



# **Assessment of MCC Irrigation Investments in Ghana**

**Report  
October 9, 2015**

## ACRONYMS

EDAIF	Export Trade Agricultural and Industrial Development Fund
FBO	Farmer-Based Organization
FGD	Focus Group Discussion
GCAP	Ghana Commercial Agriculture Project
GIDA	Ghana Irrigation Development Authority
GOG	Government of Ghana
ISC	Irrigation Service Charge
KIA	Kotoka International Airport
LAC	Land Allocation Committee
MCC	Millennium Challenge Corporation
MiDA	Millennium Development Authority
MoTI	Ministry of Trade and Investment
MOFA	Ministry of Food and Agriculture
NORC	National Opinion Research Center
PAAL	Post Agric Associates, Limited
PCC	Perishable Cargo Center
PPP	Public-Private Partnership
SGB	Stakeholders Governing Board
SPEG	Sea-Freight Pineapple Exporters of Ghana
SME	Scheme Management Entity
USAID	US Agency for International Development

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## EXECUTIVE SUMMARY

This report was prepared for the Millennium Challenge Corporation (MCC), Washington, DC, by NORC at the University of Chicago. The report presents the results of an interim assessment of MCC's irrigation investments under the Ghana Compact, which was implemented over the period February 16, 2007 - February 15, 2012.

The fieldwork for the assessment was completed during a three-week period in September 2014 by a three-person team composed of an international agribusiness specialist, a Ghanaian irrigation engineer, and a Ghanaian focus group leader. During the fieldwork, the assessment team visited the irrigation schemes at Bontanga and Golinga located in the Tolon-Kumbungu District in the Northern Agricultural Zone, as well as the Torgorme scheme located in the North Tongu District of the Volta Region of the Southern Horticultural Belt. At the three schemes, the team interviewed key informants including officials with the Ghana Irrigation Development Authority (GIDA), the district officers with the Ministry of Food and Agriculture (MOFA), smallholder farmers at the schemes and their cooperative unions, scheme anchor farmers, representatives of the Stakeholders Governing Board (SGB), the Land Allocation Committee (LAC), and at the Torgorme scheme, the contracted scheme management entity (SME). In Accra, the team interviewed relevant officials with the Millennium Development Authority (MiDA), GIDA, and the Ghana Commercial Agriculture Project (GCAP) that is now supporting contract farming programs at Bontanga and Torgorme with funding from the World Bank and USAID.

In addition, the team conducted focus group discussions (FGDs) with two groups of smallholders at each of the three schemes to learn of their farming experiences within the irrigation schemes, and to what extent they have obtained greater crop production or diversified into higher value crops as the result of better irrigation services.

Construction work at the three irrigation sites of Bontanga, Golinga, and Torgorme began near the beginning of the final year of the Ghana Compact, although only the first two sites had been completed by the end of the Compact on February 15, 2012. Construction of the Torgorme irrigation scheme began on January 21, 2011 with a specified, contracted 12-month completion date. When the Compact ended, the scheme was only 71% complete and construction work has continued since that time with funding provided by the government's Export Development and Agriculture Investment Fund (EDAIF).

Torgorme is a completely new scheme, whereas Bontanga and Golinga were existing schemes in a state of severe disrepair that required extensive renovation.

The Bontanga scheme provides irrigation water for a total area of 800 hectares that are now farmed by approximately 600 smallholders from 10 local communities on 495 hectares, in addition to a large-scale anchor farm, Solar Harvest, that has an assigned area of 305 hectares for crop production. The smallholders grow crops on an average farm size of slightly less than 0.8 hectare (two acres).

The Golinga scheme directly benefits a total of 156 famers from six different communities who farm the total scheme area of 40 hectares. Each smallholder has an average, net farm size of 0.2 hectares (.5 acres).

At the Torgorme irrigation scheme, 887 smallholders associated with 15 FBOs have been assigned a net farming area of 337 hectares, while 14 mid-sized farmers have been provided a farming area of 50 hectares. This contiguous area is separate from the 1,070 hectares that has been assigned to the anchor farm, Vegpro. However, there is sufficient water and land is readily available for an irrigated area of up to 2,000 hectares by simply extending the length of the two main canals that serve the current small- and medium-scale farmers at the scheme. Construction work to complete the Torgorme scheme is still ongoing. Many of the mid-size farmers that have been assigned farm plots are developing their own contract farming programs with smallholders at the scheme.

The USAID and World Bank-funded GCAP is now in the process of awarding a \$500 K, 80% matching grant to the Vegpro anchor farm at Torgorme and providing a similar grant to the Solar Harvest anchor farm at Bontanga to jump-start their outgrower programs. This project is also preparing to finance the expansion of the irrigated area at the Torgorme scheme from its present 387 hectares to its potential area of 2,000 hectares. The project management team has also expressed its interest in having the project complete the remaining work at Torgorme that would be required for efficient smallholder irrigation on their individual plots.

### **Summary of Findings**

MCC's investment for renovating the Bontanga and Golinga schemes was \$3.38 million, while at Torgorme, MCC's investment for scheme construction under the Compact was \$15.4 million. The Government of Ghana (GOG) budgeted an additional \$6.6 million to complete the construction of the Torgorme irrigation project after the Compact ended.

The Torgorme scheme is now in a one-year "construction completion and defects correction" period. However, during the period since the scheme was first turned over to MiDA by the contractor on December 19, 2013, remedial construction work has lagged and little progress has been seen toward final completion.

Before construction of the schemes began, MiDA designed an extensive institutional structure to oversee and manage their operations. The different institutions included a stakeholder governing board, a SME, a land allocation committee, and different committees formed with leaders of the farmer-based organizations (FBOs). MiDA was unable to name a scheme manager for Bontanga and Golinga, which caused the collapse of the planned structure. Scheme management there reverted to the pre-Compact method of scheme co-management by GIDA and the farmers' organizations, with the farmers playing the leading role.

At Torgorme the institutional structure is operating as originally planned but the limited capitalization of the SME has severely limited effective scheme management. When the SME assumed its position, they anticipated that the MOFA would provide an up-front operating subsidy as "seed capital" for scheme management, equivalent to three years' operating income from irrigation service charges. This subsidy has not materialized.

Since GIDA has limited staff and budget for field operations, at Bontanga and Golinga it uses the method of farmer-operated and farmer-managed irrigation services. However, current scheme farmers are not prepared for these tasks. Although, according to MOFA, farmers were trained with funds from the Japanese Government between 2000 and 2006,

many of the plots have been passed down to family heirs or third parties, and the original owners no longer cultivate the plots of land. Plot owners change frequently and many of the new owners are illiterate and untrained. GIDA has not actively dealt with management issues at the two schemes, and has essentially abdicated authority for scheme management to the smallholder associations.

