropriation rights to the water. Any change in the availability or use of irrigation water requires consultation to ensure equitable sharing and avoid conflict.
 - 19. Community participation in irrigation rehabilitation design, operation and maintenance:** Unless the local associations in the project area are made part of this project, there could be major issues with the people of the community in order to ensure that the design is compatible with the needs of the community. The community, through an effective farmer's association will have to take responsibility for the management, operation and maintenance of the system.
 - 20. Women's participation:** Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.
 - 21. Vector borne diseases (malaria, chikungunya, dengue):** Vector borne disease are endemic in Haiti and are present in the Haut du Cap watershed. The disease vectors live nearby and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.
 - 22. Water borne diseases (diarrhea, typhoid, dysentery, etc.):** The use of irrigation water for drinking, bathing, and clothes washing is very current in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal and drainage water for drinking and washing.

This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.

23. Safety Hazards: Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.

24. HIV/AIDs, sexually transmitted infections (STIs): Workers' camps may be a source of social unrest and environmental problems such as transmission and spread of diseases (e.g. or sexually transmitted diseases (STDs)) to the resident community by the project personnel and vice versa.

25. Change of Community Lifestyle: The construction of the irrigation scheme will have an impact on the day-to-day lives of the people living in the area. An influx of workers to the area will bring increased economic activity, with and associated positive impact. But the workers may also bring with them behaviors which disrupt the community and puts them and the community at increased risk for conflicts.

Mitigation measures specified in the PEA (see table following this environmental screening form) will therefore be applied to mitigate the potential impacts listed above.

Overall, the following strategies will be implemented to mitigate the potential impacts described above:

- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards.
- Bring awareness of these potential issues and their impact to the engineers and construction contractors who will be responsible for the design, construction and supervision of the project.
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behaviour of farmers during and after the rehabilitation of the system.
- Monitor the rehabilitation activities of the projects during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.

Table 1. Environmental Screening Form

Name of Ferrier (Bas Maribahoux) Irrigation system, Jassa Watershed Activity:___(Drainage not requiring additional surface water withdrawals)_____ Type of Activity:___Infrastructure / Canal Cleaning _____ Contractor/Grantee: DAI _____ Date:_05 August 2015_____ IEE/ETD #____LAC-IEE-14-17_____ 		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium- Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc?		X		
4	Involve the construction or repair of irrigation systems?	X			X
5.	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land ?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas,wetlands, critical wildlife habitat or nesting areas.?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity <u>in</u> compatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic,physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any waterbody?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		

22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		
OTHER					
34	Does the project/Activity involve a sub-grant component? ⁶				

RECOMMENDED ACTION (<i>Check Appropriate Action</i>):	(Check)
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more	

extensive review and monitoring.

² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.

³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.

⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).

⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.

⁶ If the Project/Activity includes a sub-grant component, each sub-grantee shall be required to prepare an EMPR prior to implementation of the sub-grant.

Table 2: Identification of Mitigation Plan

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
4	Construction or repair of irrigation network	Earthworks will contribute to a large amount of soil movement causing erosion and sedimentation Non-maintenance of irrigation canals will lead to recurring operational and productivity problems Material cleaned or dredged from canals not disposed of or used properly	Bring awareness to project engineers for the design, construction and supervision of work related to soil movement and erosion Strengthen the capacity of WUAs so that they become operational and sustainable and able to maintain the irrigation system on an ongoing basis Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the berms separating the rice parcels
7	Disposal of used engine oil	Oil and fuel spills from trucks or their improper disposal	Promote the limitation of heavy machinery and equipment during the construction phase
9	Sensitive terrestrial or aquatic areas near the project site	Siltation and other pollutants will enter the water body and may harm aquatic fauna and flora	Reduce use of chemicals and monitor water quality

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
10	Generation of airborne gases, liquids, or solids	Harmful exhaust smoke, fumes, and dust from construction in surrounding communities	Promote the limitation of vehicles and machines during construction phase; reduce use of airborne chemicals
11	Waste generation and surface and groundwater	Improper disposal of solid waste during construction causing contamination and pollution	Establishment of comprehensive waste management program monitored by AVANSE
15	Contribution to erosion	Earthworks contribute to large amount of soil movement leading to erosion, sedimentation	Bring awareness to project engineers for the design, construction and supervision of work related to soil movement and erosion
19	Impacts to inhabitants, natural landscape	Establishment of worker camps and other work facilities causing pollution, erosion, social unrest Exploitation of borrow pits causing loss of vegetation,	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition Request AVANSE's approval prior to exploitation of borrow pits.

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
		farmland, dust, health and public safety problems, wildlife decline	
27	Increasing in existing noise levels	Noise becomes unbearable nuisance to workers; vehicles and machines will produce noise unpleasant to communities	Promote the limitation of heavy machinery and equipment during the construction phase

* provide overview of measures used from the USAID LAC Environmental Guidelines or other pertinent guidelines, details on exact monitoring plan are illustrated in Table 3, Environmental Monitoring and Evaluation Tracking Table.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Strengthen the capacity of WUAs so that they become	Implementaion: AVANSE rice	Canals cleaned on a	Site visits	Quarterly	No cost, normal obligation	1			
							2			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	operational and sustainable and able to maintain the irrigation system on an ongoing basis	team Monitoring: AVANSE Technical Team	regular basis or schedule			of staff salaries	3			
							4			
2	Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the berms separating the rice parcels	Implementation: AVANSE rice team Monitoring: AVANSE Technical Team	Sediment used to build canal slopes; debris uses to reinforce berms	Site visits	Quarterly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
3	Promote the limitation of heavy machinery and equipment during the construction phase to reduce fuel spills	Implementation: Subcontractor Monitoring: AVANSE Technical Team	No spill is recorded Fuels and lubricants are stored	Site visits	Periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
4	Reduce use of	Implementation:	Separate	Site visits	regular	No cost,	1			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	chemicals and monitor water quality	Subcontractor Monitoring: AVANSE Technical Team	car wash facilities	Water sampling and testing		normal obligation of staff salaries	2			
			No spill is recorded				3			
			Water tested below threshold levels				4			
5	Promote the limitation of vehicles and machines during construction phase; reduce use of airborne chemicals	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Dust generation and emissions from machines and vehicles are minimal No complaints from workers	Document complaint book kept by liaison officer Site visits	periodic	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
			and the community							
6	Establishment of comprehensive waste management program monitored by AVANSE	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Waste and hazardous substance management plan has been approved and is operational No spill is recorded Solid wastes are properly handled	Document plan approval	Subcontractor mobilization weekly	No cost, normal obligation of salaries staff				
7	Bring awareness to project engineers for the design, construction and supervision of work related to soil	Implementation: Subcontractor Monitoring: AVANSE	Erosion controls are in place	Erosion plan approval	During design (document review)	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	movement and erosion	Technical Team			periodic					
8	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Toilet and handwashing facilities available and properly supplied	Review of training materiel Spot attendance	Subcontractor mobilization as presented Daily supervision	No cost, normal obligation of staff salaries				
9	Request AVANSE's approval prior to exploitation of borrow pits.	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Borrow pits are being properly managed according to approved plans Proper closure and contouring	Site visits Final closure inspection	Borrow pit closure	No cost, normal obligation of staff salaries				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
			of borrow pits							
10	Promote the limitation of heavy machinery and equipment during the construction phase	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Noise level is kept below 50 dB during the day No complaints on excessive noise by workers and community	Document complaint book kept by liaison officer Site visits	Periodic	No cost, normal obligation of staff salaries				

Table 1. Environmental Screening Form

Name of Grison –Garde Irrigation Sytem, Haut du Cap Watershed Activity:___(irrigation system not requiring additional surface water withdrawals)_____ Type of Activity:___Infrastructure_____ Contractor/Grantee: DAI _____ Date: _05 August 2015_____ IEE/ETD # ___LAC-IEE-14-17_____ 		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc?		X		
4	Involve the construction of repair of irrigation systems?	X			X
5.	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land ?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas,wetlands, critical wildlife habitat or nesting areas.?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		

15	Will the activity contribute to erosion?	X			X
16	Is the activity <u>in</u> compatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic,physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any waterbody?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		
OTHER					
34	Does the project/Activity involve a sub-grant component? ⁶				

RECOMMENDED ACTION <i>(Check Appropriate Action):</i>	<i>(Check)</i>
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed. ⁶ If the Project/Activity includes a sub-grant component, each sub-grantee shall be required to prepare an EMPR prior to implementation of the sub-grant.	

Table 2: Identification of Mitigation Plan

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
1	Rehabilitation of Grison Garde intake system (design, location, operation, maintenance)	Use of unreliable stream flow data leading to excessive intake Poor design due to lack of data leading to overuse and/or loss of water	Stream flow monitoring Development of system's O&M
4	Construction or repair of irrigation network	Earthworks will contribute to a large amount of soil movement causing erosion and sedimentation Non-maintenance of irrigation canals will lead to recurring operational and productivity problems Material cleaned or dredged from canals not disposed of or used properly	Bring awareness to project engineers for the design, construction and supervision of work Strengthen the capacity of WUAs so that they become operational and sustainable and able to maintain the irrigation system on an ongoing basis Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
			berms separating the rice parcels
7	Disposal of used engine oil	Oil and fuel spills from trucks or their improper disposal	Promote the limitation of heavy machinery and equipment during the construction phase
9	Sensitive terrestrial or aquatic areas near the project site	Siltation and other pollutants will enter the water body and may harm aquatic fauna and flora	Reduce use of chemicals and monitoring of water quality
10	Generation of airborne gases, liquids, or solids	Harmful exhaust smoke, fumes, and dust from construction in surrounding communities	Promote the limitation of vehicles and machines during construction phase, reduce use of airborne chemicals
11	Waste generation and surface and groundwater	Improper disposal of solid waste during construction causing contamination and pollution	Establishment of comprehensive waste management program monitored by AVANSE
15	Contribution to erosion	Earthworks contribution to large amount of soil movement leading to erosion,	Bring awareness to project engineers for the design, construction and supervision of work

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
		sedimentation	
19	Impacts to inhabitants, natural landscape	Establishment of workers camps and other work facilities causing pollution, erosion, social unrest Exploitation of borrow pits causing loss of vegetation, farmland, dust, health & public safety problems, wildlife decline	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition Request AVANSE's approval prior to exploitation of borrow pits.
24	Increase of waterborne diseases	Use of irrigation water for drinking, bathing, and clothes washing leading to pollution, sickness	Discourage people from using reservoir or canal water Encourage local authorities to provide safe drinking water to population
27	Increasing existing noise levels	Noise becomes unbearable nuisance to workers; vehicles and machines will produce noise unpleasant to	Promote the limitation of heavy machinery and equipment during the construction phase

