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FEED THE FUTURE- WEST/WINNER

**WATERSHED INITIATIVE FOR NATIONAL NATURAL
ENVIRONMENTAL RESOURCES PROJECT**

**ENVIRONMENTAL MITIGATION PLAN & REPORT
(EMPR)**

CONSTRUCTION OF A CRDD IN MONTROUIS

May 2013

CONTRACT NO. EPP-I-0404-000200-00

II. Narrative of the Environmental Mitigation Report

1. Background, Rationale and Outputs/Results Expected:

Feed the Future West (FtF)/WINNER is a USAID project to improve the production of selected agricultural crops in the Cul-de-Sac and Matheux corridors, while fostering large-scale investments for the sustainable management of natural resources and reducing environmental, infrastructural and economic vulnerability in these corridors. Focusing mainly on corn, rice, banana/plantain and beans value chains, the Project seeks to achieve three Intermediate Results (IRs):

1. Increased agricultural productivity in the targeted chains of production;
2. Improved stability on the targeted watersheds; and
3. Strengthened agricultural markets and commercialization of targeted chains of production.

As part of its efforts to obtain these results, the project has established three (3) regional offices for close relationships and interactions with the local population, leaders and authorities, as well as three (3) Sustainable Rural Development Centers (CRDDs) to serve as centers for agricultural experimentation, demonstration, and promotion of new or improved agricultural techniques and packages. Located in Bas-Boën (Cul-de-Sac Plain), Duvier (in the commune of Pétionville), and Kenscoff, these CRDDs also serve for the promotion of sustainable practices that protect the environment, and the training of trainers and master farmers.

The project proposes to establish a fourth CRDD in Montrouis, in the Matheux Corridor where the agro-ecological conditions and the focus crops are different from the other three. Like the others, the proposed CRDD will serve as demonstration and training center for the modernization of agricultural production in the Matheux corridor through the introduction and promotion of improved agricultural practices, crop varieties and equipment, with significant focus on plantain/banana and rice production. It will comprise a pilot farm, nursery, demonstration plots, training facilities and dormitory, a small plant laboratory unit, and venue for meetings, etc. It will also serve as a reference for the farmers and farmers associations to facilitate the shift from subsistence to market/business oriented agriculture, thereby contributing to increase agricultural productivity and revenues generated from agriculture and related activities, and to improve livelihoods in the target areas.

2. Description of the Activity

The Montrouis CRDD will include (figure 1):

- An administrative building with a surface area of 317.58 m² to accommodate the administration and technical offices, the conference room, a cafeteria, and a plant laboratory;
- A storage place with a surface area of 39.70 m²;
- A training center of 73.82 m²;
- A hangar for tractors with a surface area of 114.21 m²;

- The sanitary facilities, a generator room; and
- The guard quarters.

It will also encompass:

- A courtyard with landscaped sections and a parking lot;
- The rehabilitation of a 350-meter dirt access road (4 meter wide) ;
- 249.05 meters of cyclone fencing around the facility with a gate at the entrance; and
- The rehabilitation of 300 meters of irrigation (50 cm wide), and of 200 meters of drainage canal to connect the CRDD with the existing irrigation and drainage systems in order to respond to the irrigation and drainage needs of the CRDD.

2.1 The Work:

The Construction of the Montrouis CRDD involves:

Phase 1: Mobilization and site preparation

This includes:

- Preparing the site, facilities, materials and equipment;
- Defining the area of intervention with proper marking, i.e. staking out the work area. As described in Chapter 3, the site is currently under agricultural;

Phase 2: Construction

A. Administrative building and storage facilities (figure 2), and training center, hangar, generator room and guard quarters (figure 3)

The Procurement of construction materials will be from legal and approved and quarries in as close proximity as possible to the project site in order to reduce transportation distance. The disposal of excess dirt material will be in an environmentally sound and sustainable manner, in WINNER-approved locations.

1. *Foundation and base*: Concrete blinding, reinforced concrete for base plates and plinths, and reinforced concrete ring beam and slab. This includes:

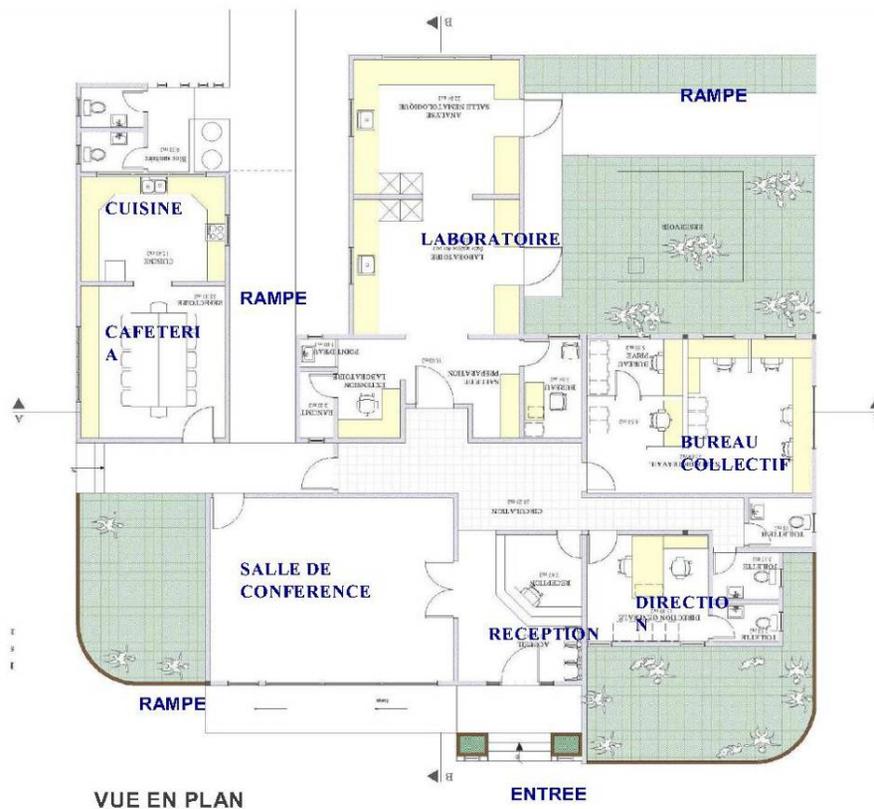
- Placing the erosion control structures
- Installation of formworks and rebar
- Excavation and/or backfill for the foundation and base

2. *Reinforced concrete for walls*. This includes:

- Installation of agglomerated masonry blocks of 20 cm
- Installation of reinforced concrete walls