The Golinga scheme is fully utilized year round for rice and vegetable production. At Bontanga, the scheme is used mainly for rice and vegetable production during the dry season. Farmers are reluctant to use the Bontanga scheme during the rainy season due to their preference for upland farming and their feelings of entitlement to their irrigated farm plots with no penalty if the plots are not fully utilized. This occurs in spite of the fact that farmers are supposed to be sanctioned for underuse of their land by the legally established (LI1350). However, the reality, according to farmers, is that the sanctions are not enforced even when farmers do not cultivate their plots and payment of user fees is low. Farmers who don't comply, thus continue to have user rights to the land, and have little incentive to fully utilize plots.

The production of high-value vegetable crops has lagged at Bontanga and, to some extent, at Golinga even though farmers recognize their economic benefits, due to their tradition for growing rice as a food security crop, their lack of knowledge and the difficulty of growing vegetables, and the delayed start of Solar Harvest's outgrower program. There is no "champion" to consistently promote and encourage vegetable production at the schemes.

At Bontanga and Golinga, farmers' associations control water management on behalf of the GIDA for a token fee of GHC2/month. No measurements are made, nor are data collected on the amount of water applied at the schemes. Discipline is weak, with no action taken against those farmers who divert water to their farms without regard to the irrigation schedule. At Torgorme, irrigation services are not provided because the scheme is still under construction.

At Bontanga and Golinga, GIDA is responsible for maintaining the main canals, whereas the smallholders are responsible for maintaining the secondary (lateral) canals. The canals at the two schemes appear to be in good condition. At Torgorme, the earthen canal network, roadways, and drains have deteriorated considerably due to erosion and silting caused by heavy rains during the extended construction period.

The amounts fixed by GIDA for the irrigation service charges (ISC) for smallholders are ¢100 per hectare per year for Bontanga and ¢150 per hectare per year for Golinga – considerably lower than the amounts initially recommended. The ISC payment rate is extremely low – for the past two crop years, Bontanga producers have paid 14% and 25% of the respective amounts owed, while at Golinga, the annual payment rates were 35% and 50% respectively. The amount of ISC has not been established for Torgorme.

The smallholders at Bontanga and Golinga are generally satisfied with the performance of the irrigation schemes, although they recognize that the low assessment and the poor collection rate of irrigation service charge jeopardizes the schemes' sustainability over the long term. Smallholders at Torgorme are angry and embittered over the lengthy delays in scheme construction that is keeping them from crop production at the scheme.

MiDA's policy at the Torgorme scheme was to provide irrigation water at an access point adjacent to the smallholders' plots and leave it to the initiative of the individual farmers on how to best irrigate their farms. In some cases the undulating terrain limits within the smallholder plots limits the effectiveness of flood irrigation and, in extreme cases, water must be pumped from the access point onto the smallholder farms.

Additional investment would be required at the Torgorme scheme for smallholders to fully utilize their irrigated farm plots, either for land leveling as required for flood irrigation, or to install small-scale, pumped, pressurized irrigation systems such as sprinkler or drip irrigation. Technical assistance such as engineering surveys would also be needed to help the smallholders lay out the drainage networks for the removal of excess water from their plots.

A system for the remote monitoring of irrigation performance at the three schemes by MCC would involve periodic visits by a local irrigation engineer to collect data, conduct interviews with scheme users, observe scheme performance, and report on the results.

## **Conclusions**

- Without professional management, the operation of the irrigation schemes at Bontanga and Golinga will not move beyond the present ineffective level.
- The slow development of the Solar Harvest contract farming program has limited the opportunities for high-value crop production at Bontanga.
- MiDA's withdrawal from active involvement in the operation of the irrigation assets provided under the Compact has created a leadership vacuum that is jeopardizing the successful operation of the investments.
- MiDA's inability to select the SME for Bontanga and Golinga before the Compact ended has jeopardized the operations of these irrigation schemes.
- There is an element of anarchy in the distribution and management of irrigation water by scheme smallholders, particularly at the Bontanga scheme.
- In view of the low assessment amount of the ISC at Bontanga and Golinga, and the extremely poor payment record by scheme farmers, the irrigation systems are unlikely to be adequately managed or maintained, and will not be sustainable over the long run.
- Construction delays at the Torgorme Irrigation Project have delayed crop production by small-scale farmers at the scheme and have severely affected their livelihoods.
- Without further investment by smallholders for land leveling to provide effective flood irrigation or for the installation of small-scale pressurized irrigation systems that would be required for sprinkler or drip irrigation, smallholder irrigation will not be effective at Torgorme.
- Without further investment after construction work has been completed to correct the deterioration from weather that has occurred at the Torgorme scheme, the irrigation system will not perform as planned.

- At Torgorme, there presently appears to be a situation of bureaucratic gridlock, with none of the responsible government institutions providing the leadership needed to complete the construction of the irrigation system on a timely basis.
- MCC's investments in Bontanga and Golinga are only partially successful. MCC's investment in the Torgorme irrigation scheme is not yet successful.

## **Recommendations**

It is recommended that MCC apply as much pressure as possible on the GOG, through the second Ghana Compact or other means, to ensure the resolution of the pending items that continue to delay the effective operation of MCC's investments in the three irrigation schemes that were initiated under the first Ghana Compact. Critical actions required to resolve pending issues and ensure the long-term functionality and usefulness of MCC's investment, are the following:

- (a) Re-initiate the process of selecting a viable SME candidate for Bontanga and Golinga, with an assured up-front government subsidy equivalent to three years' irrigation service fees to provide adequate working capital for scheme management;
- (b) Appoint a full-time manager at MiDA with the decision-making authority required to resolve the current contracting issues that are delaying construction completion at the Torgorme irrigation project;
- (c) Arrange financing and construction services as required to correct the deterioration of the Torgorme scheme that has occurred due to the lack of maintenance and upkeep of the network of in-farm roadways, irrigation canals and drains during the construction phase of the Torgorme irrigation project;
- (d) Develop a new project activity in collaboration with the GCAP project to provide matching grant funding for the installation of on-farm irrigation and drainage for 887 smallholders that will operate at the Torgorme scheme;
- (e) Follow through with EDAIF on the grant request by the Minister of Trade and Industry to ensure that grant funding equivalent to three years' irrigation service charges is provided to the Torgorme SME for working capital financing.

MCC should develop a strong collaborative relationship with USAID and the GCAP project staff in Accra to ensure that the remaining work required at the Torgorme scheme would be fully completed with GCAP project funding.

In view of the rigid, 5-year timeframe for completion of MCC-funded initiatives, we recommend that future development activities be oriented toward projects whose implementation requirements are relatively simple and straightforward, and do not require the satisfaction of numerous Conditions Precedent before substantive work can begin.