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
		communities	

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Stream flow and weather monitoring Development of system's operation and maintenance (O&M)	Implementation: AVANSE Technical Team Monitoring: AVANSE Technical Team	Establish hydro-meteorological stations Develop system's O&M	Hydrometeorological stations are in operation Regular flow measurement O&M plan is in operation	Weekly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
2	Bring awareness to project engineers for the design, construction and supervision of work	Implementation: AVANSE Technical Staff Monitoring: AVANSE Technical Team	Design includes mitigation measures Request for authorization filed and approved No excessive destruction of vegetation	Document review process Review of documentation Site visits	During design documents review At time of requests Weekly/periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
3	Strengthen the capacity of WUAs so that they become operational and sustainable and able to maintain the irrigation system on an ongoing basis	Implementation: AVANSE rice team Monitoring: AVANSE Technical Team	Canals cleaned on a regular basis or schedule	Site visits	Quarterly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
4	Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the	Implementation: AVANSE rice team Monitoring: AVANSE Technical Team	Sediment used to build canal slopes; debris used to reinforce berms	Site visits	Quarterly	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	berms separating the rice parcels									
5	Promote the limitation of heavy machinery and equipment during the construction phase to reduce fuel spills	Implementation: Subcontractor Monitoring: AVANSE Technical Team	No spill is recorded Fuels and lubricants are stored	Site visits	Periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
6	Reduce use of chemicals and monitoring of water quality	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Separate car wash facilities No spill is recorded Water tested below threshold	Site visits Water sampling and testing	regular	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
			levels							
7	Promote the limitation of vehicles and machines during construction phase; reduce use of airborne chemicals	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Dust generation and emissions from machines and vehicles are minimal No Complaints from workers and the community	Document complaint book kept by liaison officer Site visits	periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
8	Establishment of comprehensive waste	Implementation: Subcontractor	Waste and hazardous substance management	Document plan approval	Subcontractor mobilization weekly	No cost, normal obligation of staff	1			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	management program monitored by AVANSE	Monitoring: AVANSE Technical Team	ment plan has been approved and is operational			salaries	2			
			No spill is recorded				3			
			Solid wastes are properly handled				4			
9	Bring awareness to project engineers for the design, construction and supervision of work	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Erosion controls are in place	Erosion plan approval	During design: document review periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
10	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Toilet and hand-washing facilities available and properly supplied	Review of training material Spot attendance	Subcontractor mobilization as presented Daily supervision	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
11	Request AVANSE's approval prior to exploitation of borrow pits	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Borrow pits are being properly managed according to approved plans Proper closure and contouring of	Site visits Final closure inspection	Borrow pit closure	No cost, normal obligation of staff salaries	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
			borrow pits				4			
1 2	Discourage people from using reservoir or canal water Encourage local authorities to provide safe drinking water to population	Implementation: Subcontractor Monitoring: AVANSE Technical Team	Meeting with local authorities Awareness campaign about the quality of the canal and reservoir water	Other drinking water sources are identified or provided to the population Less people are using reservoir or canal water Site visits	Before the start of the project periodic	No cost, normal obligation of staff salaries	1			
							2			
							3			
							4			
1 3	Promote the limitation of heavy machinery and equipment during the	Implementation: Subcontractor Monitoring: AVANSE	Noise level is kept below 50 dB during the day	Document complaint book kept by liaison officer	Periodic	No cost, normal obligation of staff salaries	1			
			No complaints	Site visits			2			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	construction phase	Technical Team	on excessive noise by workers and community				3			
							4			

Comments:

The total irrigated area covers 220 ha of land yet an extension of 130 ha is possible, which would increase the irrigated area to 350 ha. Environmental concerns related to the Grison-Garde Irrigation System can be summarized as follows:

- Soil erosion upstream of the dam resulting in sedimentation of the dam.
- Heavy sediment (rocks) deposits in the dam.
- Agricultural practice of weeding around the primary channel causing sediment deposits in the channel after each storm.
- The obstruction of the natural outlet constraining drainage of salts.
- Excessive fertilizer use causing salinization.
- Salinization of groundwater system due to the lack of an adequate drainage system to eliminate salts.
- Proximity of the irrigation channels to the roads.
- Outbreak of social conflict when water levels are low.
- Displacement of the riverbed.
- Erosion of the right side of the dam (risks caving in) by water in heavy rain and flood periods.
- Planting of crops in drainage channels connected with the primary channel.

To overcome these problems, the following mitigation actions will be undertaken:

- Define a management plan with the IR2 specialists to protect the upstream area of the dam permanently and reduce river sedimentation to a minimum.
- Rehabilitate drainage systems to allow the evacuation of excess water in cases of heavy rainfall.
- Identify an appropriate natural outlet for the system.
- Assist farmers in establishing quantities of chemical fertilizers to be used (reduced amount for rice) to prevent salinization.
- Build retaining walls or gabion structures to the right of the dam to prevent erosion underway (and associated risk of caving in) and migration of the riverbed.
- Consolidate the irrigation channels already built alongside the roads to prevent the overflow of water onto the roads.
- Establish a protected area for each drainage channel (free of agriculture) to facilitate the infiltration and evacuation of water during periods of flooding.

Given the above work proposed for the Grison Garde Irrigation System, the key environmental impact factors that will have to be addressed are the following:

1. **Soil erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas, and agricultural plots are being worked on. Soil from disturbed surfaces is likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soil will also be washed away into the canals and in turn, the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks, and the characteristics of the overburden in the area which is easily erodible.
2. **Soil pollution:** It is anticipated that the contractor will bring vehicles and equipment to the worksite. Oil and fuel spills from this equipment could impact the soil. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being moved to and from a work site may pass through agricultural fields and also impact agricultural soil through oil and fuel spills. In addition, areas where the contractor will store fuels, lubricants, and chemicals or where vehicles and equipment are fueled or serviced, represent a source of hazardous substances being released into the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.
3. **Erosion and ecosystem damage at construction material borrow pits:** There are a few

places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the sub-contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.

4. **Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if an adequate drainage system is not installed and maintained.
5. **Waste generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. These will include solid waste from packaging materials, wood and steel crates, cardboard, wrapping materials, boxes, sacks, drums, cans and chemical containers, and any other unused materials. Workers will also generate domestic solid waste. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
6. **Dust and air pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes, and dust that may be harmful to the surrounding communities.
7. **Noise pollution:** The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area.
8. **Exploitation of borrow pits:** The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and a breeding ground for disease vectors. Without adequately consulting with land owners, borrow pits can also become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the approval of AVANSE.
9. **Establishment and use of other worksites:** There is the need for sub-contractors to establish a construction camp in order to facilitate activities pertaining to the realization of the project. It also provides security for their equipment, and storage for materials to be used for the works. This will entail the following:
 - Land acquisition/Lease,
 - Clearing,
 - Construction of structures, and
 - Provision of sanitary facilities

The establishment of workers camps and other work facility locations in the area may bring a number of negative impacts on the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.
10. **Community – worker – contractors relations:** Friction may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STIs and Increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, complaints coming from the community left unaddressed may also provoke bad relations between members of the community and the sub-contractors.
11. **Hydrology and hydrologic monitoring:** The lack of hydrological data is a problem that may contribute to poor irrigation design. When hydrologic data is lacking, engineers attempt to correlate site hydrology with data from the nearest available catchment, resulting in a considerable loss of precision. Hydrological data is also required in monitoring and mitigation. An

example is the impact of the irrigation construction and use on stream flow and depth of the water table. The project will have to be designed with the understanding that data development will be part of the system's O&M.

12. **Irrigation engineering:** Irrigation engineering includes the design, construction, operation, and maintenance of an irrigation system. Traditionally, small irrigation systems are designed based on the hydrology and geomorphology of an area. The lack of appropriate information combined with modern engineering solutions developed for larger systems, could lead to problems when applied to the redesign of traditional systems.
13. **Effect on fauna and flora:** Considering the project location, the animals that could be impacted by project activities are fish and amphibians. As the system drains to nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on these coastal waters.
14. **Displacement of economic activities:** Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the flows into the area, on which the farmers rely for their crops.
15. **Water rights:** Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It can be a major source of conflict among beneficiaries of the system.
16. **Conflict resolution:** Conflict often arises between upstream users, who begin to use or increase their use of water, and downstream users, who may have prior appropriation rights to the water. Any change in the availability or use of irrigation water requires consultation between both upstream and downstream users to ensure equitable sharing and avoid conflict.
17. **Community participation in irrigation rehabilitation design, operation and maintenance:** Unless the local associations in the project area are made part of this project, there could be major tension with community in terms of ensuring that the design is compatible with their needs. The community, through an effective farmers' association will have to take responsibility for the management, operation and maintenance of the system.
18. **Women's participation:** Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.
19. **Water borne diseases (diarrhea, typhoid, dysentery, etc.):** The use of irrigation water for drinking, bathing, and clothes washing is a common practice in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal, and drainage water for drinking and bathing. This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.
20. **Safety hazards:** Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for residents of nearby communities. These residents may not be aware of the hazards and may be interested in observing the activities. Specifically, children are often eager to see construction equipment at work. Such curiosity may lead to accidents ranging from minor to major injuries such as bruises and fractures.
21. **HIV/AIDs, sexually transmitted infections (STIs):** Workers' camps may be a source of social unrest and environmental problems including the transmission and spread of diseases (e.g. or sexually transmitted diseases (STDs)) to the resident community by the project personnel and vice versa.

Mitigation measures specified in the PEA (see table following this environmental screening form) will therefore be applied to mitigate the potential impacts listed above.

The following strategies will be implemented to mitigate the potential impacts described above:

- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards;
- Bring awareness of these potential issues and their impact to the engineers and construction contractors who will be responsible for the design, construction and supervision of the project;
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behaviour of farmers during and after the rehabilitation of the system;
- Monitor the rehabilitation activities of the projects during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.

Table 1. Environmental Screening Form

Name of Activity:	La Suisse Irrigation System Rehabilitation, Haut du Cap Watershed (irrigation system not requiring additional surface water withdrawals)	Column A	Column B	Col C	
Type of Activity:	Infrastructure/Rehabilitation			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	20 April 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?	X			X
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X		X	
20	Will the activity contribute to change in the amount of surface water in any water body?	x		x	
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		• Column A	• Column B	• Col C	
		• Yes	• No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	x
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and inmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: La Suisse farming area is estimated at 137 ha. Of this, about 63 hectares are currently irrigated. The system takes water from the Marianné River (from two sides of the river). Water enters the system through the water inlets. Then water is transported to the fields by a system of canals whose total length is about 7,246 meters of which about 68% is in masonry and 32% in earth. The land is relatively flat with a slope of less than 2%.

The system is controlled by a number of gate valves of which 2 are placed in the inlet structures, 2 on the primary canals allowing water to flow through the system, 6 gate valves supplying the secondary canals, and a series of gate valves on secondary canals supplying water to the tertiary canals. Secondary canals extended by tertiary earth canals use artisanal means, such as branches, as gates. The drainage system is inexistent due to the poor preparation of the irrigated fields. The total length of the system is about 2081 meters. About 86% of the drained water from the perimeter exits to the Marianné River and the remaining 14% of the perimeter drains into the Parque River. In general the drains are in very bad shape and must be rehabilitated. The system is currently managed by l'AILS which has 34 active members. Of these, 13 are women. There are many conflicts among the farmers which are primarily due to access to available water.

The infrastructure problems of the current irrigation system are the following:

- The dam is sited too low to supply upstream farming land with water.
- The gate valves are porous.
- Counter slopes on secondary masonry canals which do not allow water to reach the end plots.
- Earth canals are not properly maintained. They are losing water through infiltration. Their capacity is reduced due to heavy siltage and vegetation growth on their banks.
- Some canals are still not completely built and therefore discharge water into open fields.
- There are no drains in the irrigated parcels.
- There are no dykes to protect parcels which are easily flooded during high water periods.

To address these problems, the following actions have been proposed:

- Complete the irrigation canals.
- Rehabilitate masonry canals including the installation of new gate valves.
- Develop the drainage system.
- Retrofit the riverbed to facilitate the flow of water.
- Build dykes to protect parcels against high water flows.
- Rehabilitate water intake.
- Build the system's extension.

Given the above work to be done on the "La Suisse" irrigation system, the key environmental impact factors that will have to be addressed are the following:

- 1. Soil Erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas and agricultural plots are being worked on. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils will equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.
- 2. Soil Pollution:** It is anticipated that the sub-contractor will bring vehicles and equipment to be

used during construction. These may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being moved to and from a work site may pass through agricultural fields and impact agricultural soil with oil and fuel spills. In addition, areas where the sub-contractor will store fuels, lubricants and chemicals are stored or where vehicles and equipment are fueled or serviced will be sources of hazardous substance releases to the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.

3. **Erosion and ecosystem damage at construction material borrow pits:** There are a few places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the sub-contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.
4. **Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if proper drainage is not installed and the drainage system is not well maintained.
5. **Loss of Top Soil:** Construction of irrigation and drainage structures for La Suisse will require fill material which will generally be taken from canal and drain excavations or off-site locations. During the construction of secondary and tertiary canals, however, some fill material may be taken from adjacent fields, particularly if the field is in need of land leveling. In these cases, the potential exists for the destruction of top soil.
6. **Water Contamination:** If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:
 - Washing construction vehicles or equipment in or nearby the river;
 - Use of the rivers and canals for the maintenance of the personal hygiene of the population;
 - Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
 - Surface run-off from on-site stockpiled sand and gravel; and
 - Inadequate disposal of solid wastes and wastewater generated during construction from workers.
7. **Waste Generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. These will include solid waste from packaging materials, wood and steel crates, cardboard, wrapping materials, boxes, sacks, drums, cans and chemical containers and any other unused materials. Workers will also generate domestic solid waste. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
8. **Dust and Air Pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes and dust that may be unpleasant to the surrounding communities.
9. **Noise Pollution:** The vehicles and machines used in the civil works will produce noise that

may be unpleasant to communities who live near the project area.