Figure 1: General overview of the CRDD



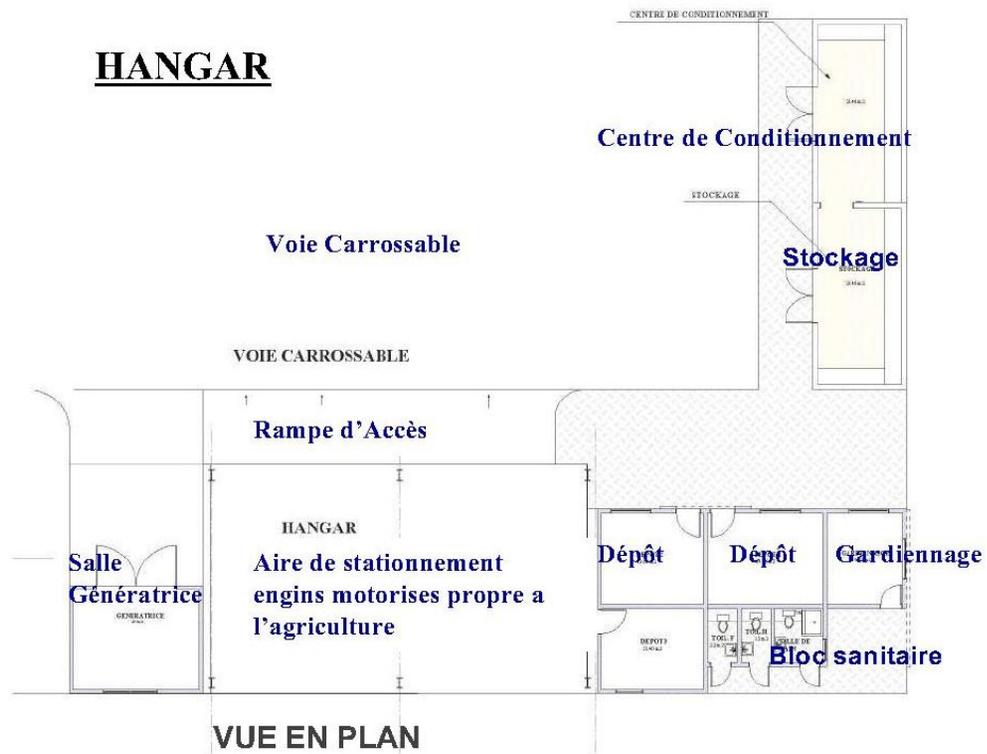
BATIMENT **ADMINISTRATIF**

BATIMENT ADMINISTRATIF_
Activités et surfaces Usuelles:

Accueil	: 18,33 m ²
Salle de conférence	: 45,83 m ²
Bureaux collectif	: 35,20 m ²
Bureaux indépendant	: 5,80 m ²
Bureau Direction	: 13,20 m ²
Bloc sanitaire	: 8,83 m ²
Laboratoire	: 54,54 m ²
Cafétéria et cuisine	: 37,71 m ²
Bloc sanitaire (ext.)	: 9,32 m ²
Aire de circulation intérieure:	28,25 m ²
Aire de circulation extérieure, escalier et rampes	: ~80.00 m ²

EQUIPEMENTS ET CONSTRUCTION S.A. [ECSA] 31-10-12

Figure 2: Layout of administrative building



BLOC TECHNIQUE, SANITAIRE ET HANGAR._

Activités et surfaces Usuelles:

	212.96 m ²
Esplanade Hangar	: 114,21 m ²
Incluant le stockage de 10,70 m ²	
Dépôts 1	: 14,62 m ²
Dépôts 2	: 13,68 m ²
Dépôts 3	: 11,40 m ²
Bloc sanitaire	: 8.60 m ²
Gardiennage	: 9.52 m ²
Centre de conditionnement	: 20.46 m ²
Salle pour groupe électrogène	: 20.00 m ²
Aire de circulation extérieure, escalier et rampes	: ~100.00 m ²

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EQUIPEMENTS ET CONSTRUCTION S.A. [ECSA] 31-10-12

Figure 3: Layout of agricultural hangar and generator room

3. *Metal and aluminum roof work.* This includes:

- Installation of frame and roof, according to design specifications
- Installation of suspended plywood painted ceiling

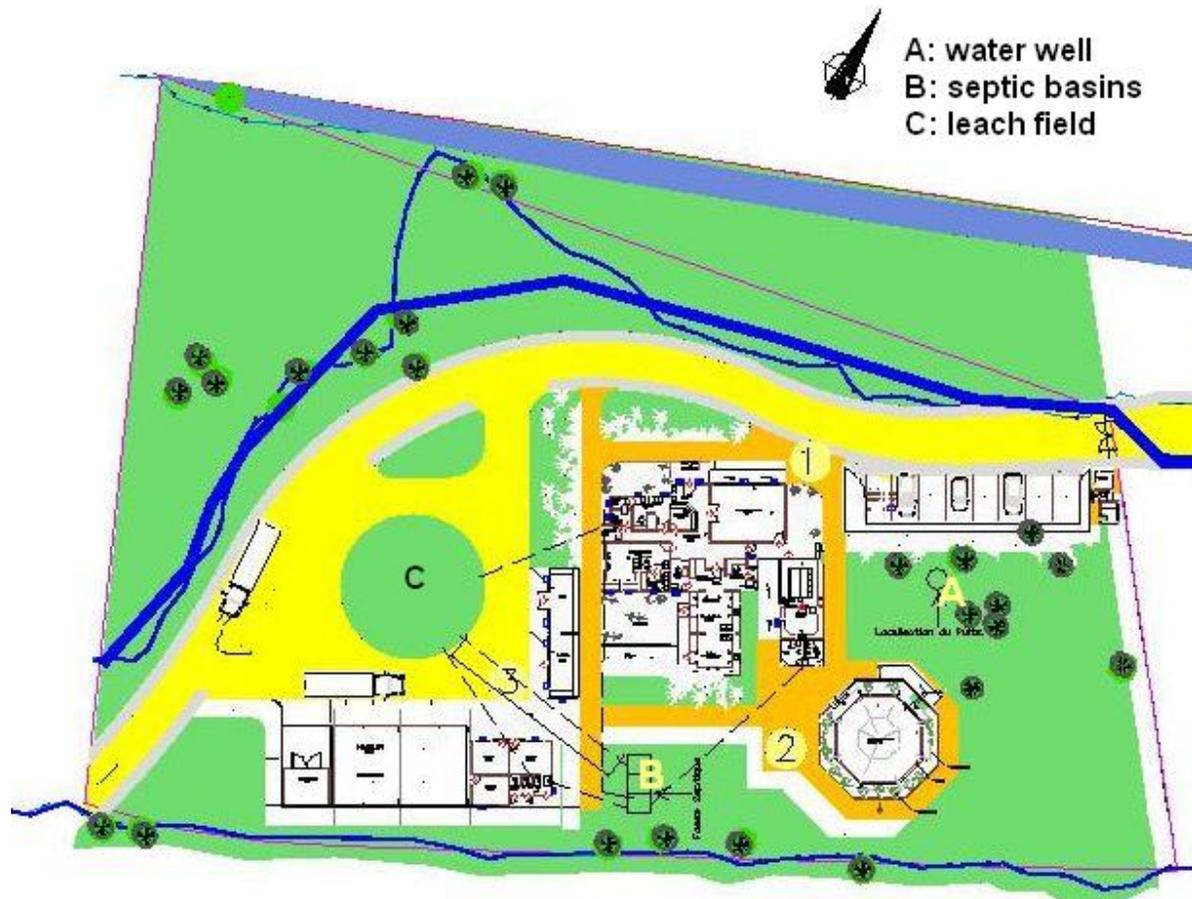


Figure 4: Location of the water well and sanitation infrastructures

4. *Plumbing and hydraulic work.* This includes:

- Procurement and installation of all plumbing and sanitation materials
- Implementation of all associated works for the drainage of excess water and/or treatment for waste water. The CRDD drainage canals will be linked to the already existed system.
- Installation of gutters and pipes to collect rainwater from the roofs
- Installation of water towers, reservoirs for water storage, and of a 1-hp water pump
- Digging, conditioning and equipping a well, south of the parking and east of the administrative building, to supplement the water already provided by DINEPA for domestic use. The water table is at an average depth of 18 to 23 m. Note that Indigo Club water well is about 200 m from the CRDD campus.
- Testing of water quality, which should meet GoH guidelines and USAID requirements (Annex A).