For future development projects, the collaborative agreement between MCC and its implementation partner should specify that the latter must remain active for as long as required after the Compact ending date to resolve ongoing issues that might occur.



## **Lessons Learned**

Continuing leadership and involvement of the development partner beyond the end of the Compact is required to ensure the effective operation of the assets that were provided and the resolution of ongoing problems.

For complex development efforts such as the MCC-funded irrigation schemes, the ability to effectively operate and manage the facilities and assets that were provided under the project has equal importance as the assets themselves. In other words, project “software” has equal importance as project “hardware” in providing operating results. Management systems and operating processes must be fully instituted before the Compact ends to ensure the optimum performance of the asset or facility.

## 1. INTRODUCTION

This report was written for the Millennium Challenge Corporation (MCC), Washington, DC, by the National Opinion Research Center (NORC) at the University of Chicago. The report presents the results of an interim assessment of MCC's irrigation investments that were made under the Ghana Compact, which was implemented over the period February 16, 2007 - February 15, 2012.

The fieldwork for the assessment was completed during a three-week period in September 2014 by a three-person team composed of an international agribusiness specialist, a Ghanaian irrigation engineer, and a Ghanaian focus group leader. An international irrigation engineer worked remotely on an intermittent basis to provide advice and counsel to the team on technical aspects of developing an irrigation monitoring system at the irrigation sites under the assessment. During the time period when the irrigation assessment was being carried out, the international agribusiness consultant also reviewed MCC's investments in the Perishable Cargo Center (PCC) at the Kotoka International Airport (KIA) near Accra and analyzed the results of the loan program for post-harvest facilities and equipment that were provided to selected pineapple exporters affiliated with the Sea-Freight Pineapple Exporters of Ghana (SPEG). These two reports are separate deliverables.

Because the local irrigation engineer and the focus group leader were previously associated with the MCC-Ghana Compact as a result of their employment with the counterpart agency, the Millennium Development Authority (MiDA), and the MiDA irrigation contractor, SNC Lavalin, respectively, we did not consider it appropriate to engage them in analyzing the data collected during the field visits nor writing the report as this could have led to a conflict of interest. Consequently, this report was written solely by the international agribusiness specialist.

Over the course of this study, the assessment team visited the irrigation schemes at Bontanga and Golinga located in the Tolon-Kumbungu District in the Northern Agricultural Zone, as well as the Torgorme scheme located in the North Tongu District of the Volta Region of the Southern Horticultural Belt. At the three schemes the team interviewed key informants including officials with the Ghana Irrigation Development Authority (GIDA), the district officers with the Ministry of Food and Agriculture (MOFA), smallholder farmers at the schemes and their cooperative unions, scheme anchor farmers, representatives of the Stakeholders Governing Board (SGB), the Land Allocation Committee (LAC), and at the Torgorme scheme, the contracted scheme management entity (SME). In Accra, the team interviewed relevant officials with the MiDA, GIDA, and Ghana Commercial Agriculture Project (GCAP) that is now supporting contract farming programs at Bontanga and Torgorme with funding from the World Bank and USAID.

In addition, the team conducted focus group discussions (FGDs) with two groups of the smallholders at the three schemes to learn of their farming experience within the irrigation schemes, and the extent to which they have obtained greater crop production or have diversified into higher value crops as the result of better irrigation services. Although the construction of the new Torgorme scheme has not yet been completed, the smallholders there have been assigned their farm plots and have received training in crop

production, and some are presently engaged in rainfed farming; but none of the scheme farmers has yet engaged in irrigated crop production. The FGDs there were structured primarily to determine the smallholders' expectations of their opportunity to participate in irrigated agriculture, their main concerns, and their crop production plans.

This report contains the consultant's analysis of the situation and outlook for the three schemes, and a presentation of findings, conclusions, recommendations, and lessons learned. The report annexes include a description of the recommended methodology that MCC could use to remotely monitor the performance of the three irrigations schemes, summaries of the FGDs held with smallholders at the schemes, the assessment's work plan, contact information for the people whom the team interviewed, and transcribed notes from the different interviews that were conducted by the team members.

## 2. BACKGROUND

Construction work at the three irrigation sites of Bontanga, Golinga, and Torgorme was initiated near the beginning of the final year of the Ghana Compact and only the first two sites had been completed by the end of the Compact on February 15, 2012. Construction of the Torgorme irrigation scheme began on January 21, 2011 with a specified, contracted 12-month completion date. When the Compact ended, the scheme was only 71% complete and work has continued since that time with funding provided by the Government of Ghana's (GOG's) Export Development and Agriculture Investment Fund (EDAIF).

Torgorme is a completely new scheme, whereas Bontanga and Golinga were existing schemes that were previously in a state of severe disrepair and required extensive renovation. As detailed in MiDA's Compact completion report<sup>1</sup>, the total cost of MCC's irrigation investments was nearly US \$22 million, as shown by Table 1, below.

**Table 1: Cost and Completion Dates of MCC-Supported Irrigation Schemes**

Scheme	Start Date	End Date	Cost (US \$)
Bontanga Construction	March 15, 2011	January 31, 2012	\$3,378,823
Golinga Construction	March 15, 2011	January 31, 2012	
Torgorme - Smallholders	January 21, 2011	Continuing	13,176,272
Torgorme – Anchor farm	January 21, 2011	October 31, 2011	2,164,932
Construction Supervision	January 21, 2011	February 15, 2012	2,107,623
Feasibility studies	September 24, 2009	February 15, 2012	6,334,270
<b>Total</b>			<b>\$21,925,653</b>

Note: The cost of the Torgorme smallholder scheme shown in this table is the amount funded by MCC during the Compact. After the Compact ended, GOG authorized an additional amount of \$6.6 million for the work remaining to complete the scheme and this amount was disbursed.

<sup>1</sup> The Millennium Development Authority (MiDA), *Millennium Challenge Account (MCA) Ghana Compact Completion Report*, September 2012

Source: MiDA

MiDA had initially considered developing and/or renovating 10 irrigation schemes in Ghana encompassing a total of 4,200 irrigated hectares, and completed the required feasibility and design studies for the 10 proposed sites. However, as budget and time considerations became clear, this ambitious program was scaled back to the three sites that were eventually selected.

## **2.1 Pre-Investment Situation**

### ***Bontanga Irrigation Scheme***

Before MCC made its investments at the Bontanga irrigated area, the average holding per farmer at the scheme was one acre (0.4 hectares). Most crop production was consumed by the farm household. Based on a survey made in early 2010, the average income for a smallholder farm of 0.4 ha was €190 per rainy season cropping and €960 for one dry season cropping which took into account the production of vegetables like onion and okra<sup>2</sup>. The much lower income from rainy season farming was due in part to the priority for producing staple crops such as rice or maize for food security.