10. Exploitation of Borrow Pits: The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, and public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and becomes breeding ground for disease vectors and with inadequate consultation with land owners, borrow pits can become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the approval of AVANSE.

11 Establishment and use of other worksites: There is the need for the sub-contractors to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for equipment, storage for materials to be used for the works, and includes siting of offices and/or residences This entails:

- Land acquisition/Lease;
- Clearing;
- Erection of structures; and
- Provision of sanitary facilities.

The establishment of workers camps and other work facility locations in the area may bring a number of negative impacts on the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.

12. Community – Worker – Contractors relations: Friction may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STIs and increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, bad relations may exist between members of the community and the sub-contractors caused by community complaints not been properly addressed by the sub-contractors.

13. Hydrology and hydrologic monitoring: The lack of hydrologic data is a problem that may contribute to poor irrigation design. When hydrologic data is lacking, engineers attempt to correlate site hydrology with data from the nearest available catchment, with a considerable loss in precision. Hydrologic data is also required in monitoring and mitigation. An example is the impact of the irrigation construction and use on stream flow and depth of the water table. The project will have to be designed with the understanding that data development will be part of the system's O&M.

14. Irrigation engineering: Irrigation engineering includes the design, construction, operation and maintenance of an irrigation system. Traditionally, small irrigation systems are designed with according to the hydrology and geomorphology of an area. The lack of appropriate information combined with modern engineering solutions developed for larger systems, could lead to problems when applied to the redesign of traditional systems.

15. Effect on Fauna and Flora: Where the project is located, the only animals that could be impacted by its activities are fish and amphibians. As the system drains to the nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on these coastal waters.

16. Displacement of Economic Activities: Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the flood flows into the area, on which the farmers rely for their crops.

17. Water Rights: Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It is a major source of conflict among beneficiaries of the system.

18. Conflict resolution: Conflict often arises between upstream users, who begin to use or

increase their use of water, and downstream users, who may have prior appropriation rights to the water. Any change in the availability or use of irrigation water requires consultation to ensure equitable sharing and avoid conflict.

19. Community participation in irrigation rehabilitation design, operation and maintenance:

Unless the local associations in the project area are made part of this project, there could be major issues with the people of the community in order to ensure that the design is compatible with the needs of the community. The community, through an effective farmer's association will have to take responsibility for the management, operation and maintenance of the system.

20. Women's participation: Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.

21. Vector borne diseases (malaria, chikungunya, dengue): Vector borne disease are endemic in Haiti and are present in the Haut du Cap watershed where La Suisse is located. The disease vectors live nearby and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.

22. Water borne diseases (diarrhea, typhoid, dysentery, etc.): The use of irrigation water for drinking, bathing, and clothes washing is very current in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal and drainage water for drinking and washing. This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.

23. Safety Hazards: Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.

24. HIV/AIDs, sexually transmitted infections (STIs): Workers' camps may be a source of social unrest and environmental problems such as transmission and spread of diseases (e.g. or sexually transmitted diseases (STDs)) to the resident community by the project personnel and vice versa.

25. Change of Community Lifestyle: The construction of the irrigation scheme will have an impact on the day-to-day lives of the people living in the area. An influx of workers to the area will bring increased economic activity, with an associated positive impact. But the workers may also bring with them behaviors which disrupt the community and puts them and the community at increased risk for conflicts.

Mitigation measures specified in the PEA (see table following this environmental screening form) will therefore be applied to mitigate the potential impacts listed above.

In addition, the following strategies will be implemented to mitigate the potential impacts described above:

- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards.

- Bring awareness of these potential issues and their impact to the engineers and construction sub-contractors who will be responsible for the design, construction and supervision of the project.
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behavior of farmers during and after the rehabilitation of the system.
- Monitor the rehabilitation activities of the projects during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.

Table 1. Environmental Screening Form

Name of Activity: <u>Robino Irrigation System, Jassa Watershed</u> Type of Activity: <u>Infrastructure development</u> Contractor/Grantee: <u>DAI</u> Date: <u>April 21, 2015</u> IEE/ETD #: <u>LAC-IEE-14-17</u>		Column A	Column B	Col C	
				Yes	No

IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?	X		X	
5.	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X		X	
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X		X	
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		• Column A	• Column B	• Col C	
		• Yes	• No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	X
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The Robino irrigation system is part of the Maribahoux plain. It is located in upper Mahibaroux which is in the Jassa watershed. AVASE proposes to rehabilitate 300 hectares of the existing 4,655 hectares that have been deprived of irrigation water since 2007. The system was once irrigated from the Jassa River from a system of earth canals. However, with the shutting of the inlet that provided water to the area, the irrigation system, made of earth canals, became obsolete and fell to ruins. Currently, farmers rely solely on rainwater to irrigate their crops in the targeted irrigation area.

The rehabilitation of the 300 hectares will include the following works:

- Improve the inlet on the Jassa River where the Makimara dam is located in order to have access to enough water.
- Build a primary canal of approximately 5 km from the inlet that will convey water to secondary canals located in the targeted perimeter.
- Build 5,500 meters of secondary and tertiary canals to distribute water to the plots.
- Build gates to control the distribution of irrigation water.
- Rehabilitate the existing access road from RN-6 to the targeted perimeter.
- Build a drainage system for the perimeter.
- Strengthen the existing water user association to manage, operate and maintain the system.

Given the above situation, the environmental concerns are the following:

1. **Preliminary Study for the Robino System:** Although a preliminary study was done for this project by AVANSE, the study did not provide any information on river flow and no environmental survey of the project was made. Hence no information on the capacity of the Jassa river has been determined and no environmental issues have been identified. Therefore it is imperative that the quantity of available water be determined, taking into consideration what is used now, as well as downstream needs. It is also imperative that the drainage situation be determined given the fact that the river flows into a Protected Prea.
2. **Hydraulic Information development:** Given the fact that there is no flow data available to determine the impact that the withdrawal of more water from the Jassa River would have on the availability of enough water to support irrigation of the proposed system, particularly during low flow periods and for downstream users, it is recommended that a hydraulic data collection system for the river be established.
3. **Soil Erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas and agricultural plots are being worked on. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils will equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.
4. **Soil Pollution:** It is anticipated that the sub-contractor could bring vehicles and equipment to be used during construction. These may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being moved to and from a work site may pass through agricultural fields and impact agricultural soil with oil and fuel spills. In addition, areas where the contractor will store fuels, lubricants and chemicals, or where vehicles and equipment are fueled or serviced, will be sources of hazardous substance released to the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.
5. **Erosion and ecosystem damage at construction material borrow pits:** There are a few

places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the sub-contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.

- 6. Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if proper drainage is not installed and the drainage system is not well maintained.
- 7. Loss of Top Soil:** Construction of irrigation and drainage structures will require fill material which will generally be taken from canal and drain excavations or off-site locations. During the construction of secondary and tertiary canals, however, some fill material may be taken from adjacent fields, particularly if the field is in need of land leveling. In these cases, the potential exists for the destruction of top soil.
- 8. Water Contamination:** If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:
 - Washing construction vehicles or equipment in or nearby the river;
 - Use of the rivers and canals for the maintenance of the personal hygiene of the population;
 - Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
 - Surface run-off from on-site stockpiled sand and gravel; and
 - Inadequate disposal of solid wastes and wastewater generated during construction from workers.
- 9. Waste Generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
- 10. Dust and Air Pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes and dust that may be unpleasant to the surrounding communities.
- 11. Noise Pollution:** The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area.
- 12. Exploitation of Borrow Pits:** The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and becomes breeding ground for disease vectors and with inadequate consultation with land owners, borrow pits can become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the approval of AVANSE.
- 13 Establishment and use of other worksites:** There is the need for the sub-contractors to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for their equipment, storage for materials to be used for the works, and includes siting of offices and/or residences This entails:
 - Land acquisition/Lease,
 - Clearing,

- Erection of structures, and
- Provision of sanitary facilities.

The establishment of workers camps and other work facility locations in the area may bring a number of negative impacts to the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.

- 14. Community – Worker – Contractors relations:** Friction may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STIs and Increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, bad relations may exist between members of the community and the sub-contractors caused by community complaints not been properly addressed by the sub-contractors.
- 15. Effect on Fauna and Flora:** Where the project is located, the only animals that could be impacted by its activities are fish and amphibians. As the system drains to the nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on the coastal waters in an area that is comprises a recently-declared Protected Area.
- 16. Displacement of Economic Activities:** Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the flows into the area, on which the farmers rely for their crops.
- 17. Water Rights:** Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It is a major source of conflict among beneficiaries of the system.
- 18. Conflict resolution:** Conflict regarding water use already exists among farmers in the Maribahoux plain. Any change in the availability or use of irrigation water requires consultation to ensure equitable sharing and avoid conflict. The Water User Association must have the capability to resolve conflicts regarding water usage.
- 19. Community participation in irrigation rehabilitation design, operation and maintenance:** Unless the local associations in the project area are made part of this project, there could be major issues with the people of the community in order to ensure that the design is compatible with the needs of the community. The community, through an effective farmer's association will have to take responsibility for the management, operation and maintenance of the system.
- 20. Women's participation:** Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.
- 21. Vector borne diseases (malaria, chikungunya, dengue):** Vector borne disease are endemic in Haiti and are present in the northeast of Haiti where the Robino perimeter is located. The disease vectors live nearby and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.
- 22. Water borne diseases (diarrhea, typhoid, dysentery, etc.):** The use of irrigation water for drinking, bathing, clothes washing is very current in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal and drainage water for drinking and washing. This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.
- 23. Safety Hazards:** Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be

interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.

24. HIV/AIDs, sexually transmitted infections (STIs): Workers' camps may be a source of social unrest and environmental problems such as transmission and spread of diseases (e.g. or sexually transmitted diseases (STIs)) to the resident community by the project personnel and vice versa.

25. Change of Community Lifestyle: The construction of the irrigation scheme will have an impact on the day-to-day lives of the people living in the area. An influx of workers to the area will bring increased economic activity, with and associated positive impact. But the workers may also bring with them behaviors which disrupt the community and puts them and the community at increased risk for conflicts.

Mitigation measures specified in an environmental assessment will therefore be applied to mitigate those impacts listed above.

Overall, the following strategies will be implemented to mitigate the potential impacts described above:

- Establish a program to record hydraulic data on the Jassa River over the life of the project. Information from the program should be shared with the MARNDR in order to have continuity beyond the project life.
- Conduct a more detailed environmental survey of the system and its surroundings.
- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards.
- Bring awareness of these potential issues and their impact to the engineers and construction sub-contractors who will be responsible for the design, construction and supervision of the project.
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behavior of farmers during and after the rehabilitation of the system.
- Monitor the rehabilitation activities of the projects during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.
- Provide access to the Makimara dam area on the Jassa River.

Table 1. Environmental Screening Form

21 Environmental Screening Form					
Name of Activity:	<u>Chalopin Irrigation System – Marion Watershed</u>	Column A	Column B	Col C	
Type of Activity:	<u>Infrastructure development</u>				
Contractor/Grantee:	<u>DAI</u>	Yes	No	If answered yes to Col. A, is it a--?	
Date:	<u>April 21, 2015</u>				
IEE/ETD #:	<u>LAC-IEE-14-17</u>			High Risk	Medium-Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?	X		X	
5.	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X		X	
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X		X	
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		• Column A	• Column B	• Col C	
		• Yes	• No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	X
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments: The Chalopin irrigation perimeter is located in the Marion watershed. The perimeter's current irrigable area is about 170 hectares. However, according to a study made by LGL SA that was commissioned by the Ministry of Agriculture, Natural Resources, and Rural Development (MARNDR), the total irrigable area is 430 hectares. The Marion river splits in two branches at a point called Jambes Pantalón which is right below the Dumas perimeter which gets its water from the river. The right branch of the Marion river proceeds to irrigate the Coicou perimeter, while the left branch of the river proceeds to irrigate the Chalopin and the Garde Saline perimeter. Water is withdrawn from the river at an inlet placed at the level of the Chalopin perimeter. Then water is distributed from the main canal to secondary canals with a total length of 350 meters that are in masonry. The topography of the land is relatively flat with slopes of less than 1%.