- Construction of the waste water treatment and septic system (specifications presented in Annexes B and C)

5. *Electrical Power.* This includes the installation of the electrical power system for the entire site, including the interior and exterior of all structures. The following equipment will be procured and installed:

- 50 kW generator
- 50 kVA transformer
- Lights with bulbs
- Electrical outlets
- Air conditioning units

6. *Wall finishing and Painting.* This includes:

- Plaster and coating of all walls
- Two-coats of paint and ceramic finishing of all walls

B. Courtyard and parking lot

1. *Foundation and base:* Concrete blinding, reinforced concrete for base plates and plinths, and reinforced concrete ring beam and slab. This includes:

- Placing erosion control structures
- Installation of formworks and rebar
- Excavation and/or backfill for the foundation and base.
- Paving of parking lot in cobblestone, and marking according to the approved plans
- Landscaping of the courtyard according to the approved plans
- Removal of erosion control measures only when vegetation has been established

2. *Cyclone fencing.* This includes:

- Installation of 249.05 linear meters of a 2-meter high cyclone fence around the site (excluding the side already fenced by the hotel Club Indigo)
- Installation of the entrance gate

C. Access road (figure 5)

1. *Leveling and compacting, laying gravel foundation.* This includes:

- Staking about 350 m of road (180 m on the CRDD campus and the rest to link the campus to the main road). The road width will be 4 meters.
- Placing erosion control structures
- Clearing the roadway, stripping and removing dirt and poor materials from the road surface and digging of the road drainage canal. The removed materials will be transported to the designated and approved disposal place. The engineering subcontract will state that

no fill will be stored in wetlands or waterways, or in any way that would obstruct the flow of water. It will also state that fill will only be stored on already disturbed land, and never on agricultural lands.

- Weeding and removal of brush and other vegetation from the road way, and transportation and disposal offsite in an approved location.
- Backfill of aggregate and other materials for road surface, using crushed gravel (40 cm thick).
- Leveling and compacting the road surface.
- Placement of cobblestones for rolling surface.
- Removal of erosion control measures.

D. Irrigation and drainage canals

1. *Rehabilitation of irrigation and drainage systems* (fig 5). These canals already exist, and are part of a larger network, but the sections that cover the CRDD campus are in a state of disrepair. The work includes:

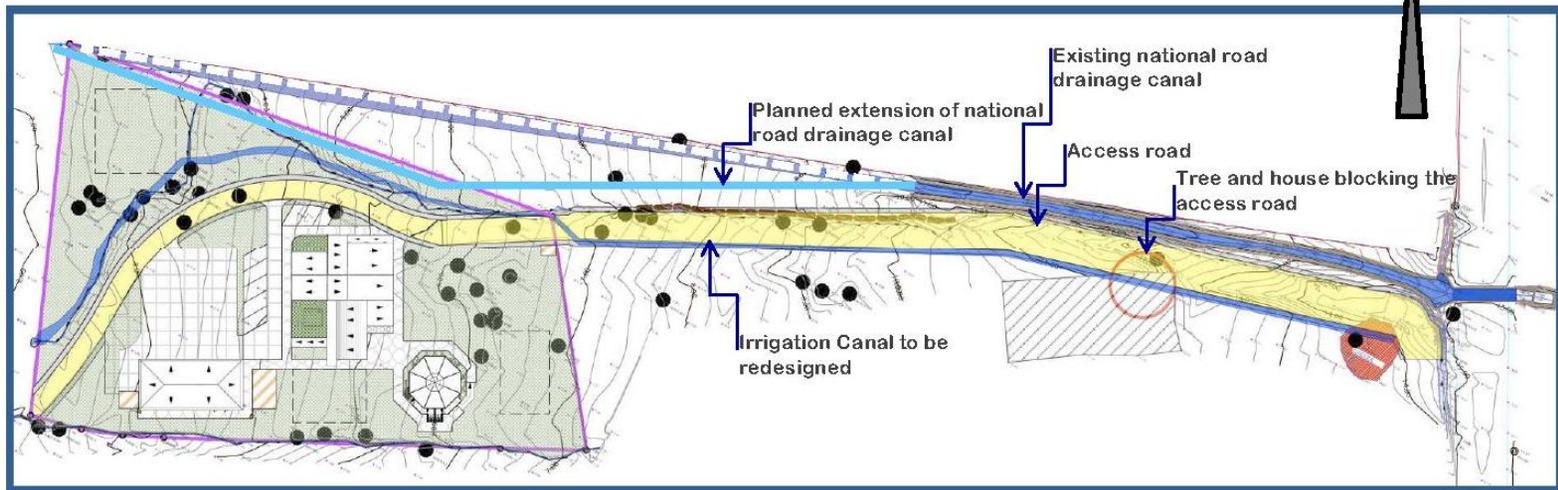
- Placing of erosion control structures, as appropriate
- Cleaning up and reprofiling 300 meters of irrigation canal and of 200 meters of drainage canal
- Lining up in stone masonry the irrigation canal (width: 50cms) and the drainage canal (width: 3 m).

Phase 5: Decommissioning

This includes:

- Demobilization of all equipment and personnel from the site
- Clean-up of the site, removing and disposing of all construction related debris and waste. The disposal will be in WINNER-approved locations.

Surface of the lot dedicated to construction : 6 820.00 m²
Total surface to be built : 534.24 m²
Length of access road : ~179,80 linear meters (within property)+ ~127.00 m (extra muros) = 306,80 ml



EQUIPEMENTS ET CONSTRUCTION S.A. [ECSA] 31-10-12

Figure 5: Layout of access road and drainage canal

Phase 6: Operations & Maintenance

Operations will involve the use of the CRDD to, among other aspects:

- Provide extension services to WINNER beneficiaries in the Matheux region
- Implement demonstration plots for the promotion of improved agricultural packages and techniques
- Conduct training for Master farmers, members of farmers associations and others on agricultural production practices, natural resources management and environmental protection.

The operations phase will include maintaining demonstration plots, the irrigation scheme, and the infrastructure – buildings, drainage canals, the access road, and water, electrical, and septic systems. WINNER will develop a management plan for the CRDD, and will work with the Ministry of Agriculture, UF and the various stakeholders, including relevant farmers associations and agri-businesses for the management and operation of the CRDD.