An assessment of the reservoir storage capability and the carrying capacities of the two main canals located on both sides of the valley serving the irrigated area found them capable of supporting a total irrigable area of 800 hectares. However, it was determined that if the flood irrigation efficiency increased from the normal level of around 40% to between 50% - 60%, a total area of 900 hectares could be irrigated.

At the time, when the Bontanga feasibility study was made (December 2009), it was found that a large percentage of the concrete slabs lining the primary and secondary irrigation canals were defective and had to be replaced. Furthermore, gates controlling the flow of water into secondary and tertiary canals were missing, which meant that irrigation water flowed throughout the entire irrigation network whenever water entered the main canals. In addition, almost all of the end structures at the tertiary canals were broken. The result was that whenever water entered the tertiary canal to irrigate the adjoining farms, large quantities of water would exit freely from the canal into the main drain. Furthermore, the drainage system for the entire scheme was non-functioning due to excessive siltation and grass growth in the drainage channels. At the time when the prefeasibility study was carried out, 62% of the irrigated land was fallow.

At that time, the scheme was managed jointly by GIDA and the Bontanga Irrigation Farmers and Marketing Co-operative Association. Initial studies revealed that, in general, the organization and management of the scheme needed to be strengthened. Furthermore, although the irrigation service fee was only €12 per acre per season, collection rates were low and the fees collected did not cover the actual cost of operation and maintenance.

The initial Bontanga feasibility study called for the renovation of a scheme area of 615 hectares, at a cost that, at that time, was estimated to be US \$2.1 million (US \$3,420 per hectare).

### ***Golinga Irrigation Scheme***

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<sup>2</sup> SNC Lavalin International, Final Feasibility Study Report, Lot 1: Botanga Scheme, April 2010

The Golinga irrigation scheme, which was constructed between 1971 and 1974, was jointly managed by GIDA and the Golinga Irrigation Farmers and Marketing Co-operative Association. When the MCC-funded scheme renovation took place, the Golinga irrigated area was largely used for growing rainfed lowland rice which yielded about 10 84 kg bags of paddy rice per 0.4 hectares. The irrigation facility was barely functioning due to a broken spillway at the reservoir, which resulted in a low water volume that limited irrigated farming at the scheme. During the dry season, vegetables were produced by a very few farmers using rudimentary irrigation. Vegetables could not be grown during the rainy season because the soils were poorly drained as a result of the deterioration and blockage of the main drain. The drainage system that had been constructed earlier to collect excess water from rain and irrigation and deposit it into a tributary of the Golinga River had become heavily silted and overgrown with vegetation.

The Golinga scheme was originally constructed to provide irrigation water for 60 hectares of net irrigated area (66 hectares gross area). Apparently, there was never any serious maintenance performed on the scheme. At the time of the MiDA rehabilitation, in addition to the broken spillway, entire sections of the canal system were non-functional and, in some cases, had entirely disappeared. Even before the spillway became inoperative, no more than 30 hectares could be cropped. None of the original water control structures remained on any of the irrigation canals, and in many locations, farmers were required to dig earth canals in parallel with the broken laterals to irrigate their crops. The level of deterioration of the laterals was so bad that the most efficient method for rehabilitation was to demolish existing laterals and construct new canals. To improve water management and limit the amount of water wasted, measures were implemented such as the delivery of water every other day to the scheme, and a pilot drip irrigation project.

The initial feasibility study found that organization and management of the Golinga scheme was poor and needed to be considerably strengthened, and that the collection rates for the irrigation service fee were low and those fees collected did not cover the true cost of operation and maintenance. At that time, an irrigation service charge of ¢25 per acre per year (¢62.50 per hectare per year) was assessed at Golinga.

Initially, a total area of 100 hectares was surveyed for the improved irrigation scheme at Golinga, corresponding to the existing scheme area of 66 hectares and 34 hectares as a potential expansion area. However, it was discovered that there was insufficient water to expand the irrigation scheme. On the contrary, with the maximum capacity of the reservoir, it would not be possible to irrigate more than 40 hectares of land during the dry season with the irrigation practices that existed at the time. Increasing the flood irrigation efficiency to an amount ranging from 50 - 60 % would allow a partial second dry season cropping. Further increases in efficiency would increase the irrigation capacity to twice the cropped area during the dry season.

Taking into consideration the volume of water available and improved irrigation practices, it was decided to rehabilitate the first 40 hectares of the irrigation scheme located near the dam, and also to reconstruct the spillway, which was a precondition for the scheme to function. With an irrigation efficiency of 60%, it was calculated that the scheme could adequately provide supplementary irrigation for 40 hectares of crops during the rainy season, and fully irrigate 40 hectares for one crop during the dry season,

and then irrigate a crop area of 10 hectares for the second dry season crop. The initial estimate of the total cost of the rehabilitation was US \$535,000, or US \$13,500 per hectare.

The estimated operating and maintenance costs for the Golinga scheme included: a) the cost of water management at ₺250 per hectare; b) support services at ₺250 per hectare; and c) maintenance cost of ₺200 per hectare for a total cost of ₺700 per hectare (at an exchange rate of US \$1.00 = ₺1.44)

Given the small size of the Golinga scheme, it was recognized that it would be difficult to organize a separate, commercial SME to oversee irrigation operations there. It was considered unlikely that the anticipated revenue from an irrigated area of only 40 hectares would be sufficient to provide competent services for scheme management and operations. It was therefore proposed that Golinga would work in collaboration with the larger Bontanga scheme.

### ***Kpong Left Bank or Torgome Irrigation Scheme***

The Kpong Left Bank Irrigation Project, also known as the name of the nearby village, Torgorme, was a “greenfield” project with entirely new construction. It is located in an area at the Volta Lake in the North Tongu District of the Volta Region. The North Tongu District Assembly is the administrative authority over the irrigated area. The Kpong left bank project mirrors a similar, earlier project located on the right bank, known as the Kpong Irrigation Project. The earlier project draws water through a similar intake gate on the right bank of the same reservoir to irrigate about 1,640 hectares of paddy rice farms.

The designated area for the Torgorme scheme covers 2,000 hectares downstream from the Kpong Hydroelectric Reservoir, which was found technically feasible for surface irrigation by gravity flow with water from an existing outlet in the Kpong Hydropower Dam.

The Torgorme irrigation project included the construction of smallholder irrigation and drainage networks, land clearing, de-stumping, and smoothing; provided a supply of water for rice, maize and vegetable cultivation; and constructed offices, shops, and ancillary structures. The initial estimate for the total investment in scheme design and construction was US\$ 19.3 million.