The Chalopin system drains in a big canal over a length of 2 km. The total length of this drainage canal is unknown. The system is not currently managed by a water users association. There are many conflicts among the Chalopin farmers and the ones in the Dumas perimeter (located upstream of Chalopin) due to access to available water. Most of the times the water users inside the system have conflicts regarding having their fair share of water to irrigate their land as water use is not regulated.

The infrastructure problems of the current irrigation system are the following:

- In order to expand the perimeter from 170 hectares to the proposed 430 hectares, more water should be deviated to the left branch of the river to feed both the Chalopin and Garde perimeters.
- Not enough water enters through the Chalopin inlet to irrigate the existing and expanded perimeters.
- The inlet is very old and easily destroyed by the flooded river.
- The secondary canals are too low as they do not allow water to enter the irrigated plots.
- Inefficiency of the drainage system to remove salts due to excessive use of fertilizers. There are no drains in the irrigated parcels.
- The gate valves are porous.
- Earth canals are not properly maintained. They are losing water through infiltration. Their capacity is reduced due to heavy siltage and vegetation growth on their banks.
- Presence of irrigation channels beside the roads.
- Social conflict during low water periods.
- Some canals are still not completely built and therefore water discharges into open fields.
- There are no dykes to protect parcels which are easily flooded during high water periods.

To address these problems, the following actions have been proposed:

- Increase the level of water at the juncture of the Marion River to allow more water to flow to the left branch of the river.
- Rehabilitate the inlet structure entering the Chalopin perimeter.
- Rehabilitate the masonry canals including the installation of new gates.
- Rehabilitate drains to allow the evacuation of excess water in case of rain.
- Redefine the natural outlet for the system.
- Assist farmers in defining quantities of chemical fertilizers to be used (less fertilizers for rice) to prevent salinization.
- Consolidate the irrigation channels already built alongside the roads to prevent water overflow on the roads.
- Complete the irrigation canals.
- Rehabilitate masonry canals including the installation of new gate valves.
- Retrofit the riverbed to facilitate the flow of water.
- Build dykes to protect parcels against high water flows.
- Build the system's extension.

Given the above work proposed for the Chalopin irrigation system, the key environmental impact factors that will have to be addressed are the following:

1. **Preliminary Study for the Chalopin System:** Although a preliminary study was done for this project by the firm LGL, SA, commissioned by the Ministry of Agriculture, natural Resources, and Rural Development (MARNDR), the study did not provide any information on river flow and no environmental assessment of the project. Hence no information on the capacity of the Marion river was given.
2. **Hydraulic Information development:** Given the fact that there is no flow data available to determine the impact that the withdrawal of more water from the Marion river would have on the availability of enough water to support irrigation of the system, particularly during low flow periods and downstream users, it is recommended that a program to gather hydraulic data for the river upstream of Jamb's Pantalon and for the two branches be implemented to gather ample data for consideration of future expansion of the irrigated perimeters of Chalopin and other perimeters below Jamb's Pantalon.
3. **Soil Erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas and agricultural plots are being worked on. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils will equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.
4. **Soil Pollution:** It is anticipated that the sub-contractor could bring vehicles and equipment to be used during construction. These may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being moved to and from a work site may pass through agricultural fields and impact agricultural soil with oil and fuel spills. In addition, areas where the sub-contractor will store fuels, lubricants and chemicals are stored or where vehicles and equipment are fueled or serviced will be sources of hazardous substance releases to the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.
5. **Erosion and ecosystem damage at construction material borrow pits:** There are a few places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.
6. **Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if proper drainage is not installed and the drainage system is well maintained.
7. **Loss of Top Soil:** Construction of irrigation and drainage structures will require fill material which will generally be taken from canal and drain excavations or off-site locations. During the construction of secondary and tertiary canals, however, some fill material may be taken from adjacent fields, particularly if the field is in need of land leveling. In these cases, the potential exists for the destruction of top soil.
8. **Water Contamination:** If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:
 - Washing construction vehicles or equipment in or nearby the river;

- Use of the rivers and canals for the maintenance of the personal hygiene of the population
 - Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
 - Surface run-off from on-site stockpiled sand and gravel; and
 - Inadequate disposal of solid wastes and wastewater generated during construction from workers.
- 9. Waste Generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
- 10. Dust and Air Pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes and dust that may be unpleasant to the surrounding communities.
- 11. Noise Pollution:** The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area.
- 12. Exploitation of Borrow Pits:** The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and becomes breeding ground for disease vectors and with inadequate consultation with land owners, borrow pits can become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the approval of AVANSE.
- 13 Establishment and use of other worksites:** There is the need for the sub-contractor to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for his equipment, storage for materials to be used for the works and siting of offices and or residences This entails:
- Land acquisition/Lease
 - Clearing
 - Erection of structures
 - Provision of Sanitary facilities
- The establishment of worker camps and other work facility locations in the area may bring a number of negative impacts on the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.
- 14. Community – Worker – Contractors relations:** Friction may be caused by inappropriate or unacceptable behavior of workers in communities in the area. Sexual activity of workers with locals may lead to unwanted pregnancies, STDs and Increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, bad relations may exist between members of the community and the sub-contractors caused by community complaints not been properly addressed by the sub-contractors.
- 15. Effect on Fauna and Flora:** Where the project is located, the only animals that could be impacted by its activities are fish and amphibians. As the system drains to the nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on the coastal waters in an area that has been declared as a protected zone.
- 16. Displacement of Economic Activities:** Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the

flows into the area, on which the farmers rely for their crops.

- 17. Water Rights:** Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It is a major source of conflict among farmers currently using the existing system.
- 18. Conflict resolution:** Conflict arising between upstream users, who begin to use or increase their use of water, and downstream users, who may have prior appropriation rights to the water, will need to be addressed through the local water users association with the support of local authorities. Any change in the availability or use of irrigation water requires consultation to ensure equitable sharing and avoid conflict.
- 19. Community participation in irrigation rehabilitation design, operation and maintenance:** Unless the local associations in the project area are made part of this project, there could be major issues with the people of the community in order to ensure that the design is compatible with the needs of the community. The community, through an effective farmer's association will have to take responsibility for the management, operation and maintenance of the system.
- 20. Women's participation:** Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.
- 21. Vector borne diseases (malaria, chikungunya, dengue):** Vector borne disease are endemic in Haiti and are present in the northeast of Haiti where the Chalopin perimeter is located. The disease vectors live nearby and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.
- 22. Water borne diseases (diarrhea, typhoid, dysentery, etc.):** The use of irrigation water for drinking, bathing, and clothes washing is very current in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal and drainage water for drinking and washing. This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.
- 23. Safety Hazards:** Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.
- 24. HIV/AIDs, sexually transmitted infections (STIs):** Workers' camps may be a source of social unrest and environmental problems such as transmission and spread of diseases (e.g. or sexually transmitted diseases (STIs)) to the resident community by the project personnel and vice versa.
- 25. Change of Community Lifestyle:** The construction of the irrigation scheme will have an impact on the day-to-day lives of the people living in the area. An influx of workers to the area will bring increased economic activity, with an associated positive impact. But the workers may also bring with them behaviors which disrupt the community and puts them and the community at increased risk for conflicts.

Mitigation measures specified in an environmental assessment will therefore be applied to mitigate those impacts listed above.

Overall, the following strategies will be implemented to mitigate the potential impacts described above:

- Establish a program to record hydraulic data on both rivers over a sufficiently long period.
- Conduct a more detailed environmental survey of the system and its surroundings.
- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards.
- Bring awareness of these potential issues and their impact to the engineers and construction sub-contractors who will be responsible for the design, construction and supervision of the project.
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behavior of farmers during and after the rehabilitation of the system.
- Monitor the rehabilitation activities of the project during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.
- Provide access to the intersection at Jambs Pantalón.

Table 1. Environmental Screening Form

Name of Activity:	Garde Saline Irrigation System Rehabilitation, Marion Watershed (irrigation system requiring additional surface water withdrawals)	Column A	Column B	Col C	
Type of Activity:	Infrastructure/Rehabilitation			If answered yes to Col. A. is it a--?	
Contractor/Grantee:	DAI	Yes	No	High Risk	Medium-Risk
Date:	April 20, 2015				
IEE/ETD #:	LAC-IEE-14-17				
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc.)?	X			X
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc.?		X		
4	Involve the construction of repair of irrigation systems?	X		X	
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ extraction of forest products, clearing of forest cover, and/or conversion of forest land?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X		X	
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X		X	
20	Will the activity contribute to change in the amount of surface water in any water body?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		
22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		

		• Column A	• Column B	• Col C	
		• Yes	• No	If answered yes to Col. A. is it a--?	
				High Risk	Medium-Risk
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	X			X
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		

RECOMMENDED ACTION (Check Appropriate Action):		(Check)
(a)	The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b)	The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	
(c)	The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	X
(d)	The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e)	The project has substantial and inmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq. meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more extensive review and monitoring. ² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk. ³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project. ⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination). ⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.		

Comments:

The Garde Saline perimeter is located south of the Chalopin perimeter. It is an existing perimeter which is irrigated by the Malfety River. The irrigable perimeter has an area of 41 hectares. The existing intake structure has been found to be in good condition, but will need light rehabilitation work which includes:

- 1) Cleaning upstream of the intake to a length of 150 meters, and
- 2) Replacing the gate valves.

A second intake is planned. It is located 570 meters from the existing intake. It is a natural intake and requires no new intake structures. Finally, a third intake is planned downstream of the second intake at the end of the Malfety River where an intake structure exists but needs to be rehabilitated. The irrigation of a second perimeter known as "Romeo" that has an area of 28 hectares is also being considered. In addition, two alternatives are being considered for this extension from the Garde Saline Perimeter. They are:

- **Alternative one:** Build six new intakes on the Malfety River that would that would need to be built to irrigate that perimeter. Repair works on the river bank will also be needed to improve water flow to the intakes in order to limit river overflow which should be minimized due to upstream works.
- **Alternative two:** Build about 500 meters of secondary canals that would include some equipment. The irrigation water would come from the Chalopin irrigation system. Drainage structures as well as access paths (for pedestrians and vehicles) would also need to be built.

A technical and cost study for adding the Romeo perimeter and selecting one of the two alternatives to irrigate it will need to be done. Given the above, proposed work to be done on the "Garde Saline" irrigation system, and potential extension to the Romeo perimeter, the key environmental impact factors that will have to be addressed are the following:

1. **Preliminary Study for the Garde Saline and the Romeo Extension:** Although a preliminary study was done for this project by the firm LGL, SA, commissioned by the Ministry of Agriculture, natural Resources, and Rural Development (MARNDR), the study did not provide any information on river flow and no environmental assessment of the project. Hence no information on the capacity of the Malfety and Marion rivers were given. Therefore the lack of appropriate information combined with modern engineering solutions developed for larger systems, could lead to problems when applied to the redesign of these two small irrigation systems.
2. **Hydraulic Information development:** Given the fact that there is no flow data available to determine the impact that the withdrawal of more water from the Malfety or Marion rivers would have on the availability of enough water to support irrigation of the systems, particularly during low flow periods and for downstream users, it is recommended that a study on the flow of these two rivers be done over a minimum period of one year.
3. **Soil Erosion:** Earthworks will contribute to a large amount of soil movement as the canals, the drains, the flood barriers, temporary material storage areas and agricultural plots are being worked on. Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils will equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.
4. **Soil Pollution:** It is anticipated that the Contractor could bring vehicles and equipment to be used during construction. These may impact the soil with oil and fuel spills. Trucks hauling construction materials such as aggregates, sand and gravel and equipment being move to and from a work site may pass through agricultural fields and impact agricultural soil with oil and fuel spills. In addition, areas where the contractor will store fuels, lubricants and

chemicals, or where vehicles and equipment are fueled or serviced, will be sources of hazardous substance released to the soil. Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles can also contaminate soil.