3. Environmental Situation: Baseline

A. General information:

The general area is characterized by two main seasons: a dry season running from the end of November to the middle of April, and a rainy season from April to November, with 80% of the annual rainfall coming in the rainy season. The average temperature is 27° C. The area is irrigated by the Montrouis River, which has its source in the high reaches of the Matheux mountain range. The flow of the river diminishes significantly in the dry season, reducing the irrigated area in the dry season. The soil is of sedimentary limestone rock, and the alluvial plain a limestone/clay mix with increasing drainage issue as one gets closer to the coast.

Fairly fertile, the area is mostly used for agriculture, but it also has high density of fruit trees. Highly impacted by urbanization, and other human activity, it boasts some very large beach houses, hotels and resorts. It is a major tourist destination.

B. Specific information:

The sea side of the proposed Montrouis CRDD campus is occupied by Club Indigo, an important beach tourist destination (figure 6). The property is bordered by perennial trees, especially fruit trees. With a general slope close to 3%, it drains into the main canal that runs on the northwest of the property, draining water coming from National Road No. 1 (figure 7). Since the main drainage canal is in masonry, it does not carry much mud, but it does bring high quantity of plastic bottles and plastic bags.

The site has been under cultivation for more than a century. Up to last year, it was planted in banana, but has been in fallow for about one year (figure 8).



Figure 6: Location of future Montruis CRDD



Figure 7: Main drainage canal from the national road, up slope, to the property



Figure 8: Lot to be built, been left in fallow since last trimester of 2012

4. Evaluation of the potential environmental impacts on the activities (Table 2):

The following environmental screening form (Table 1) shows the environmental risk levels (medium or high) related to the construction of the Montrouis CRDD and associated infrastructure.

III-A. Environmental Screening Form (Table 1)

Name of Activity: Construction of a CRDD in the Matheux Corridor Type of Activity: Infrastructure to assist in agricultural intensification in the plain Beneficiary: Date: 26 April 2013		Column A	Column B	Column 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 of any type of structure (building, check dam, walls, etc)?	✓			✓
2	Will the project involve the construction ² or repair of roads or trails?	✓			✓
3	Will the project consider training in the use of any chemical compounds such as pesticides ³ (including neem), herbicides, paint, varnish, lead-based products, etc?	✓			✓
4	Will the project involve the construction or repair of irrigation systems?	✓			✓
5	Will the project Involve the construction or repair of fish ponds?		✓		
6	Involve the disposal of used engine oil?		✓		
7	Will the project involve implementation of timber management ⁴ or extraction of forest products?		✓		
8	Are there any potentially sensitive terrestrial or aquatic areas near the project site, including protected areas?		✓		
9	Does the activity impact upon wildlife, forest resources, or wetlands?		✓		
10	Will the activities proposed generate airborne gases, liquids, or solids (i.e. discharge pollutants)		✓		
11	Will the waste generated during or after the project impact on neighboring surface or ground water?		✓		
12	Will the activity result in clearing of forest cover?		✓		
13	Will the activity contribute to erosion?		✓		
14	Is the activity incompatible with existing land use in the vicinity?		✓		
15	Will the activity contribute to displace housing?		✓		
16	Will the activity affect unique geologic or physical features?		✓		
17	Will the activity contribute to change the amount of surface water?		✓		
18	Will the mangroves and coral reefs be affected by this activity?		✓		
19	Will the activity expose people or property to flooding?		✓		
20	Will the activity contribute substantial reduction in the amount of ground water otherwise available for public water supplies?	✓			✓
21	Will the activity create objectionable odors?		✓		
22	Will the activity violate air standard?		✓		
ENVIRONMENT AND HEALTH					
23	Will the project activities create conditions encouraging an increase of waterborne diseases or populations of disease carrying vectors?	✓			✓
24	For road rehabilitation as well as water and sanitation grants, has a maintenance plan been submitted?	✓			✓
25	Will the activity generate hazards or barriers for pedestrians, motorists or persons with disabilities?		✓		
26	Will the activity increase existing noise levels?		✓		
27	Will the project involve the disposal of syringes, gauzes, gloves and other biohazard medical waste?		✓		
28	Is the activity incompatible with existing land use?		✓		
LOCAL PLANNING PERMITS					
29	Does the activity e.g. infrastructure improvements, require local planning permission(s)?	✓			

30	Does the activity meet the national building code (e.g. infrastructure improvements)?	✓			
GENDER⁵					
31	Do men and women benefit disproportionately or are involved unequally in the project's activities? Does the project activity inhibit the equal involvement of men and women?		✓		✓
32	Are there factors that prevent women's participation in the project?		✓		✓

5. Environmental Mitigation Activities (Tables 2 & 3) (this section is included in the annual EMPR and not in the initial EMPR):

Based on the detailed list of impacts above, Table 2 lists the required mitigation measures. The table is based on the Programmatic Environmental Assessment prepared for the FtF West/WINNER project for the infrastructure component.

III-B. Identification of Measures in the Mitigation Plan (Table 2)

The table below is revised from the Mitigation Plan for CRDD construction included in the Programmatic EA for WINNER. It has been revised so that it is specific to the current proposal and the potential impacts identified above in Table 1. (See also Annexes D and E – Excerpt mitigation measures from the PEA – LAC-EA-11-02)

Impacts No.	Mitigation Measures
1, 2 & 4	<p>All the mitigation measures for small scale construction recommended in the WINNER PEA (LAC-EA-11-02) shall be incorporated into the tender documents and contracts. Costs for environmental mitigation shall be included in the project budget.</p> <p>The tender documents and contracts shall also include a requirement for waste re-use and/or recycle, and for all material to be sourced in an environmentally sound and sustainable manner.</p> <p>To ensure the safety of the public, WINNER shall also require the construction firm to, among other aspects, as spelled out in LAC-EA-11-02:</p> <ul style="list-style-type: none"> • Restrict public access to hazard areas • Hold meetings with neighbors to inform them of the work to be carried out • Hold consultations with community leaders to assess potential inconvenience to neighbors, and devise ways to avoid or reduce them • Develop a safety plan, and train workers and personnel accordingly • Provide appropriate safety equipment, as needed to employees and visitors • Post proper signage.
3	<p>All the mitigation measures for agricultural production recommended in the WINNER PEA (LAC-EA-11-02) and all guidelines and recommendation in USAID/Haiti Mission-wide PERSUAP shall apply for the agricultural activities to be implemented on the CRDD campus.</p> <p>The potential use of chemical compounds to support the agricultural production activities would be an indirect impact of the CRDD construction (Operation Phase).</p>
13	<p>All the erosion control and mitigation measures for small scale construction recommended in the WINNER PEA (LAC-EA-11-02) shall be incorporated into the tender and engineering documents and contracts. Costs for environmental mitigation shall be included in overall project budget (Design and construction phases). For example, the construction firm shall place erosion control measures and filters such as geotextiles, siltscreens (or other appropriate materials) prior to starting construction activities, and shall not remove them until the construction is complete and vegetation re-established.</p> <p>All the mitigation measures for agricultural production recommended in the WINNER PEA (LAC-EA-11-02) and WINNER EA for mechanized land preparation (LAC-EA-12-02) shall apply for the agricultural activities that will be implemented on the CRDD campus. The potential erosion that may result from these activities would be an indirect impact of the CRDD construction (Operation Phase).</p>
23	<p>The rehabilitated irrigation and drainage canals are expected to service the CRDD campus. WINNER shall train the CRDD staff on the regular operation and maintenance of these canals in order to avoid, reduce, clear and/or eliminate clogs and stagnant waters. WINNER shall also ensure the sound and efficient operation of these canals with a view to prevent and/or drain waterlogged fields.</p> <p>This is not a mitigation measure, but an important recommendation: WINNER shall use these canals to train the farmers on irrigation water management, and raise their awareness on waterborne diseases. This will be important for the off-CRDD campus irrigation activities.</p>
24	<p>There are no requirements for submission of a maintenance plan to the authorities; however WINNER shall prepare an operation and maintenance plan for the facilities, and train the personnel accordingly.</p>