Initial planning for the scheme layout considered a combination of small-, medium-, and large-scale users at the scheme: smallholders would farm less than 10 hectares, medium-size holdings would range from 10 – 50 hectares, and large-scale farmers would manage 50 hectares or more. The large-scale farmers would be required to invest in more expensive but water-saving irrigation technologies such as center-pivot overhead irrigation systems.

Before beginning scheme construction, MiDA completed a comprehensive set of pre-feasibility and feasibility studies and assessments, including: a) meteorological and hydrological studies; b) topographical surveys and mapping; c) soils and land suitability assessments; d) agriculture assessments; e) designs for irrigation and road networks; f) environmental and social impact assessments; g) economic and financial analyses; and h) an organizational and management needs assessments.

Planning for the Torgorme scheme anticipated an influx of some 1,000 farm families into the area, with little to no knowledge of irrigated farming. As is the case for other rural locations in Ghana, the majority of the people in the project area were smallholder subsistence farmers employing simple, mostly labor-intensive practices for crop production. The primary food crops grown were cassava, maize and groundnuts, along with small quantities of vegetables grown as cash crops such as tomatoes, okra, and eggplant. It was anticipated that a shift to highly marketable vegetables as squash, spring onions, baby corn, and cherry tomatoes would be realized to ensure the profitability and sustainability of the irrigation scheme.

Land in the Torgorme area is under the control of local chiefs. The chiefs and their clans use land for farming and also lease or rent land to interested farmers. Smallholder plots usually range from 0.5 to 1.0 acre, although some farmers have larger plots. Land can be acquired by hiring or leasing depending on the duration of the arrangement. The normal duration of a long lease is 50 years and must be approved by the government. For land rental, the cost is around GH¢10 per acre per season. Individual landowners hire small parcels of land for farming, but the chiefs are involved in land transactions for large-scale commercial farming.

Five large communities and 14 smaller sub-communities or hamlets are located within the area surrounding the scheme, with an estimated population (2010) of approximately 7,750. At the time when scheme construction began, there were only two registered farmer organizations in the area – the Volta Mango Growers Association and Cattle Association for cattle growers. There was no active farmer organization to support irrigated crop production.

As a means for creating a marketing outlet and ongoing technical support to smallholder commercial vegetable producers at the Torgorme irrigation scheme, MiDA attracted a Kenyan company, Vegpro Kenya Ltd., to begin the production and export of fresh vegetables. Vegpro was recruited as an agribusiness “anchor” to provide opportunities for smallholders at the irrigation scheme to become value chain participants for export vegetables. Vegpro is now in the process of establishing an approximately 1,000 hectare irrigated farm bordering the mid-north area of the Torgorme smallholder project. The irrigation potential for the entire Vegpro area is 3,500 hectares. The company plans to produce high-quality fresh vegetables for export to the UK and other European markets. During its early startup phase, the company produced maize for local markets, and in early 2014 it began producing baby corn for export. The smallholders at the scheme will serve as contract farmers or “outgrowers” to supply export vegetables for the anchor farm. Farmers within five farmer-based organizations (FBOs) at the scheme, consisting of approximately 250 smallholders, have already been assigned to work as contract farmers with Vegpro.

In preparation for commercial farming by smallholders at the scheme, MiDA initiated an extensive program for farmer training covering farming as a business, crop production, and membership practices for agricultural organizations. All scheme farmers received training from MiDA and in farming techniques for the production of vegetable crops required by the anchor farm.

## **2.2 Current Situation**

The final results in terms of the number of irrigated hectares and the number of farmers served at the three sites is shown in Table 2, below. At all three sites, irrigation water provided to the small- and medium-scale farmers is provided by gravity flow, meaning that pumping is not required for water to reach the individual plots.

**Table 2: Irrigated Hectares and Farmers Served by the Irrigation Schemes**

Scheme	Small-scale Farmers		Medium-scale Farmers		Large-scale Farmers	
	Hectares	No.	Hectares	No.	Hectares	No.
Bontanga	495	600	0	0	305	1
Golinga	40	183	0	0	0	0
Torgorme	336	887	50	14	1070	1
<b>Total</b>	<b>871</b>	<b>1,670</b>	<b>50</b>	<b>14</b>	<b>1375</b>	<b>2</b>

### ***Bontanga***

The Bontanga scheme provides irrigation water for 800 hectares that are farmed by approximately 600 smallholders on 495 hectares, as well as a large-scale anchor farm, Solar Harvest, that has an assigned area of 305 hectares. This irrigation scheme has reached its limit of 800 hectares for flood irrigation. This is the amount of the entire area that has been assigned to the anchor farm along with the approximately 600 smallholders that are now farming at Bontanga. However, because the anchor farm uses overhead sprinkler irrigation that is considerably more efficient in terms of water use than is flood irrigation, the Bontanga scheme could likely increase by up to 400 irrigated hectares covered by two overhead sprinkler irrigation systems at the anchor farm.

The smallholders are from the surrounding communities and members of 10 FBOs, each with a net area farmed of slightly more than 0.75 hectares. For smallholder irrigation, water flows by gravity through a network of main and lateral (secondary) canals until it reaches the individual plots of the small-scale farmers. The farmers can irrigate their farms by opening a control gate that allows water to flow from one of the lateral canals directly onto their plots. Once the water flows into the plot, the entire area is flooded. It is up to the farmer to control the amount of water that flows onto his or her farm. Natural drainage through a network of interconnected furrows removes excess water from the farm plot where it eventually flows into the main drainage canal. The Bontanga smallholders have had access to irrigation water flowing to their plots since the scheme rehabilitation was completed, shortly before the Compact ended.

It was revealed during the evaluation team's field visit to the Bontanga scheme that during the rainy season, a considerable number of smallholders do not produce crops at the scheme. For example, during the current rainy season (May – October 2014), scheme farmers produced 250 hectares of rice and a limited area of approximately 20 hectares of vegetable crops, consisting of mostly chili peppers, which together amount to only 56% of the total area of 395 hectares. In comparison, during the immediate past dry season (November 2013 – April 2014), scheme farmers grew rice on 333 hectares and vegetables on 111 hectares for a total of 444 net hectares, while approximately 10 hectares remained



fallow with no crops produced. The remaining area was leased for the season by some scheme smallholders to migrant farmers to grow seasonal vegetable crops, mostly onions.