5. **Erosion and ecosystem damage at construction material borrow pits:** There are a few places where aggregates are mined in the vicinity of the project area. However, it is anticipated that the contractor may have to use borrow pits in the riverbed or in any suitable site in the project area. The selection of suitable borrow sites must be approved by AVANSE as improper sand extraction can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.
6. **Degradation of rehabilitated structures during heavy rain or flooding events:** The rehabilitation of this irrigation system is susceptible to damage by heavy rains or flooding if proper drainage is not installed and the drainage system is not well maintained.
7. **Loss of Top Soil:** Construction of irrigation and drainage structures will require fill material which will generally be taken from canal and drain excavations or off-site locations. During the construction of secondary and tertiary canals, however, some fill material may be taken from adjacent fields, particularly if the field is in need of land leveling. In these cases, the potential exists for the destruction of top soil.
8. **Water Contamination:** If erosion occurs and/or soil is polluted, as discussed above, it is possible that the rivers may be impacted with sediment, leaked/spilled lubricants, fuels and hazardous substances. Other sources of potential water pollution are:
 - Washing construction vehicles or equipment in or nearby the river;
 - Use of the rivers and canals for the maintenance of the personal hygiene of the population;
 - Improper disposal of concrete wastes resulting from on-site concrete batching or cleaning of ready-mix concrete vehicles;
 - Surface run-off from on-site stockpiled sand and gravel; and
 - Inadequate disposal of solid wastes and wastewater generated during construction from workers.
9. **Waste Generation:** Solid waste will be generated from site vegetation clearance during construction. The vegetation and other rubbish that will be cleared from the site will lead to the generation of large volumes of waste that require proper disposal. Various wastes generated during construction will need to be managed and disposed of properly. A comprehensive waste management program will have to be established by the sub-contractor and monitored by AVANSE.
10. **Dust and Air Pollution:** The vehicles and machines used in the construction of civil works will produce exhaust smoke, fumes and dust that may be unpleasant to the surrounding communities.
11. **Noise Pollution:** The vehicles and machines used in the civil works will produce noise that may be unpleasant to communities who live near the project area.
12. **Exploitation of Borrow Pits:** The principal environmental concerns related to the exploitation of borrow pits are: loss of vegetation, farmlands, dust, health, public safety. When unprotected during usage and if it is not reinstated after use it would become a hazard for children and animals and becomes breeding ground for disease vectors and with inadequate consultation with land owners, borrow pits can become a source of litigation. Construction in reserves can affect the wildlife population since it would entail exploitation of material in that jurisdiction. Prior to the development of any borrow pits, the sub-contractor will seek the

approval of AVANSE.

13. Establishment and use of other worksites: There is the need for the sub-contractors to establish a base camp for easy referencing and coordinating of activities pertaining to the realization of the project. It also provides security for their equipment, storage for materials to be used for the works, and includes siting of offices and/or residences This entails:

- Land acquisition/Lease,
- Clearing,
- Erection of structures, and
- Provision of sanitary facilities

The establishment of workers camps and other work facility locations in the area may bring a number of negative impacts on the environment that include poor siting of facilities, solid waste disposal, taxing potable water supply, etc.

14. Community – Worker – Contractors relations: Friction may be caused by inappropriate or unacceptable behavior of workers in communities along the corridor. Sexual activity of workers with locals may lead to unwanted pregnancies, STIs and Increased incidence in HIV/AIDS. Friction between workers and sub-contractors may be caused by labor relations that exist between the sub-contractors and the workers. Finally, bad relations may exist between members of the community and the sub-contractors caused by community complaints not been properly addressed by the sub-contractors.

15. Effect on Fauna and Flora: Where the project is located, the only animals that could be impacted by its activities are fish and amphibians. As the system drains to the nearby rivers, siltation and other pollutants will enter these water bodies and may harm these creatures. These rivers will ultimately reach the coastal area downstream and add to the pollution burden on the coastal waters in an area that has recently been declared a Protected Area.

16. Displacement of Economic Activities: Construction activities can disrupt current farming practices in the project area. Building the main canal and flood control structures will disrupt the flows into the area, on which the farmers rely for their crops.

17. Water Rights: Water rights is a crucial issue that will need to be addressed before the system is rehabilitated. It is a major source of conflict among beneficiaries of the system.

18. Conflict resolution: Conflict often arises between upstream users, who begin to use or increase their use of water, and downstream users, who may have prior appropriation rights to the water. Any change in the availability or use of irrigation water requires consultation to ensure equitable sharing and avoid conflict.

19. Community participation in irrigation rehabilitation design, operation and maintenance: Unless the local associations in the project area are made part of this project, there could be major issues with the people of the community in order to ensure that the design is compatible with the needs of the community. The community, through an effective farmer's association will have to take responsibility for the management, operation and maintenance of the system.

20. Women's participation: Women in the project area are already very involved in all aspects of farming in the area. They must play a major role in the association that will be formed to manage the project.

21. Vector borne diseases (malaria, chikungunya, dengue): Vector borne disease are endemic in Haiti and are present in the northeast of Haiti where the Garde Saline perimeter is located. The disease vectors live near and breed in lakes, ponds, rivers, streams, coastal plains and human settlements. Hydrologic changes, resulting from irrigation development or dam construction, can lead to a significant increase in mosquito breeding sites. Environmental health engineering can modify the irrigation environment so as to reduce or eliminate the vector habitat.

22. Water borne diseases (diarrhea, typhoid, dysentery, etc.): The use of irrigation water for drinking, bathing, and clothes washing is very current in the targeted project areas. Water borne diseases can be prevented by discouraging people from using reservoir, canal and drainage water for drinking and washing. This can be done by encouraging the local and national authorities to provide a safe and convenient source of water and by linking irrigation development with health education and sanitation programs.

23. Safety Hazards: Workers at the site will be exposed to several safety hazards, including open trenches, openly stored or moving construction materials, and moving construction equipment. Also, construction sites can be dangerous places for the safety of residents of nearby communities. These residents may not be aware of the hazards and they may simply be interested in observing the equipment and activities. Children are often eager to see construction equipment at work. Such children's curiosity may lead to safety hazards ranging from minor to major injuries such as bruises and fractures.

24. HIV/AIDs, sexually transmitted infections (STIs): Workers' camps may be a source of social unrest and environmental problems such as transmission and spread of diseases (e.g. or sexually transmitted diseases (STIs)) to the resident community by the project personnel and vice versa.

25. Change of Community Lifestyle: The construction of the irrigation scheme will have an impact on the day-to-day lives of the people living in the area. An influx of workers to the area will bring increased economic activity, with and associated positive impact. But the workers may also bring with them behaviors which disrupt the community and puts them and the community at increased risk for conflicts.

Mitigation measures specified in an environmental assessment will therefore be applied to mitigate those impacts listed above.

Overall, the following strategies will be implemented to mitigate the potential impacts described above:

- Establish a program to record river hydraulics over time.
- Conduct a more detailed environmental survey of the system and its surroundings.
- Ensure that the rehabilitation of this irrigation system adheres to national and international technical design standards.
- Bring awareness of these potential issues and their impact to the engineers and construction sub-contractors who will be responsible for the design, construction and supervision of the project.
- Promote the limitation of heavy equipment and machinery during the construction phase of the project.
- Establish maintenance committees to oversee the rehabilitation of the system and to ensure that proper maintenance is provided as well as the proper behavior of farmers during and after the rehabilitation of the system.
- Monitor the rehabilitation activities of the projects during and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.
- Provide access to the intersection between the Marion and Malfety rivers.

NB: The above site-specific EMPRs and screening forms are supplemented with the mitigation measures that will be the responsibility of the construction subcontractor and that will be included in the construction subcontract at the end of the table. The construction subcontractor's contractual responsibilities will include required environmental mitigation measures and these are to be incorporated in “Appendix D - Technical Specifications” of the DAI construction subcontract. The site-specific EMPRs and screening forms are also supplemented with the following table for any additional irrigation system rehabilitation and construction work.

Generic Mitigation Measures for Future Irrigation System Rehabilitation and Construction Work

Sub-activity or component	Description of Impact	Mitigation Measures
Identification of specific irrigation systems for rehabilitation and conducting preliminary analysis.	During irrigation systems identification for rehabilitation environmental issues may not be considered or may not be given equal weight to other issues. It may just be assumed that there is enough water for the proposed irrigation. Important habitat or ecosystems sensitive to disturbances may be located within project site boundaries or may be affected by the proposed rehabilitation. The mitigation measures and monitoring activities in this generic EMPR may not be adequate to address all of the issues posed by the rehabilitation of a specific irrigation scheme.	1.1 AVANSE's Engineering Team and the Environmental Compliance Team shall work together to conduct an internal environmental review of all new proposed irrigation systems rehabilitation and ancillary activities to: • ensure that the location of each activity is such that it will not significantly impact important habitats or ecosystems or cultural or historical sites; • ensure that there is sufficient water to meet the irrigation requirement without adversely impacting downstream water users; and • determine if the proposed irrigation scheme rehabilitation is in line with the applicable Participatory Watershed Management Plan (if one exists). 1.2 The internal environmental review shall also determine if the mitigation measures and monitoring activities in this generic EMPR are sufficient to mitigate potential environmental impacts for the specific site conditions of the proposed irrigation system rehabilitation activity. 1.3 The results of the internal environmental review shall be documented in AVANSE's files and reported in AVANSE's quarterly progress reports. 1.4 If the internal environmental review identifies: • significant impacts to important habitats or ecosystems or cultural or historical sites, • that there is not enough water, and/or • that it cannot comply with the Participatory Watershed Management Plan. AVANSE shall abandon the proposal. 1.5 If the internal environmental review determines that the generic mitigation measures and monitoring activities in this EMPR are not sufficient to mitigate potential environmental impacts for the specific site conditions of the proposed irrigation system's rehabilitation activity, AVANSE shall prepare an EMPR for the scheme addressing the issues of concern for review and approval by USAID. 1.6 Once an irrigation scheme is identified and approved for rehabilitation, notify members and government authorities.

Sub-activity or component	Description of Impact	Mitigation Measures
Conduct project identification activities, prepare procurement process and hire engineering firm or consultant to design the activity	During PIA and design activities, engineers may not be aware of their role and responsibilities in the expected management of environmental issues and impact mitigation if these are not included in their subcontract with AVANSE.	2.1 Terms of reference provided by AVANSE need to describe the role and responsibilities of Designers and Subcontractors in both design and construction of the irrigation system. 2.2 A requirement for compliance with all relevant Government of Haiti and local legislation shall be incorporated into subcontracts. 2.3 AVANSE shall ensure that construction subcontracts include the provision that 30% of laborers are women 2.4 Costs for environmental management shall be included as a specific line item in the Bill of Quantities. 2.5 AVANSE shall hold a special meeting for the engineering firm or consultant specifically on environmental mitigation and monitoring requirements prior to starting their work shall be organized.
Review and approval of design	Designs that fail to incorporate environmental concerns could result in adverse environmental impacts.	3.1 AVANSE's Environmental Compliance Team shall review the design to ensure that it complies with the applicable mitigation measures and that the mitigation measures and monitoring activities are sufficient to address the address the environmental impacts. 3.2 If the review determines that the generic mitigation measures and monitoring activities in this EMPR are not sufficient to mitigate potential environmental impacts for the specific site conditions of the proposed irrigation system rehabilitation activity, AVANSE shall prepare an EMPR for the irrigation system addressing the issues of concern for review and approval by USAID.
Recruit construction firm	The construction firm may not be aware of its role and responsibilities in managing environmental issues during the implementation of the project	4.1 AVANSE shall include the mitigation measures and applicable monitoring activities prescribed in this EMPR in the subcontract for services. 4.2 AVANSE shall hold a special meeting for the construction firm specifically on their role and responsibilities and environmental monitoring prior to starting their work shall be organized.
Community Involvement	People in the community may be anxiously waiting for the project to start and will need to be informed about upcoming activities.	5.1 As soon as the construction subcontract is signed, AVANSE shall meet with the community to provide them with adequate information about progress of work. The meeting shall include Commune officials as well as key community members. 5.2 AVANSE shall keep up the information flow throughout the construction period by keeping the immediate project area communities informed about progress of work. 5.3 AVANSE shall ensure that women and women's organizations are included in community meetings on infrastructure improvements, infrastructure maintenance committees and focus groups on safety

Sub-activity or component	Description of Impact	Mitigation Measures
Construction firm mobilization	Subcontractor may lease properties for installing its offices, workers camp, and other facilities that are in dispute. Subcontractor personnel may cause disputes with community members. Location from which construction company obtains construction material may not be environmentally sound or sourced sustainably, and obtaining these materials may result in ecological, hydrological, aesthetic, and land use impacts.	6.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Layout of irrigation canal or pumped water systems and drains network	The area for laying out the irrigation facilities and distribution systems may create dispute among farmers	7.1 AVANSE shall work with local authorities and the local organization responsible for managing the irrigation system (such as the Farmers Association if one exists) to address all encroachment issues
Rehabilitation of the paths to irrigation system's components	Impassable paths along the main canals will not allow for building and maintenance the various components of the irrigation system	8.1 The paths along the main canals and pump stations need to be rehabilitated to provide access to key components of the irrigation system. The paths should be resurfaced and widened to at least 4 meters.
Vegetative Cover Protection	Loss of vegetative cover and borrow site clearance can result in inadvertent damage to vegetation during construction.	9.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Dust Generation	Generation of dusts and exhaust emissions due to construction activities can be a nuisance and a health problem to workers and members of the community	10.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Noise Pollution	Increase in noise level can become an unbearable nuisance to workers and members of the community	11.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.