Impacts No.	Mitigation Measures
29 & 30	WINNER shall ensure that required permits are obtained and maintained on file with copies on site for and when inspection occurs.
31	WINNER shall include in the tender documents and the contract a clause for the construction firm to have a fair and equitable gender ratio, develop a Gender Integration Plan, use local sources of labor to the greatest extent possible, use only legal age labor, and abide by the Haitian Labor Code.

RECOMMENDED ACTION (*Check Appropriate Action*):

(*Check*)

(a) The project has no potential for adverse environmental effects. No further environmental review is required	
(b) The project will have few adverse environmental effects. However, measures to mitigate environmental effects will be incorporated. No further environmental review is required	
(c) The project has potentially substantial adverse environmental effects that may be mitigated. However, measures to mitigate those effects will be incorporated.	✓
(d) The project has potentially substantial adverse environmental effects. However, it is necessary to undertake an in-depth analysis before drawing a conclusion. An Environmental Evaluation will be prepared.	
(e) The project has important adverse environmental effects and requires the review of the project, the site and new alternatives.	
(f) The project has substantial adverse environmental effects that cannot be mitigated. Mitigation measures will not eliminate those effects and alternatives measures cannot be implemented. The project is not eligible for funding.	

Impacts	Description of Mitigation Measures	Party Responsible	FTF WEST/WINNER Monitoring Methods			Estimated Additional Costs	Monitoring/Evaluation Visit Results			Recommended Adjustments
			Indicators	Methods/Reference Tools	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
	PERSUAP shall apply for the agricultural activities to be implemented on the CRDD campus. The potential use of chemical compounds to support the agricultural production activities would be an indirect impact of the CRDD construction (Operation Phase).	Director and Matheux Regional Director	the contract Implementation of LAC-EA-11-02 recommendations	contracts						
13	All the erosion control and mitigation measures for small scale construction recommended in the WINNER PEA (LAC-EA-11-02) shall be incorporated into the tender and engineering documents and contracts. Costs for environmental mitigation shall be included in overall project budget (Design and construction phases). For example, the construction firm shall place erosion control measures and filters such as geotextiles, siltscreens (or other appropriate materials) prior to starting construction activities, shall not remove them until construction is complete and vegetation is re-established. All the mitigation measures for agricultural production recommended in the WINNER PEA (LAC-EA-11-02) and in the EA for mechanized land preparation (LAC-EA-12-02) shall apply for the agricultural activities to be implemented on the CRDD campus. The potential erosion that may result from the agricultural activities would be an indirect impact of the CRDD construction (Operation Phase).	WINNER and contractor Chief engineers WINNER livelihoods Director and Regional Director	Staking occurs; area protected from construction effects Erosion control measures in place during and up to point that native vegetation is established.	Review engineering documents & contracts Site visits	Prior to project And Monthly	5,700				
23	The rehabilitated irrigation and drainage canals are expected to service the XX hectares of the CRDD campus. WINNER shall train the CRDD staff on the regular operation and maintenance of the canals in order to avoid, reduce, clear and/or eliminate clogs and stagnant waters. WINNER shall also ensure that the sound and efficient operation of these canals to prevent and/or drain waterlogged fields. Not a mitigation measure, but an important recommendation: WINNER shall use these canals to train the farmers on irrigation water management, and raise their awareness on waterborne diseases.	WINNER livelihoods Director and Regional Director	training materials	Review training materials Review quarterly and special reports	Quarterly	N/A				
24	There are no requirements for submission of a maintenance plan to the authorities; however WINNER shall prepare an operation and maintenance plan for the facilities, and train the personnel accordingly.	WINNER Chief Engineer and Livelihoods Director	Operation and maintenance plan for the facilities	Review operation and maintenance plan	At least 90 days after beginning of construction	N/A				
29 &	WINNER shall ensure that required permits are obtained and	WINNER	Copies of	Review permits	Prior to	N/A				

Impacts	Description of Mitigation Measures	Party Responsible	FTF WEST/WINNER Monitoring Methods			Estimated Additional Costs	Monitoring/Evaluation Visit Results			Recommended Adjustments
			Indicators	Methods/Reference Tools	Frequency		Dates Monitored	Problems Encountered	Mitigation Effectiveness	
30	maintained on file with copies on site for inspection.	and contractor Chief engineers	permits		construction					
31	WINNER shall include in the contract a clause for contractor to have a fair and equitable gender ratio, develop a Gender Integration Plan, use local sources of labor to the greatest extent possible, use only legal age labor, and abide by the Haitian Labor Code.	WINNER WIF Director	Copies of contracts, gender integration plan, hiring procedures	Review of contracts, gender integration plan, hiring procedures Site visits Interviews with community leaders	Prior to construction Monthly	N/A				

ANNEXES

ANNEX A

DINEPA Water Quality Testing Requirements

The following are the requirements of DINEPA (GoH) for water quality testing. They are required at least twice, once after a dry season and the other during the rainy season and every time a change is made upstream in the capping and the distribution pipes. That also satisfies USAID water quality testing concerns:

NAME OF THE RESOURCE:

NATURE OF THE RESOURCE: SPRING WELL RIVER FORAGE

LOCALISATION OF THE RESOURCE

Geographic position :.....

Department :.....Municipality:.....

Section communale ;.....Borough

DATE of analysis / / 201 TIME

NAME OF TECHNICIAN.....