The team's FGDs with smallholders at the scheme and interviews with GIDA staff revealed the following reasons for the limited use of the scheme during the rainy season:

- Given the high demand for equipment services for land preparation at the beginning of the rainy season, smallholders complain that it is difficult to obtain land preparation equipment for their small plots at the irrigation scheme, and the lack of crossing points over the lateral canals make it difficult for heavy equipment to reach their plots. Equipment operators prefer to work in upland areas instead of operating in the lowland irrigation scheme during the rainy season.
- Around 90% of Bontanga scheme farmers have access to larger, upland farms located outside the irrigated area where they can produce rainfed crops during the rainy season. Thus, they have little need to produce crops at the smaller, irrigated plots during the rainy season.
- The irrigation service charge (ISC) at Bontanga is assessed at a flat rate of ₦100 per hectare per year. Farmers tend to pay half the annual charge during the dry season, and if they do not use their land during the rainy season, they declare their non-use of the land as justification for non-payment of the corresponding proportion of the ISC for the rainy season.
- There is a sense of entitlement, or land ownership, by scheme farmers. The current land distribution at Bontanga was made in the early 1990s, and has since remained with the original occupants, or their heirs, or in some cases, third parties selected by the occupants. Land allocation to other users has largely been made by the occupants themselves, instead of an official body such as a land allocation committee. Most farmers interviewed feel that they have ownership of the land; hence, they are not concerned with the consequences of not using the land effectively.

This smallholder cropping pattern that emphasizes rice production is difficult to understand, given that vegetable production is much more profitable for smallholders than is rice production. Furthermore, MiDA's economic justification for the Bontanga scheme assumed that one rice crop would be produced on the entire scheme during the rainy season, and that two short-cycle vegetable crops such as okra and peppers could be produced on the scheme during the dry season. However, based on the team's interviews with Bontanga smallholders and the GIDA scheme manager, the reasons for the present cropping pattern of rice with limited vegetable production by small-scale scheme farmers are the following:

- Based on the soil types identified through the earlier soil analysis for the Bontanga scheme, the optimum cropping pattern would be to produce 240 hectares of rice and 255 hectares of vegetables on the irrigated area of 495 hectares. However, during the rainy season when vegetables are at their lowest prices and are much more susceptible to pests and disease than is rice, it would be best to produce rice on the entire area of 495 hectares. During the dry season, the optimum production pattern would be to produce one crop of irrigated rice on 240 hectares and two crops of irrigated vegetables on 255 hectares.

- Rice is the traditional smallholder crop grown at Bontanga, and is also an important crop for smallholder food security. Excess production has a ready market. Therefore, farmers tend to produce rice.
- While vegetables are more profitable than rice, they are considerably more difficult to grow. Furthermore, they demand more of the farmers' time and require greater amounts of working capital investment. Scheme farmers are unsure of their capabilities to successfully grow vegetables.
- There is no "champion" for vegetable crop production at Bontanga that is actively encouraging and training farmers to grow vegetables and marketing their crops. The anchor farm has yet to begin its planned contract farming program for vegetable production.

For the anchor farm at Bontanga, water flows by gravity through one of the main canals at the scheme into a sump that serves as the intake supply point for its irrigation water. Water must then be pumped from the supply point by the anchor farms to irrigate its crops through an overhead irrigation system. The anchor farm has installed an overhead sprinkler, center-pivot irrigation system that is capable of irrigating an area of 200 hectares. However, its irrigation system has not been used since the Bontanga scheme was rehabilitated due to delays by the company in procurement and installation, and the subsequent testing of the irrigation system. Furthermore, Solar Harvest officials complain that scheme water management is deficient in that insufficient water reaches the farm when scheduled and, as a result, it has been necessary for the farm to construct a small reservoir at its water intake point to hold sufficient water to complete its full irrigation cycle over a four day period. The time required for the construction of the reservoir has been another factor in the delayed use of the irrigation system by Solar Harvest.

Solar Harvest started its farming operation as rainfed production at the beginning of the rainy season from April – October 2013. It is currently in its second production season for the rainy period April – October 2014. During the company's first rainfed production season it produced 48 hectares of rice, along with a trial crop of two hectares of soya. During the current rainy season, Solar Harvest is farming an area of 60 hectares of rice and 32 hectares of soybeans. The reason for its limited production is likely due to a cash flow shortage that the company appears to be experiencing.

A recent, positive development for the Bontanga scheme is that the GCAP, a \$145 million agricultural development initiative funded by the World Bank and USAID that is now being implemented by Ghana's Ministry of Food and Agriculture (MOFA), has agreed to provide a \$500K matching grant to Solar Harvest to initiate its contract farming operation on land within the Solar Harvest concession area. The grant covers 80% of the \$500K project cost. It will finance a center pivot irrigation system for 200 hectares, as well as land clearing, training, and startup costs for 205 smallholders. This will be an important stimulus for Solar Harvest, whose outgrower program has lagged due to its apparent lack of funding.

### **Golinga**

The Golinga scheme directly benefits a total of 156 farmers from six different communities who farm the total scheme area of 40 hectares. Each smallholder has an

average, net farm size of 0.2 hectares, or .5 acres. Individual holdings of such small size are conducive to crop production primarily for subsistence or family consumption, with only small amounts of commercial production available for local markets. There is no anchor farmer available at the Golinga scheme.

The limited water storage capacity of the Golinga reservoir limits the area irrigated by the scheme to only 40 hectares. During the height of the dry season, when water demand is greatest, farmers complain that they have insufficient water, particularly for rice production that demands large amounts of water. GIDA has determined that the reservoir is severely silted as a result of erosion caused by farming around the scheme perimeter. GIDA estimates that since it was first constructed, approximately half the reservoir storage capacity has been lost due to erosion.

During the present rainy season, the Golinga scheme area is planted 100% in rice. During the dry season, the normal cropping pattern is 10 hectares of rice and 30 hectares of vegetables. This distribution is based on the suitability of the soils within the Golinga scheme. The rice crop is mostly planted for seed multiplication, which is used for commercial seed production. Seed rice is much more profitable than rice produced as a grain crop.

Although irrigation water is available at the two schemes during the dry season (November – April) and also during the rainy season (May – October), only supplemental irrigation is needed during the rainy season due to generally reliable and plentiful rainfall.

### ***Torgorme***

At the Torgorme irrigation scheme, 887 smallholders associated with 15 FBOs have been assigned a net farming area of 337 hectares, while 14 mid-sized farmers have been provided a farming area of 50 hectares. This contiguous area is separate from the 1,070 hectares that has been assigned to Vegpro, the anchor farm. However, there is sufficient water and land is readily available for an irrigated area of up to 2,000 hectares by simply extending the length of the two main canals that serve the current small- and medium-scale farmers at the scheme.

Construction work to complete the Torgorme scheme is still ongoing today. After the Compact ended, the construction contractor continued to work at the scheme with funding provided by EDAIF. The contractor turned the scheme over to MiDA on December 19, 2013 but the construction supervising company found an extensive number of deficiencies, as well as some required tasks that had not been completed. On that date, the contract entered a one-year “construction completion and defects correction” period. During this period, however, the contractor appears to have experienced severe cash flow problems and has made limited, erratic progress toward construction completion. The irrigation system has never been used. The projected ending date for the Torgorme irrigation construction with the existing contractor is December 19, 2014, nearly three years after the Compact ended. It is not assured that the present contractor will be able to successfully complete the construction of the scheme by that date.