Sub-activity or component	Description of Impact	Mitigation Measures
Soil erosion	Soils from disturbed surfaces are likely to be washed away during the rainy season and also in dry conditions through wind erosion. If cut and fill sites are not protected, loose soils can equally be washed away into the canals and later into the rivers. The risk of soil erosion is considered high, particularly during high and intense rainfall, given the proximity of the rivers, the scale of the earthworks and the characteristics of the overburden in the area which is easily erodible.	12.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Health and Safety	Irrigation System's work may cause diseases that could affect both workers and community members	13.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Increase Incidence of HIV/AIDS, water borne diseases and vector borne diseases	Workers in a new community will be exposed to diseases such as HIV/AIDS; other STDs such as gonorrhea and syphilis; waterborne diseases such as cholera, typhoid fever and diarrhea, and vector borne diseases such as malaria, chikungunya, and dengue	14.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Waste production and Management	Waste produced in work areas, worker's camps, offices, and other facilities can harbor insects and rodents that can be vectors of diseases. Hazardous waste can also be a cause of intoxication to workers. If not properly handled, waste can also degrade landscape and aesthetics.	15.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Worksite accidents prevention	Injury to workers will occur on work site if proper preventive measures are not taken	16.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Soil pollution	Vehicles and the dispensing and storage of fuel can spill and pollute the soil	17.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.

Sub-activity or component	Description of Impact	Mitigation Measures
Water resources protection	If not properly protected, water resources will be contaminated by workers actions	18.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Exploitation of Borrow Pits	Poor management of borrow pits will cause such problems as accidents, soil erosion, and dispute with landowners	19.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Establishment and use of other worksites	The procurement of property by the Subcontractor in the project area may cause conflict between the Subcontractor and property owners. Camps must be properly located in order not to become a pollution producing area	20.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.
Community – Worker – Subcontractor relations	Workers conduct in the community may cause serious resentment of the new comers. The Subcontractor, if not applying labor laws may result in dispute and strike which will delay work	21.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.

Sub-activity or component	Description of Impact	Mitigation Measures
Subcontractor demobilization	If the system's management team is not trained to operate, maintain, and manage the system, it may not be a sustainable system If construction camps and other ancillary features are not dismantled or if other provisions are not made for them, they will degrade over time, and could impact water quality, degrade soils, and create a public hazard. Leaks or spills that are not cleaned up can continue to contaminate the environment. If hydrology and grade are not restored, flooding, pounding, and destruction of vegetation and other aquatic and terrestrial resources could result. If vegetation is not restored, and soil is left bare, erosion and landslides could result. Develop and implement a training activity on irrigation system maintenance for the members of the community who will be responsible for maintaining the irrigation system	22.1 Include construction mitigation measures as outlined "Attachment to subcontract APPENDIX D: Technical Specifications" in the construction subcontract.

Attachment to Construction Subcontract APPENDIX D: TECHNICAL SPECIFICATIONS

Minimum Environmental Construction Requirements for AVANSE Irrigation Projects

1.0 Subcontractor Mobilization

- 1.1 The Subcontractor should make sure that none of the properties that he wants to lease are in dispute.
- 6.2 The Subcontractor should train personnel brought from out of the area on community relations.
- 6.3 The Subcontractor shall ensure that all material is sourced in an environmentally sound and sustainable manner.
- 6.4 The Subcontractor shall contact Bureau for Mines and Energy to ensure that Subcontractor selected sources of materials is approved by the Bureau.

2.0 Clearing and Cutting of Vegetation

- 2.1 Excessive destruction of trees and other vegetation shall be avoided. During the design phase the Designer shall determine which trees can be removed.
 - Do not cut mangroves.
 - Do not cut trees in sensitive and/or high quality habitat.
- 2.2 The Designer shall count all trees of commercial value to be removed during construction and include them in the Bill of Quantities.
- 2.3 Consideration shall be given to the location of mature trees during site selection for borrow sites and route selection for access irrigation systems to those sites.
- 2.4 Vegetation clearing shall be limited to the limits of canals and pipelines RoW and ancillary facilities as stipulated in the design reports.
- 2.5 The Subcontractor shall put in writing a request for authorization to carry out clearing. The authorization shall indicate the width and the exact location where clearance will take place. The Supervising Engineer shall issue a site instruction that shall show the dimension and extent of clearing.
- 2.6 Wood from trees that are cut down shall be given to communities for their use or used in the construction camp.
- 2.7 Borrowing, stockpiling, spoil disposal and construction camps shall be prohibited within the boundaries of existing productive farmland, wetlands and forests.
- 2.8 The Subcontractor shall be responsible for any damage or destruction of vegetation outside the limits of the RoW and ancillary facilities.
- 2.9 The Subcontractor shall be responsible for the conduct of its workforce in relation to environmental protection matters and to specifically prohibit unnecessary felling of trees.

3.0 Dust and Exhaust Emissions

- 3.1 Haul trucks shall be covered.
- 3.2 Speed limit in the work zone of 20 km/hr shall be enforced.
- 3.3 Construction machinery shall be well maintained to minimize excessive gaseous emissions. A program of servicing all equipment and vehicles to ensure optimum performance and control of emissions of noxious gases shall be rigorously followed to minimize pollution levels.

3.4 Measures shall be taken to avoid exposing volatile chemicals to the air.

4.0 Construction Noise

4.1 The Subcontractor shall use the quietest available equipment where possible.

4.2 All vehicles and equipment used during construction shall be well maintained in accordance with manufacturers' specifications and manuals.

4.3 All internal combustion engine equipment shall be equipped with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

4.4 Work shall be restricted to 6.00-18.00hrs to avoid increasing unnecessarily the background noise levels in the night when people need to sleep.

4.5 Noisy equipment shall be sited away from noise sensitive areas and positioned behind stockpiles or other barriers to provide acoustic screening.

4.6 During induction, workers shall be trained to avoid and minimize unnecessary noise caused by leaving engines and equipment running when not in use and revving of engines.

5.0 Health & Safety

5.1 Prior to the start of construction, the Subcontractor shall submit to AVANSE its health and safety plan (HASP) for approval. The HASP shall include:

- Identify and provide appropriate personal protective equipment (PPE) that offers adequate protection to the workers including eye protection, dust masks, hard hats, gloves, high visibility jackets, hearing protection equipment, proper clothing, safety boots, safe ladders, etc.
- Properly maintain PPE, including cleaning when dirty and replacement when damaged or worn out.
- Ensure that proper use of PPE is part of the recurrent training programs for employees and laborers.
- Implement a policy to terminate employees who fail to wear PPE after receiving a warning for the first infraction.
- Restrict and control access to the construction site. Security of the site at all times is the responsibility of the Subcontractor
- Provide sufficient onsite drinking water, portable toilets with hand washing facilities, wash and change facilities for all crafts. No open disposal of sanitary waste should be allowed onsite
- Institute a monitoring program to detect and correct unsafe conditions
- Develop a first aid team to manage emergency treatment needs to workers. The Subcontractor should keep a list of neighboring health facilities to use in case of emergencies requiring treatment

5.2 The Subcontractor shall select staff to be trained by officers from Health directories within the Ministry of Health in first aid procedures. The first aid team shall be in charge of educating workers on first aid procedures. A well-stocked first aid kit shall be provided on site. The location of first aid kit and names and contacts of first aiders shall be provided on site.

5.3 There shall always be a project standby vehicle to rush injured persons to the nearest health facility.

5.4 Reversing alarm shall be fitted on all moving vehicles to avoid accidents.

5.5 Subcontractors shall apply 'safety first' rule to govern all activities and operations within the work camp and along the route and areas within his jurisdiction.

5.6 The Subcontractor shall make every reasonable effort to minimize irrigation system safety hazards and inconvenience area users, resulting from the passage of his, or his subcontractors' haulage vehicles, and shall impose and enforce compliance with speed limits.

6.0 Disease Transmission

- 6.1 The Subcontractor shall incorporate STI/HIV/AIDS awareness and prevention into the training programmed for all construction workers, and extend the awareness and prevention program to the nearby local communities.
- 6.2 Condoms shall be made available for workers and inhabitants and their use promoted.
- 6.3 The Subcontractor shall also incorporate waterborne and vectorborne diseases awareness and prevention into the training programmed for all construction workers.
- 6.5 The Subcontractor shall provide safe drinking water and promote good hygienic practices as well as providing protective gears for mosquitoes such as nets in camp and/or repellent.

7.0 Storm Water and Erosion Protection

- 7.1 Land clearance shall be limited to the minimum needed for the irrigation, drainage, flood control, and road infrastructure.
- 7.2 Avoid executing excavation works under aggressive weather conditions.
- 7.3 Erect temporary erosion control barriers around work sites during site preparation and construction to direct runoff away from the site in a manner that will minimize erosion.
- 7.4 Stabilize and compact the soils in canals and on embankments after completion of each stage of works.
- 7.5 Place clear markers indicating the limits of the construction trenches and stockpiling area of excavated materials to restrict equipment and personnel movement, thus limiting the physical disturbance to land and soils in adjacent areas.
- 7.6 Every effort shall be made to secure borrow materials from existing, government approved sites.
- 7.7 Develop new sites, if necessary, in agreement with local authorities the land owners or AVANSE approval. New sites should be developed on non-agricultural or unproductive land.
- 7.8 Close borrow pits that are no longer in use by backfilled with approved materials and/or landscaping, or turning them into water storage points for livestock.
- 7.9 In all cases, grade the edges of the pits to ensure safe access for children and livestock.

8.0 Waste Management

- 8.1 The Subcontractor shall prepare a Waste and Hazardous Substances Management Plan to be approved by AVANSE before commencing work. The plan shall include:
- Provision of garbage bins for the separate disposal of domestic and hazardous waste.
 - Segregation of waste materials so that only materials which cannot be reclaimed or recycled will be directed to a disposal site.
 - Worker training in waste segregation.
 - Designation of a Commune-and/or AVANSE-approved site or method for disposal of domestic and hazardous wastes and construction debris.
 - Such wastes shall be properly disposed of in accordance with the manufacturer's recommendation or standard best practice and shall not be burned or indiscriminately dumped.
 - Procedures for storage and handling of hazardous substances (e.g. batteries, chemicals, fuel) and wastes.
 - Prohibit storing or handling fuels within 50 meters of waterways.
 - Store and handle bulk fuels and lubricants within containment facilities (e.g. bounded areas, leak proof trays, etc.) designed to prevent the release of spilled substances to the soil and keep the containment areas drained of rainwater.
 - Install drip pans at petroleum product dispensing points.
 - Collect and recycle used oil and lubricants.
 - Handle, store, use and process branded materials in accordance with manufacturer's instructions and recommendations.

- Designs and siting requirements for on-site maintenance, refueling and cleaning of vehicles and equipment.
- Provision of oil spill response kits, including containment and recovery equipment, in the work area to remove and dispose of spills.
- Worker training in the use of oil spill response kits. Provisions to remove contaminated soil and treat it or dispose of it in a manner appropriate to the type of contamination present (refer to Attachment E4).
- Designation of concrete batching areas with proper isolation from the soil surface, if needed.
- Cleaning of concrete ready-mix vehicles on-site in special prepared place where the concrete wastes are contained and disposed of at a municipality- or AVANSE-approved site.