Physical Parameters

Temperature: °C Conductivity (µS/cm): pH:

Turbidity (NTU) Salinity (mg/L):

Organoleptic Parameters

Appearance: Odor:

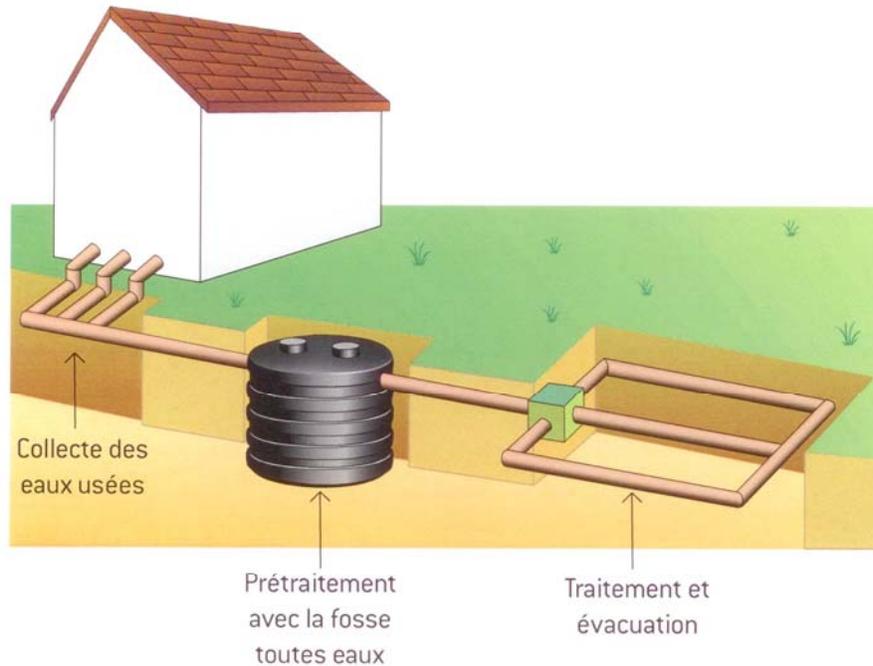
Chemical Parameters

Parameters	WHO Guidelines	Parameters	WHO Guidelines
Aluminium (mg/L)	0,2	Fluorures (mg/L)	1,5
Total Hardness (mg/L CaCO ₃)	200	Arsenic (mg/L)	0,01
Alcalinity (mg/L CaCO ₃)	No ref determined	Copper(mg/L) Cu ²⁺	2
Nitrates (mg/L)	50	Lead (mg/L)	0,01
Nitrites (mg/L)	3	Pesticide (presence or lack)	<100 µg/L
Chlorures(mg/L)	250		
Sulfates(mg/L)	500		
Iron (mg/L)	0,3		

II. Le traitement individuel des eaux usées



Fonctionnement de la fosse toutes eaux



En pratique

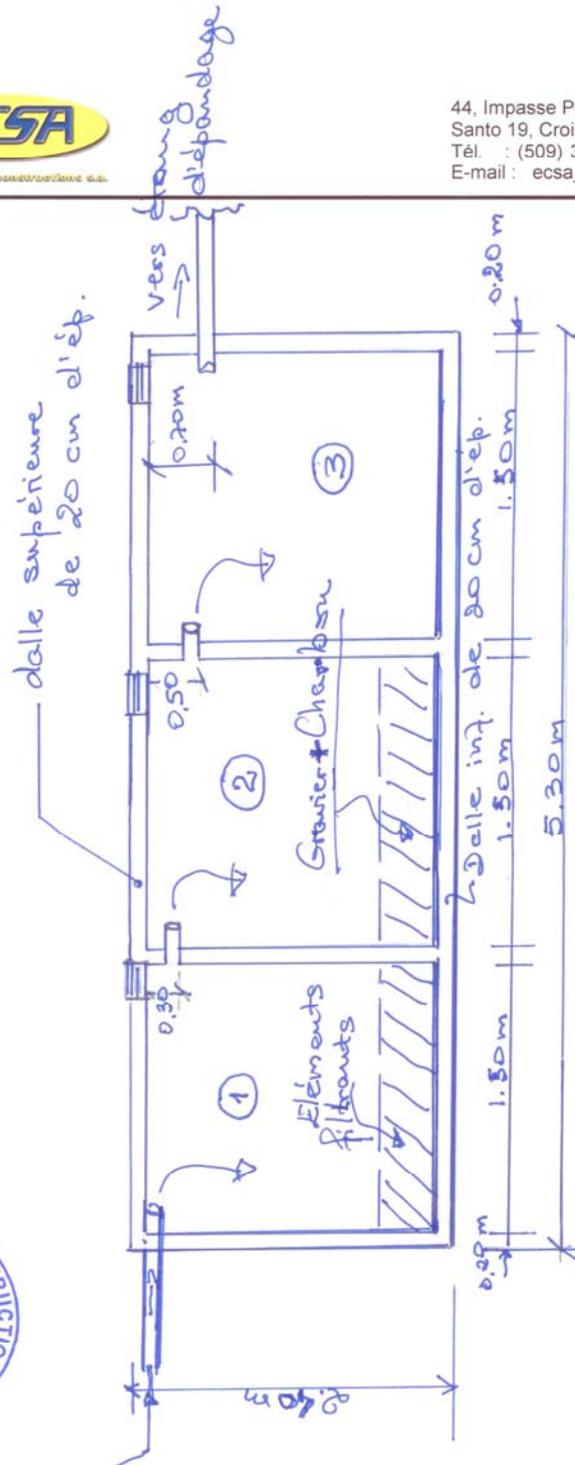
La fosse toutes eaux est obligatoirement suivie d'un dispositif de traitement réglementaire.

Tout d'abord, une tranchée d'épandage doit être mise en place. Il s'agit d'utiliser le sol en place pour disperser et infiltrer les eaux, au moyen de tuyaux d'épandage placés à 60 cm de profondeur. Ces tuyaux sont installés sur une épaisseur de graviers de 30 cm, soit dans des tranchées, soit sur un lit d'épandage. Cette solution s'applique aux sols à la perméabilité mesurée, entre 15 mm/h et 500 mm/h. L'épuration est réalisée par les micro-organismes du sol.





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Excerpt from the PEA LAC-EA-11-02

ANNEX G: ENVIRONMENTAL MITIGATION FOR SMALL-SCALE CONSTRUCTION

This annex covers mitigation measures for construction/rehabilitation of CRDDs and construction camps, and water and sanitation systems as part of CRDDs or as part of ancillary features for larger projects (flood/erosion control, irrigation and potable water provision, and road rehabilitation).

Table G-1: Mitigation Plan for Construction or Renovation of CRDDs, Construction Camps, and other Small-Scale Facilities/Buildings

Phase	Activity	Potential Adverse Impacts	Mitigation measures
Planning & Site Selection	Identification of project site: WINNER staff in collaboration with producer organizations, communities and other stakeholders	<p>At this early stage in project planning, environmental issues may not be considered or may not be given equal weight to other issues.</p> <p>Important habitat or ecosystems sensitive to disturbances may be located within project site boundaries or may be affected by the project.</p> <p>Habitat for threatened or endangered species and/or threatened or endangered species may be found within project site boundaries or may be affected by the project.</p>	<p>WINNER Biodiversity Specialist shall be involved in planning and site selection.</p> <p>Environmental Due Diligence shall be conducted at Planning & Site Selection Phase, as follows. WINNER Biodiversity Specialist shall ensure that the Mitigation Plan for the Construction Phase is adequate so that: (1) any important habitat or ecosystems that are located within project boundaries (project boundaries include all ancillary features) will be protected. (2) any important habitat or ecosystems that may be affected by the project (affected may be temporary/short-term or long-term, direct or indirect, and “project” includes ancillary features) will be protected. (3) any cultural or historical assets that are within project boundaries or that may be affected by the project will be protected. If WINNER Biodiversity Specialist determines that the Construction Phase Mitigation Plan is not adequate to protect flora, fauna, and sensitive ecosystems), and cultural/historical resources, an alternative site must be chosen. Environmental Due Diligence shall also ensure that: If any threatened, endangered, or other sensitive species, or habitat for threatened, endangered, or other sensitive species is within project boundaries or may be affected by the project, an alternative site shall be chosen. If protected areas are within project boundaries or may be affected by the project, an alternative site shall be chosen. Construction/rehabilitation shall be in line with the Participatory Watershed Management Plan. A “hand-over plan” is developed in consultation with relevant community members and government authorities. All relevant GOH and local legislation is complied with including, as necessary, land acquisition and compensation procedures, and water and sanitation system permits, as outlined in relevant GOH legislation (also see Design and Feasibility Phase). Any social and environmental concerns that cannot be mitigated by the measures in this Mitigation Plan shall be brought to the attention of WINNER senior management for action, and an alternative site shall be chosen.</p>