Since the first Compact ended, MiDA has reduced its staff and very few people remain to support any continuing activities, including the ongoing construction work to complete the Torgorme scheme. The funding agency, EDAIF, is merely the paymaster for the

contractor's work to complete the scheme, and is not involved in any day-to-day decisions related to scheme operations. GIDA, the government agency that will assume overall responsibility for scheme operations, is standing by until scheme construction has been completed – when MiDA will transfer control over the scheme to GIDA. Both the Ministry of Trade and Investment (MoTI) and MOFA are far removed from the problems involved in scheme completion. The result is that the required work to put the scheme in operation is presently in a state of gridlock with different government agencies standing by as observers, with no leadership or decision-making being provided by any of them.

Another problem that has arisen from the delays in scheme completion is that, as a result of the construction methods used and the lack of the irrigation operations, the scheme has severely deteriorated and further construction repair work would be required to bring the scheme back to a good operating condition. Some of the main problems include:

- The two main irrigation canals at the scheme are lined with concrete, although the lining does not fully reach the top of the canals. Consequently, the unlined (top) part of the canals is vulnerable to erosion, with silt washing into the canals. This diminishes their water carrying capacity.
- The network of secondary and tertiary irrigation canals consists of unlined, earthen canals. During the lengthy period that the scheme has remained idle, many of these canals have eroded and heavily silted, with diminished water carrying capacity. In light of the present deteriorated condition of the irrigation canals, it is by no means certain that irrigation water will reach all the smallholder plots as planned. Furthermore, the scheme has not yet been fully tested.
- The main drainage channel that drains water from the entire scheme was cleaned during early scheme construction, but has now become overgrown and is clogged with vegetation. During the current rainy season, approximately 20 hectares of low-lying farms were flooded and smallholders' crops were lost due to poor drainage.
- A network of in-farm roads has been built throughout the scheme, but they were not surfaced due to budget limitations. These unsurfaced scheme roadways have deteriorated, especially in low-lying areas.

The deteriorated condition of the scheme will have to be corrected for efficient scheme operations.

Another problem that is now being seen from the limitations on the scheme design is that, due to budget limitations, it was not possible for MiDA to fund the cost of leveling the terrain within the smallholder plots. For efficient flood irrigation, the farm plots should be leveled so that the irrigation water will reach the same depth across the entire irrigated area. Otherwise, the naturally undulating land pattern will make it extremely difficult for smallholders to produce vegetables using flood irrigation since some areas within their plot will be above the water level and remain dry, while other parts will be submerged and fully flooded. An alternative irrigation method such as pumped, small-scale sprinkler or drip irrigation may be the most cost-effective solution for providing on-farm irrigation for some of the smallholder plots. This, of course, requires additional capital investment.

A related issue is that in some cases, due to the undulating, unleveled terrain within the farm plots, water must be pumped from the tertiary canals onto the farm plots. In other

words, some of the farm plots are at a higher elevation than is the water in the tertiary canals that supply water to the farm plots. In these cases, water cannot flow by gravity from the tertiary canal onto these farm plots and must be pumped.

MiDA's position is that the Torgorme project was designed to provide access to irrigation water delivered to the edge of the smallholders' plots, and it will be the responsibility of the individual farmers to distribute the water within their plots as required.

Given these challenges, it is certain that the Torgorme scheme smallholders will require continued technical assistance and financial support to effectively use their farm plots once the irrigation scheme has been completed. Support will be required to distribute the irrigation water within their individual farm plots, either through land leveling or by pumping water through small-scale irrigation systems. Support will also be required to help design (and in some cases, install) an on-farm drainage network to remove excess water from the smallholder plots.

Based on the team's interviews with GIDA officials, smallholders, and the Torgorme SME, without corrective action, the most likely scenario after the scheme has been turned over to GIDA for farming operations would be the following:

- During the dry season, roughly half the scheme smallholders will not be able to use their farm plots due to the irregular terrain that exists within their plots and their lack of land development and land leveling. As financing becomes available for land development, land leveling or alternative methods are provided for irrigating the plots, these problems would be gradually overcome – although this could take several years.
- During the rainy season, scheme smallholders will generally be able to farm their assigned plots as rain-fed crops, with the exception of approximately 20 hectares of smallholder plots located in low-lying areas that are subject to flooding.

A positive development at Torgorme is that many of the 14 mid-size farmers that have been assigned farm plots at Torgorme (50 hectares in total) are developing their own outgrower programs. For example, Viva City Farms, a poultry agribusiness, which was assigned 11 hectares at the scheme has established a contract farming program with 261 smallholders associated with five FBOs to produce maize at the scheme during the current rainy season. During the visit to the scheme, the maize was being harvested. A mid-size female farmer with three hectares at the scheme is planning to initiate an outgrower program with members of two FBOs to produce birds-eye chili peppers for export during the next dry season if the irrigation scheme is completed in time. Another company, 3-A's Agri Solutions, plans to start producing vegetables during the coming dry season with smallholder scheme farmers that are affiliated with three FBOs.

Another positive development is that the World Bank/USAID-funded GCAP has announced plans to expand the Torgorme irrigation scheme to its full, potential area of 2,000 hectares. The expansion would provide irrigation water for the benefit of several anchor farms downstream from the current Torgorme scheme, as well as additional smallholders that would work as contract farmers with these anchor farms. The existing mid-size farmers that have been assigned land at the Torgorme scheme would be given priority for the assignment of farm land within the expansion area. For example, Viva

City plans to farm 200 hectares within the expansion area to produce maize and soybeans as poultry feed for its poultry venture. In addition, a large-scale Israeli-US aquaculture venture, Aqua Prima, plans to farm 400 hectares of pond-reared fish within the existing Torgorme scheme area, once irrigation water becomes available.

We learned from the GCAP team that this project is also considering the possibility of working to correct the remaining problems at the Torgorme scheme once the construction work has been completed. However, given that the GCAP project has only recently begun operating, it would likely require a year to place field staff at Torgorme, and at least another year after that to complete the required corrective action to upgrade the Torgorme scheme. Consequently, it would require at least two years, and possibly longer, for the GCAP project to resolve the pending problems at Torgorme.