Provision of sanitary facilities (toilets and urinals located beyond 120 30 meters away from any stream, drainage channel or waterway. It shall also not be located in a low lying or marshy area lest ground water or surface water is polluted.

9.0 Road Safety and Construction Signage

- 9.1 Appropriate warning signs which are reflective shall be provided at stipulated intervals.
- 9.2 Construction site shall be barricaded whenever it is occurring in a public area.
- 9.3 Restriction of speed limits to 20 km/hr shall be enforced by flagmen on either side of diversion or detour.
- 9.4 On-lookers shall be kept away from construction activities

10.0 Soil Pollution

- 10.1 Use vehicles and equipment which are in good condition and properly service and check them to make sure that they do not leak lubricants and fuels.
- 10.2 Use drip pans to contain all hydrocarbon leakages on construction equipment.
- 10.3 Machine refueling shall be carried out only at designated areas.
- 10.4 Selection vehicle routes wherever possible to avoid passing through agricultural fields.
- 10.5 Store and handle fuels and lubricants within containment facilities (e.g. bounded areas, leak proof trays, etc.) designed to prevent the release of spilled substances to the soil. These facilities should be maintained and kept drained of rainwater.

11.0 Water Resources Protection

- 11.1 The Subcontractor shall use erosion control measures during construction such as geotextile, jersey barriers, hay bales, silt screens (or other appropriate and obtainable material).
- 11.2 The erosion control barriers shall be placed prior to starting construction and shall not be removed until construction is complete and vegetation is re-established.
- 11.3 The Subcontractor shall secure prior approval from the Supervising Engineer for the location of construction staging and lay down areas.
- 11.4 The Subcontractor shall prohibit washing of vehicles and equipment in or adjacent to any water sources.
- 11.5 The Subcontractor is responsible for cleaning up any pollution caused by his activities and the payment of full compensation to those affected.
- 11.6 The Subcontractor's work program approach and methodology shall be approved by the Supervising Engineer.
- 11.7 The work program shall ensure that implementation will not cause flooding, reduce flow downstream or increase sedimentation unnecessarily. Dry season construction may be preferred especially if the particular river dries up then.
- 11.8 Subcontractor shall ensure that debris removed during cleaning the area upstream from inlet area shall be disposed according to specification

- 11.9 Inlet construction design shall be sized to accommodate expected flows under climate change conditions and designed to contain the expected flow 19.10 The Subcontractor shall complete stream bed and bank stabilization before returning flow to the water body channel.
- 11.11 Wherever possible, the Subcontractor shall avoid having machinery and equipment enter water channels. Where machines enter the watercourse, clean timber or textile mats shall be utilized to avoid excessive siltation and streambed scouring.
- 11.12 Drains shall be constructed to direct storm water and run-off off the irrigation system and into the natural drainage system. Siltation traps shall be installed to trap silt and sediment and reduce contamination of water bodies.
- 11.13 When heavy contamination of water by sediment or silt occurs, the Subcontractor shall quickly remedy the situation by removing the source of sediment or silt from near the water body.

12.0 Borrow Pits

- 12.1 The Subcontractor is required to prepare detailed Site Environmental Plans (SEPs) for approval by the Supervising Engineer, prior to commencement of any site development, and to execute all work at the sites in accordance with the plans. The SEPs shall address all matters relevant to environmental protection and the minimization of impacts. Information provided in the SEPs shall include, but not be limited to the following:
- a site plan showing the location and proposed extent of the quarry, and borrow sites,
 - details of all landholdings, vegetation and land use,
 - measures which shall be taken to minimize erosion caused by access irrigation system construction and drainage system operation,
 - any other measures which shall be taken to minimize environmental impacts, including orientation of working faces to reduce visual impact, and
 - measures to be taken to make the quarry site safe on completion of exploitation, and to rehabilitate any agricultural land which has been affected by access irrigation system construction and operation.
- 12.2 The Subcontractor shall not enter the land until compensation to owners or legal occupants is effected and the approval of the Supervising Engineer has been given.
- 12.3 The location and size of quarries, borrow pits, spoil and stockpile areas shall be subject to the approval of the Supervising Engineer.
- 12.4 Store the topsoil for site rehabilitation.
- 12.5 Borrow material shall be excavated within the limits of depth and area shown on the borrow pit plans, and in a manner that shall not prejudice the use of the material for the intended purpose.
- 12.6 Borrow pits shall be continuously protected against the ingress of surface water, and the Subcontractor shall construct such temporary banks as may be required for diverting surface water and, in so far as is possible, his operations shall be planned in such a way that the borrow pit shall be self-draining, provided that silt traps are installed.
- 12.7 Borrow areas shall be kept dry and ensure that borrow material is sufficiently dry when required for use.
- 12.8 Stockpiling areas and maximum heights of stockpiles shall be indicated or approved by the Supervising Engineer.
- 12.9 For this purpose the borrow area shall be shaped to even contours without any slopes being steeper than 1:6 (15%), The overburden and/or topsoil shall be pushed back, spread evenly to the prescribed thickness and landscaped over the area of the quarry, borrow pit, access irrigation system, spoil or stockpile area. After spreading, the topsoil shall be protected by seeding or re-vegetation.

13.0 Establishment and Use of Other Work Sites

- 13.1 Subcontractor shall enter into negotiations with owners of land and acquire the land legally.
- 13.2 Avoid lands on which disputes already exist.

13.3 Location, design and management of construction camps shall be approved by AVANSE and shall:

- Have sufficient drainage and erosion control to direct runoff off of the site without causing excessive sedimentation of nearby water courses.
- Provide for solid waste management as per the Waste and Hazardous Substances Management Plan.
- Provide water for personal hygiene and drinking.
- Provide latrines.
- Limit fuel wood collection to dead and down wood.

13.4 Prohibit use of nearby water bodies or wetlands for washing or waste disposal.

14.0 Community Liaison

14.1 A community liaison officer shall be hired by the Subcontractor.

14.2 All communication with the neighbors (community) shall be undertaken by the Community liaison officer with assistance from the proper Commune officials where necessary.

14.3 The Project Management shall ensure high level of professionalism by responding to all community enquiries and contacts in a polite and civil manner.

14.4 The Subcontractor shall establish a Complaints Register to receive, log, track and monitor response to complaints within specified timeframes.

14.5 The Subcontractor shall maintain an onsite register for complaints made directly to Liaison Officer.

14.6 The Community Liaison shall be responsible for notifying all complaints to the Project Manager.

14.7 Each complaint shall be documented, responded to an action taken shall be recorded.

14.8 The Subcontractor shall ensure that fair labor practices are used in accordance with labor laws of Haiti

15.0 Demobilization

15.1 All the Subcontractor's sites and facilities shall be formally decommissioned to an approved condition.

15.2 The Subcontractor shall prepare and implement a Decommissioning Plan for the approval of the Supervising Engineer. Activities in the Plan shall include:

- removal and disposal of all waste,
- demolition and removal of unwanted structures,
- removal and disposal of any soil which has been contaminated by the spillage of diesel, or any other polluting material,
- restore hydrology and grade to pre-construction condition (or improved drainage),
- re-vegetation with naturally occurring vegetation, if possible with vegetation retained from on-site; and/or with erosion control vegetation (vetiver, bamboo, elephant grass), and
- any other necessary to restore the site, as far as possible, to its initial state.

15.3 Prior to subcontract completion, the Supervising Engineer shall check that all decommissioning requirements have been met.

15.4 A provision shall be included in the engineering subcontract to allow for AVANSE inspection prior to finalizing payment.

Table 3. Environmental Monitoring and Evaluation Tracking Table

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	1.1 – 1.6	Implementation Engineering & EC Teams Monitoring Grant Team	Report on internal environmental review	Review of grant proposal Site visit Report approved and filed	At time of grant proposal	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
2	2.1 – 2.5	Implementation Engineering & Procurement Teams Monitoring EC Team	Language included tender documents Special meeting held	Tender document review	Tender document development	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
3	3.1 – 3.2	Implementation Design Subcontractor Monitoring EC Team	Design includes mitigation measures	Design review process	During design documents review (Preliminary through final)	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
4	4.1 – 4.2	Implementation Engineering & Procurement Teams Monitoring EC Team	Language included construction subcontract Special meeting held	Construction subcontract review	Construction subcontract development	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
5	5.1 – 5.3	Implementation Engineering Team Monitoring EC Team	Meetings held	Review of reports Attendance at sample of meetings	Start of project Periodically throughout construction	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
6	6.1	Implementation Engineering	Meetings with local authorities	Review of reports	Start of project	No cost, normal obligation of	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		Team <u>Monitoring</u> EC Team	Notifications from local authorities			salaried staff	4			
7	7.1	<u>Implementation</u> AVANSE Technical Team <u>Monitoring</u> EC Team	Meetings with Farmers Association	Review of Reports	Start of Project	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
8	8.1	<u>Implementation</u> Engineering Team <u>Monitoring</u> EC Team	Access paths function appropriately	Site visits	Start of Project Periodically throughout construction	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
9	9.1	<u>Implementation</u> Design Subcontractor & Construction Subcontractor <u>Monitoring</u> Supervising Engineer & EC Team	Design includes mitigation measures	Document review process	During design documents review	No cost, normal obligation of salaried staff	1			
			Requests for authorization filed and approved	Review of documentation	At time of requests		2			
			No excessive destruction of vegetation	Site visits	Weekly (Sup. Engineer)		3			
				Periodic (EC Team)	4					
10	10.1	<u>Implementation</u> Construction Subcontractor <u>Monitoring</u> Supervising Engineer & EC Team	Dust generation and emissions from Machines and vehicles are minimal	Document complaint book kept by liaison officer	Weekly (Sup. Engineer)	No cost, normal obligation of salaried staff	1			
			No complaints from workers and the community	Site visits	Periodic (EC Team)		2			
							3			
							4			
11	11.1	<u>Implementation</u> Construction	Noise level is kept below 50 dB during the day	Document complaint book kept by liaison	Weekly (Sup. Engineer)	No cost, normal obligation of	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		Subcontractor <u>Monitoring</u> Supervising Engineer & EC Team	No complaints on excessive noise by workers and community	officer Site visits	Periodic (EC Team)	salaried staff	4			
12	12.1	<u>Implementation</u> Construction Subcontractor <u>Monitoring</u> Engineering Team, Supervising Engineer & EC Team	Site environmental plan (SEP) is submitted and approved Borrow pits are approved by AVANSE before development Borrow pits are being properly managed according to approved plans Proper closure and contouring of borrow pits	Review and approval of SEP Site visits Final closure inspection	subcontractor mobilization Daily (Sup. Engineer) Periodically (EC Team) Borrow pit closure	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
13	13.1	<u>Implementation</u> Construction Subcontractor <u>Monitoring</u> Supervising Engineer & EC Team	HASP is prepared, approved and implemented Speed limits and signage are posted in strategic areas First aid boxes on site and full List of health facilities and telephone numbers posted in field office	Review and approval of HASP Site visits	Subcontractor mobilization Daily (Sup. Engineer) Periodically (EC Team)	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
14	14.1	Implementation Construction Subcontractor Monitoring Supervising Engineer & EC Team	Training delivered	Review of training material	Subcontractor mobilization	No cost, normal obligation of salaried staff	1			
					As presented		2			
				Spot attendance at training events			3			
			Toilet and handwashing facilities available and properly supplied	Site visits	Daily (Sup. Engineer) Periodically (EC Team)		4			
15	15.1	Implementation Construction Subcontractor Monitoring Supervising Engineer & EC Team	Waste and hazardous substances management plan has been approved and is operational	Document plan approval	Subcontractor mobilization	No cost, normal obligation of salaried staff	1			
				Site visits	Weekly (Sup. Engineer)		2			
			No spill is recorded		Periodic (EC Team)		3			
			Solid wastes are properly handled				4			
16	16.1	Implementation Construction Subcontractor Monitoring Supervising Engineer & EC Team	Traffic plan approved and implemented	Approval of plan	Subcontract mobilization	No cost, normal obligation of salaried staff	1			
			Appropriate signage in place		Weekly (Sup. Engineer)		2			
			Construction site barricaded	Site visit	Periodic (EC Team)		3			
			Road hazards minimized				4			
17	17.1	Implementation Construction	Vehicles are in operated and maintained in good	Site visits	Subcontractor mobilization	No cost, normal obligation of	1			
							2			
							3			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		Subcontractor <u>Monitoring</u> Engineering Team, Supervising Engineer & EC Team	condition Fuels and lubricants are stored		Weekly (Sup. Engineer) Periodic (EC Team)	salaried staff	4			
18	18.1	<u>Implementation</u> Construction Subcontractor <u>Monitoring</u> Engineering Team, Supervising Engineer & EC Team	Erosion controls are in place Separate vehicle washing area exists	Document plan approval Site visits	Subcontractor mobilization Weekly (Sup. Engineer) Periodic (EC Team)	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
19	19.1	<u>Implementation</u> Construction Subcontractor <u>Monitoring</u> Engineering Team, Supervising Engineer & EC Team	Site environmental plan (SEP) is submitted and approved Borrow pits are approved by AVANSE before development Borrow pits are being properly managed according to approved plans Proper closure and contouring of borrow pits	Review and approval of SEP Site visits Final closure inspection	subcontractor mobilization Daily (Sup. Engineer) Periodically (EC Team) Borrow pit closure	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
20	20.1	Implementation Construction Subcontractor Monitoring Engineering Team, Supervising Engineer & EC Team	Land use by subcontractor for camp(s) and other uses are legal and not in dispute Construction workers camps location, design, and management are approved by AVANSE Mitigation measures are being implemented	Document land use subcontracts Review and approval of location, design, and management of camps Site visits	Subcontractor mobilization Daily (Sup. Engineer) Periodically (EC Team)	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
21	21.1	Implementation Construction Subcontractor Monitoring Supervising Engineer & EC Team	The community liaison officer is hired and is functional A complaint register is in place and complaints are being registered Strikes/strife by workers and/or community are not registered	Document hiring of liaison officer Verification of complaints register Document strikes and/or strife at worksites	Subcontractor mobilization Weekly (Sup. Engineer) Periodic (EC Team)	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			
22	22.1	Implementation Construction Subcontractor Monitoring Engineering Team, Supervising Engineer & EC Team	Decommissioning plan is reviewed and approved Decommissioning is implemented according to plan	Document Plan approval Final inspection	Prior to decommissioning At walk through before decommissioning is completed	No cost, normal obligation of salaried staff	1			
							2			
							3			
							4			