Phase	Activity	Potential Adverse Impacts	Mitigation measures
Design & Feasibility	Preparation of tender documents: Engineering firm provides specifications.	If tender documents do not include mitigation measures and a budget to implement them, the project could result in adverse environmental impacts (see below for Construction Phase).	Mitigation measures described for the Construction Phase and Decommissioning Phase shall be incorporated into tender and engineering documents; costs for environmental management shall be included in overall project budget. Tender documents shall include information on water and sanitation systems to be provided (see Table 2 below). Tender documents shall include information about access roadways to be included in the project (see Cluster 2.4 Mitigation Plan). In addition to mitigation measures required for the Construction Phase and the Decommissioning Phase, tender documents should include a requirement for a re-use/recycle and waste segregation plan.
	Proposal review	Proposals that fail to incorporate environmental concerns could result in adverse environmental impacts (see below, Construction and Decommissioning Phases).	WINNER Biodiversity Specialist shall be involved in proposal review process to ensure that the proposed construction/rehabilitation is environmentally sound. Construction plans must be approved by a certified engineer, and construction works must be performed by a qualified and experienced contractor.
	Negotiations and award of engineering contract	If engineering contract does not include mitigation measures and a budget to implement them, the project could result in adverse environmental impacts (see below).	Mitigation measures described for the Construction and Decommissioning Phases shall be incorporated into contracts; costs for environmental management shall be included as a specific line item in the Bill of Quantities. Revisions to the engineering design to take into account mitigation measures identified during proposal review shall be incorporated into engineering contract. Contracts shall include a re-use/recycle and waste segregation plan for the Construction and Decommissioning Phases.
	Feasibility studies	If destruction or degradation of infrastructure and/or privately held or community owned land may result from the project, community and political acceptance may be compromised.	As part of determining the feasibility of the project, the engineering/design firm shall: Delineate a logical area with a well-defined boundary within which the owners of land, buildings or other infrastructure will be compensated. Monitor and implement a transparent and fair compensation plan by the Haitian government, as appropriate, for any permanent or temporary loss incurred (e.g. buildings, infrastructure, land, crops, gardens, plantations). Ensure that the plan allows affected people to maintain their current housing condition or better.
Sourcing of construction materials	Engineering firm enters into a contract with company(ies) to obtain material.	Location where fill material is obtained may not be environmentally sound, and mining of fill may result in ecological, hydrological, aesthetic, and land use impacts. Other construction material may not be sourced sustainably, resulting in adverse environmental impacts.	WINNER shall ensure that all material is sourced in an environmentally sound and sustainable manner.

Phase	Activity	Potential Adverse Impacts	Mitigation measures
			The following mitigation measures shall be incorporated into tender documents and the engineering contract/contract specifications.
Construction	Construct ancillary features: staff camps, access roads, storage areas, and equipment maintenance areas.	Construction of ancillary features could result in environmental impacts similar to other small-scale construction projects (loss or degradation of vegetation, wildlife habitat and species, changes in hydrology, impacts to cultural resources, etc).	Incorporate relevant mitigation measures from Road Rehabilitation Mitigation Plan (Cluster 2.4) into engineering contract. Incorporate the below Construction Phase mitigation measures into ancillary feature construction and decommissioning activities. If ancillary features will include water or sanitation systems, see Table G-2.
	Construct /renovate CRDD or other small-scale structure	Flora (including trees), fauna, and sensitive ecosystems could be destroyed or degraded.	Identify areas to be cleared and limit vegetation and tree removal to only the vegetation and trees needed to construct/rehabilitate building and to provide ancillary features. Limit encroachment into riparian areas. Delineate sensitive and/or high quality habitat and keep all foot and motorized traffic and equipment out; where riparian habitat/vegetation is of good quality, limit worker traffic. Do not remove or disturb any mangroves. Save vegetation removed for replacement during Decommissioning Phase (as practicable). Any construction or other excess material from the construction process (fill, rocks, etc.) shall not be stockpiled temporarily or permanently in wetlands or waterways or in a manner that will damage vegetation or soil.
		Cultural/historical resources could be destroyed or degraded.	Delineate cultural/historical resources to be protected, and keep all foot and motorized traffic and equipment out.
		During construction, TES and other sensitive species and/or habitats and cultural resources could be found within project boundaries or that are being affected by the project.	Educate workers about procedures to be implemented in case protected species or artifacts are found on-site. Engineering contract shall include a stop-work clause that requires project work to stop if these resources are found on site or found to be affected by the project. Work shall resume once collaboration with WINNER senior management and USAID is complete.
		Erosion could result in increased turbidity, decreased water quality, and a degraded aquatic ecosystem. This could have impacts on wildlife and humans that rely on these resources.	Use erosion control measures during construction such as geotextiles, jersey barriers, haybales, siltscreens (or other appropriate and obtainable material). Place erosion control barriers prior to starting construction and do not remove until construction is complete and vegetation is re-established.
		Heavy equipment that is not well-maintained and stored properly could degrade water quality.	Provide a maintenance area that is adequate distance (at least 50 meters) from waterways and any sensitive terrestrial habitat, and require that all equipment maintenance take place there. Keep emergency response equipment on work sites to deal with hazardous or other spills.
		Noise from the use of heavy equipment and other construction equipment could affect breeding and feeding and other wildlife behavior. Noise could affect the human environment.	If during environmental monitoring, noise is found to disrupt breeding, feeding, or other wildlife behavior, limits shall be placed on use of heavy equipment, movement of personnel, or other noise-producing construction phase activities. These limits shall remain in place until determined by the WINNER Biodiversity Specialist that they may be removed. Limit noise from construction activities to daylight hours.
		Public and worker safety could be compromised without adequate mitigation in place.	To ensure the safety of the public: Restrict access of the public to hazard areas. Hold meetings to educate and inform residents of the work to be carried out. Reduce vehicle speed in work zone.

			<p>Implement a communication plan for regular public awareness of project activities.</p> <p>To ensure the safety of employees: Provide adequate training of personnel in safety procedures. Provide appropriate safety equipment (including for noise protection, as needed). Post proper signage. Enforce safety zones and procedures Implement a work place health and safety plan, which should include employee training.</p>
		Gender concerns and local labor	<p>A gender ratio for project staff of as close to 1:1 shall be strived for. Local sources of labor should be used to the greatest extent possible.</p>
Decommissioning		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.	<p>Unless other provisions are made, staff construction camps shall be removed once construction is complete. Removal shall include disposal of solid waste, buildings, etc. A provision shall be included in the engineering contract to allow for WINNER inspection prior to finalizing payment.</p>
		Leaks or spills that are not cleaned up can continue to contaminate the environment.	<p>Any areas where leaks or spills have occurred that were not previously cleaned up, shall be cleaned prior to completing Decommissioning Phase.</p>
		If hydrology and grade are not restored, flooding, ponding, and destruction of vegetation and other aquatic and terrestrial resources could result.	<p>Once construction work is complete, restore hydrology and grade to pre-construction condition (or improved drainage) on work sites and adjacent affected areas.</p>
		If vegetation is not restored, and soil is left bare, erosion and landslides could result.	<p>Re-vegetate areas disturbed with naturally occurring vegetation, if possible with vegetation retained from on-site; and/or with erosion control vegetation (vetiver, bamboo, elephant grass).</p>
Operation and Maintenance		If a hand-over plan is not in place, it is unlikely the infrastructure will be maintained and that the CRDD will be sustainable.	<p>Starting during the planning phase, WINNER shall prepare a hand-over plan, and shall provide training necessary to ensure sustainable operation of the CRDD.</p>

TABLE G-2: MITIGATION PLAN FOR CRDDS AND CONSTRUCTION CAMPS WHERE WATER AND SANITATION SYSTEMS WILL BE PROVIDED

Table G-2 is adapted from USAID's Environmental Guidelines for Small-Scale Activities (water and sanitation projects)

Issues or aspects of activity	Impacts <i>The activity may. . .</i>	Mitigation Measures
Water Supply Systems		
If CRDD or construction camp includes a water supply system...	Deplete ground and/or surface water resources and damage local ecosystems or downstream/down communities. Pose risks to human health if contaminants are present in the water. Cause groundwater contamination	<ul style="list-style-type: none"> • Determine safe and sustainable yield. Establish system for regulating use. • Test seasonal water quality and examine historical water quality and quantity data before building facility. • Incorporate siting, design, and operation and maintenance practices that minimize environmental impacts.
Wells	Provide water contaminated with nutrients and bacteria from animal waste Create pools of stagnant water Change groundwater flow Create saltwater intrusion Deplete aquifer (groundwater) (O&M) Cause land subsidence (impact from many wells) (O&M)	Don't allow animals to graze or be watered up-gradient from wellhead Monitor and repair leaks from cracked containment structures, broken pipes, faulty valves and similar structures Keep withdrawals within safe yield limits to avoid overdrawing, possible salt water intrusion and contamination of the well Put in place a system for regulating use, such as a local warden or appropriate pricing Include a focus on proper use and maintenance of the improvement as part of the behavior change and education program Monitor water levels
Standpipes	Create pools of stagnant water (This problem can be more severe when water table is high, clay soils are present, or population/tap density is high, such as at construction staff camps)	Ensure that spilled water and rainwater drain to a soakway or equivalent structure and do not accumulate and create stagnant standing water Monitor and repair leaks from cracked containment structures, broken pipes, faulty valves and similar structures
Sanitation Systems		
If CRDD or construction camp includes a sanitation system....	Discharge untreated or insufficiently treated sewage that: <ul style="list-style-type: none"> • Contaminates drinking water (ground and surface) • Spreads diseases • Degrades aquatic ecosystems 	<ul style="list-style-type: none"> • Do not site in wetland or next to stream, river, lake or well • Do not site up-gradient from potable water sources such as wells, if possible • Do not site where water table is high or underlying geology makes contamination of groundwater likely. Alternately, choose dry sanitation options or closed disposal systems, instead of wet ones such as septic tanks or detention ponds. • Incorporate education/social marketing programs; e.g. community participation, sanitation promotion focusing on women and children, use of appropriate natural treatment systems, etc.
Composting toilets	Increase transmission of vector-borne diseases Contaminate groundwater supply with pathogens (O) Cause disease transmission to field workers and consumers of agricultural products.	Maintain humidity of composting material above 60% and supplement excreta with generous quantities of carboniferous material (dry leaves, straw, etc.). The pile should then remain aerobic, odor-free and insect-free. Construct sealed vaults to hold composting material if using fixed-batch systems. If using movable-batch systems check removable containers for leaks before installing. Test samples from active chamber and mature chamber after fallow period for <i>Ascaris</i> eggs and fecal coliforms.

Issues or aspects of activity	Impacts <i>The activity may. . .</i>	Mitigation Measures
		<p>Allow sufficient residence time in mature chamber (approximately 6 months). Ensure that the systems will be properly operated and maintained so that the soil amendment taken out after the treatment period is truly sanitized.</p>
Dry toilets	<p>Increase transmission of vector-borne diseases Cause disease transmission to field workers and consumers of agricultural products</p>	<p>Maintain humidity of composting material below 20% and supplement excreta with alkaline material (ashes or lime). Generous applications of ashes will help ensure that pathogens are destroyed. pH is the most important factor for sterilization. Construct sealed vaults to hold dehydrating and curing material. Ensure that the systems will be properly operated and maintained so that the soil amendment taken out after the treatment period is truly sanitized. Test samples from active chamber and mature chamber after fallow period for <i>Ascaris</i> eggs and fecal coliforms to assess level of sterilization. Allow sufficient residence time in mature chamber (approximately 6 months).</p>
Septic tanks	<p>Contaminate groundwater supply with pathogens Contaminate surface water supplies with nutrients, biological oxygen demand (BOD), suspended solids (SS) and pathogens. (Septic tank effluent generally contains relatively high concentrations of pathogens, BOD, and SS). Contaminate water supplies, damage water quality and/or transmit disease at other locations if waste is not properly handled and treated during or after servicing.</p>	<p>Evaluate depth to the water table, including seasonal fluctuations and groundwater hydrology. If water table is too high, line the tank with clay, plastic sheeting or some other impermeable material to prevent leakage. Avoid direct discharge of effluent to waterways if possible. Direct discharge to waterways with sufficient volume and flow to assimilate the waste may be acceptable. It is better to add a secondary treatment, such as passing effluent through an anaerobic filter, followed by discharge to an absorption field, or better yet, a constructed wetland. Ensure that a reliable system for safely removing sludge and transporting the collected material off-site for treatment is available. This should include use of a mechanized (probably vacuum-based) removal system. Ensure that collected sludge is adequately treated and not directly applied to fields or otherwise improperly disposed of.</p>
Settled and simplified sewers	<p>Damage ecosystems and degrade surface water quality Transmit diseases to field workers and consumers of agricultural products</p>	<p>Ensure that collected sewage will be treated, e.g., in a wastewater stabilization pond, and not simply discharged to a river or stream or used directly in agriculture or aquaculture. This is especially important for simplified sewerage, since there is no interceptor tank.</p>
Biogas reactors	<p>Damage ecosystems and degrade surface water quality Transmit diseases to field workers and consumers of agricultural products</p>	<p>Do not allow disposal of digested slurry in or near water bodies. Follow WHO or other national or international guidelines for use of sludge in wastewater in agriculture and aquaculture.</p>