III-A. Environmental Screening Form (Table 1)

Name: Bas Limbé Irrigation system (Corail-Titoir and Rivot Ravines), Limbé Watershed Activity: Drainage not requiring additional surface water withdrawals Type of Activity: Infrastructure / Canal Cleaning Contractor/Grantee: DAI Date: 01 September 2015 IEE/ETD #: LAC-IEE-14-17		Column A	Column B	Col C	
		Yes	No	If answered yes to Col. A. is it a--?	
				High Risk	Medium- Risk
IMPACT ON NATURAL RESOURCES & COMMUNITIES					
1	Will the project involve construction ¹ and/or reconstruction/rehabilitation of any type of structure (building, check dam, walls, etc)?		X		
2	Will the project involve new construction ² and/or repair/reconstruction/rerouting of roads or trails?		X		
3	Will the project involve the use, involve plans to use or training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc?		X		
4	Involve the construction of repair of irrigation systems?		X		
5	Will the activity involve training and/or implementation of agricultural practices/production including animal husbandry?		X		
6	Involve the construction or repair of fish ponds?		X		
7	Involve the disposal of used engine oil?	X			X
8	Will the project involve implementation of timber management ⁴ , extraction of forest products, clearing of forest cover, and/or conversion of forest land ?		X		
9	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas, wetlands, critical wildlife habitat or nesting areas.?	X			X
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)	X			X
11	Will the waste generated during or after the project impact on neighboring surface or ground water?	X			X
12	Will the activity create objectionable odors?		X		
13	Will the activity violate air standard?		X		
14	Will the activity occur on steep slopes (Greater than 15%)?		X		
15	Will the activity contribute to erosion?	X			X
16	Is the activity incompatible with existing land use in the vicinity?		X		
17	Will the activity contribute to displacement of people (housing) or businesses?		X		
18	Will the activity affect unique geologic, physical, cultural, and/or historic features?		X		
19	Will the activity have potential impacts to inhabitants, natural landscapes, or flora/fauna downstream from the activity site?	X			X
20	Will the activity contribute to change in the amount of surface water in any waterbody?		X		
21	Will the activity have a direct or indirect impact, or include actions with mangroves and coral reefs?		X		

22	Will the activity expose people or property to flooding?		X		
23	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?		X		
ENVIRONMENT & HEALTH					
24	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?		X		
25	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?		X		
26	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		X		
27	Will the activity increase existing noise levels?	X			X
28	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		X		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?		X	N/A	N/A
30	Does the activity meet the national building code (e.g. infrastructure improvements)?	X		N/A	N/A
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities?		X		
32	Does the project activity inhibit the equal involvement of men and women?		X		
33	Are there factors that prevent women's participation in the project?		X		
OTHER					
34	Does the project/Activity involve a sub-grant component? ⁶				

RECOMMENDED ACTION (<i>Check Appropriate Action</i>):	<i>(Check)</i>
(a) The project has no potential for substantial adverse environmental effects. No further environmental review is required (Categorical Exclusion). No EMPR required.	
(b) The project has potential for minimal to medium adverse environmental effects, but mitigable environmental effects. Measures to mitigate environmental effects will be incorporated (Negative Determination with Conditions). EMPR Required.	X
(c) The project has potentially substantial or significant adverse environmental effects, but requires more analysis to form a conclusion. An Environmental Assessment will be prepared (Positive Determination). No EMPR required.	
(d) The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required (Deferral).	
(e) The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.	
¹ Construction projects need to be reviewed for scale, planned use, building code needs and maintenance. New construction having a footprint larger than 1000 sq meters or 10,000 sq. ft. is considered large scale and high risk. Some small construction projects, such as building an entrance sign to a park, may require simple mitigations whereas larger buildings will require more	

extensive review and monitoring.

² New construction of roads and trails are considered high risk and will require a full environmental assessment of the planned construction, i.e. a Positive Determination. Any reroutes of a road or trail longer than 100 meters is considered a high risk. Reroutes within a protected area, nearby a water source/wetlands, and/or archeological site are considered a high risk.

³ The purchase of packaged store pesticides are included. The planned involvement of pesticides will trigger the need to develop a Supplemental Initial Environmental Examination that meets USAID pesticide procedures (Pesticide Evaluation Report and Safer Use Action Plan or "PERSUAP") for the project.

⁴ Any activities that involve harvesting trees or converting forests is considered high risk and will require a full environmental assessment of the activity (i.e. Positive Determination).

⁵ A positive response to gender questions require follow up only when there are other positive responses on questions 1 – 30, and an EMPR is developed.

⁶ If the Project/Activity includes a sub-grant component, each sub-grantee shall be required to prepare an EMPR prior to implementation of the sub-grant.

III-B. Identification of Mitigation Plan (Table 2)

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
7	Disposal of used engine oil	Oil and fuel spills from trucks or their improper disposal leading to pollution, contamination	Promote the limitation of heavy machinery and equipment during the construction phase
9	Sensitive terrestrial or aquatic areas near the project site	Siltation and other pollutants will enter the water body and may harm aquatic flora and fauna	Reduce use of chemicals and monitoring of water quality
10	Generation of airborne gases, liquids, or solids	Harmful exhaust smoke, fumes, and dust from construction in surrounding communities	Promote the limitation of vehicles and machines during construction phase, reduce use of airborne chemicals
11	Waste generation and surface and groundwater	Improper disposal of solid waste during construction leading to contamination, pollution	Establishment of comprehensive waste management program monitored by AVANSE

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
15	Contribution to erosion	Earthworks contribute to large amount of soil movement leading to erosion, sedimentation Non-maintenance of drainage canals will lead to recurring productivity problems Material cleaned or dredged from canals not disposed of or used properly	Bring awareness to project engineers for the design, construction and supervision Strengthen the capacity of WUAs or similar management committees so that they become operational and sustainable and able to maintain the drainage system on an ongoing basis Use earthen, soil-based sediment material, once cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the berms separating the plantain parcels
19	Impacts to inhabitants, natural landscape	Establishment of workers camps and other work facilities; Exploitation of borrow pits causing loss of vegetation, farmlands, dust,	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition. Request AVANSE's approval prior to exploitation of borrow pits.

# of the question from Table 1	Action or component with the different tasks required to implement the action.	Description of Impact	Mitigation Measures
		health & public safety problems, wildlife decline	
27	Increasing existing noise levels	Increase in noise level can become an unbearable nuisance to workers; Vehicles and machines will produce noise unpleasant to communities	Promote the limitation of heavy machinery and equipment during the construction phase

III-C. Environmental Monitoring and Evaluation Tracking Table (Table 3).

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	Promote the limitation of heavy machinery and equipment during the	Implementation: Subcontractor	No spill is recorded;	Site visits	Periodic	No cost (normal staff	1			
			Fuels and lubricants				2			

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementin g mitigation measures and monitoring	Results			Recomme nded Adjustme nts
			Indicators of implement- ation and effectiveness of indicators	Methods	Frequency		Dates Monitore d	Problems Encounter ed	Mitigation Effectivene ss	
	construction phase to reduce fuel spills	<u>Monitoring:</u> AVANSE Technical Team	are stored			salaries)	3			
							4			
2	Reduce use of chemicals and monitoring of water quality	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Separate car wash facilities; No spill is recorded; Water tested below threshold levels	Site visits Water sampling and testing	Regular	No cost (normal staff salaries)	1			
							2			
							3			
							4			
3	Promote the limitation of vehicles and machines during construction phase, reduce use of airborne chemicals	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Dust generation and emissions from machines and vehicles are minimal; No Complaints from workers and the community	Document complaint book kept by liaison officer Site visits	Periodic	No cost (normal staff salaries)				
4	Establishment of comprehensive waste management program monitored by AVANSE	<u>Implementation:</u> Subcontractor <u>Monitoring:</u>	Waste and hazardous substance manage- ment plan has been approved and is	Document plan approval	At Subcon- tractor mobiliza-	No cost (normal staff salaries)				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
		AVANSE Technical Team	operational; No spill is recorded; Solid wastes are properly handled		tion, then weekly					
5	Bring awareness to project engineers for the design, construction and supervision	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Erosion controls are in place	Erosion plan approval	Document review during design, then periodic	No cost (normal staff salaries)				
6	Strengthen the capacity of WUAs or similar management committees so that they become operational and sustainable and able to maintain the drainage system on an ongoing basis	Implementaion: AVANSE rice team Monitoring: AVANSE Technical Team	Canals cleaned on a regular basis or schedule	Site visits	Quarterly	No cost, normal obligation of staff salaries				
7	Use earthen, soil-based sediment material, once	Implementation:	Sediment used to build canal slopes;	Site visits	Quarterly	No cost, normal				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	cleaned of debris, to build the slopes of the canal; give debris to farmers to reinforce the berms separating the plantain parcels	AVANSE rice team Monitoring: AVANSE Technical Team	debris used to reinforce berms			obligation of staff salaries				
8	Provision of sanitary facilities, clearing, construction of structures, proper land acquisition	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Toilet and handwashing facilities available and properly supplied	Review of training materiel Spot attendance	Subcontractor mobilization as presented Daily supervision	No cost (normal staff salaries)				
9	Request AVANSE's approval prior to exploitation of borrow pits	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Borrow pits are being properly managed according to approved plans; Proper closure and contouring of borrow pits	Site visits Final closure inspection	Borrow pit closure	No cost (normal staff salaries)				

#	Description of Mitigation Measure (same as in Table 2)	Responsible Party for implementing and monitoring mitigation measures	Monitoring Methods			Estimated Cost of implementing mitigation measures and monitoring	Results			Recommended Adjustments
			Indicators of implementation and effectiveness of indicators	Methods	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
10	Promote the limitation of heavy machinery and equipment during the construction phase	<u>Implementation:</u> Subcontractor <u>Monitoring:</u> AVANSE Technical Team	Noise level is kept below 50 dB during the day; No complaints of excessive noise by workers and community	Document complaint book kept by liaison officer Site visits	Periodic	No cost (normal staff salaries)				