Vegpro, the anchor farmer at Torgorme, has initiated its export vegetable program within an irrigated area of 256 hectares with the production of baby corn. Vegpro has installed four center-pivot irrigation systems, each covering 64 hectares, as the initial phase of its irrigated agricultural program at the farm. This year, the company is farming a different 64-hectare center pivot area every three-month period so that by the end of the year, it will have farmed a total of 256 hectares of baby corn with an average daily production output of around 5 tons. This is only 25% of the farm's irrigated production capacity. The Vegpro manager is proceeding slowly and cautiously to resolve production issues with baby corn before expanding into other export crops.

Vegpro has not initiated its contract farming program with its assigned smallholders at the Torgorme scheme because the construction of the irrigation scheme is still underway.

Vegpro is now completing a matching grant program with GCAP for a \$500,000 investment in a contract farming venture at the Vegpro farm location. GCAP will provide US \$400,000 and Vegpro must invest US \$100K to fund an outgrower program with 75 smallholders that will farm 64 hectares within the Vegpro concession area, with irrigation services and farm inputs provided by Vegpro. This grant facility will cover the cost of a 64-hectare center pivot overhead sprinkler irrigation system, land clearing, farmer training, and the extension of an electric power line for 6.6 kilometers to provide electricity to the irrigation pump that supplies water to the overhead sprinkler. Vegpro has already brought equipment for land clearing, and the electric company is now extending the electric power line to the site. ACDI-VOCA will provide training to the smallholders for crop production, under contract with GCAP. The 75 smallholders that will participate in the Vegpro on-farm outgrower scheme were selected from the 887 smallholders that have been assigned farm plots at the Torgorme irrigation scheme.

### **3. ANALYSIS**

#### **3.1 Institutional Arrangements**

MiDA's plans for the institutional and administrative structure, and the operational and management system to be adopted were similar for all three schemes. The MiDA irrigation management contractor, SNV Lavalin, developed a well-conceived, comprehensive plan for scheme management and administration that reflected international best practices. The initial plans specified the roles and responsibilities that different stakeholders would have in scheme oversight, management and operations:



- GIDA would continue to provide scheme oversight with regulation and monitoring, as it normally does.
- MOFA would be the representative of the District Assembly, and would be a member of the Stakeholders Governing Board.
- A SME selected through a competitive tender would be in charge of operations and maintenance as well as financial management and administration of the scheme, and would support the FBOs and their smallholders with agricultural production, commercialization, and marketing. The SME would effectively be a concessionaire for scheme operations, management, and revenue collection. The SME would be contracted by GIDA.
- A Stakeholders Governing Board would be constituted to provide policy and strategic direction for the efficient management of each scheme, as well as exercising direct oversight for scheme operations.
- A Land Allocation Committee would be created to oversee the distribution of land in accordance with established policy, and would be empowered to remove farmers from their irrigated holdings in case of non-payment for water use, and in case the land was not used.
- Farmer-based organizations whose members are scheme farmers would be involved in agricultural production; they would co-sign the SME management contract, and would have active representation on the stakeholders governing board.
- The area Chief would be an honorary member and attend board meetings as an observer; and would serve as the main liaison on community issues.
- Water management would be the responsibility of the SME, based on a determination of the actual irrigation water flows. The water balance for the scheme would be determined by calculating the daily water requirement and comparing this with the applied irrigation schedule and the measured water discharges, while considering any antecedent rainfall.
- The irrigation schedule would define scheme operations. The schedule would be determined by the SME, based on the irrigation area and cropping patterns, and would be discussed and approved by irrigation group leaders. A clear and detailed communication of the schedule to all farmers would be a key requirement for the smooth implementation of the irrigation operations.

### **3.2 Current Institutional Situation**

#### ***Bontanga and Golinga***

After the Bontanga and Golinga schemes were rehabilitated, GIDA and MOFA, along with others involved in scheme operations, worked to create the recommended institutional structure including the Stakeholder Governing Board and the Land Allocation Committee, and to incorporate the scheme smallholders in their activities. For

approximately the first year after the Compact ended, both schemes had this institutional framework.

However, it was not possible to incorporate a key member within the planned institutional structure for the two schemes, which was the SME. Without this key player to bond the disparate groups, the entire structure eventually collapsed and reverted to the institutional structure that existed before the schemes were rehabilitated – that is, with each scheme being operated under a joint management arrangement between GIDA and the union of farmer-based organizations at the scheme.

When MiDA advertised its tender for the SME position, very few responses were received; the few offers that were received were considered inadequate. For example, the anchor farm, Solar Harvest submitted a proposal for the SME position that did not meet tender requirements, and was rejected. Afterwards, MiDA's senior staff asked the company to submit a scaled-down proposal for scheme maintenance and operations, but the company's offer was not accepted due to its high proposed cost which, at more than 20% of the smallholders' anticipated farming revenue, was considered to be too high.

As a result of the failed attempt to create a strong institutional structure at the schemes, GIDA is now using the method of farmer- managed and farmer-operated irrigation services. At both Bontanga and Golinga, farmers' associations control water management on behalf of the GIDA for a token fee of GHC2/month. However, the farmers who currently own plots have not been trained for scheme management and are generally unprepared. Most are illiterate which hampers their learning ability. Furthermore, during the team's visit to the two irrigation sites, it observed that GIDA has an extremely limited staff and budget. There is only a single, junior officer posted at Golinga, while at Bontanga the GIDA staff is composed of only three people – the scheme director, who also serves as the scheme agronomist, as well as an administrator, and an accountant. As such, GIDA is not actively dealing with management issues at the two schemes. At Bontanga, in particular, the GIDA director is extremely reticent to exercise authority over water management and scheme operations. At both schemes, the farmers claimed that they were in charge of water management, maintaining tertiary canals, and collecting irrigation service charges.

A recent development could potentially have considerable impact on the institutional structure at the two schemes and on their operation and management: a local agribusiness entrepreneur, Mr. Emmanuel Darkey, who has recently negotiated a position as marketing agent with Solar Harvest for its crop production at Bontanga, is now preparing an offer to GIDA to work as SME to manage the operations and maintenance of the two schemes, Bontanga and Golinga. This position would be consistent with MiDA's original plans for irrigation management as developed by its consulting engineering company, SNC Lavalin. The offer by the Darkey organization will be contingent on the scheme smallholders at Bontanga and Golinga being awarded a grant from the EDAIF in an amount equivalent to three years' irrigation service charge that would cover the company's initial working capital requirements for scheme management. Mr. Darkey's proposal could well be accepted by EDAIF since the current Minister of Trade and Industry recently wrote a letter to this organization requesting that the Fund approve a similar proposal at the Torgorme irrigation scheme for the scheme manager. The main advantage to Mr. Darkey for scheme management is that he would have an opportunity to



market all the smallholder commercial crops that are produced at both the Bontanga and Golinga irrigation schemes. In other words, his possible work as irrigation scheme manager would support his primary business of agricultural marketing. He plans to submit his final proposal to GIDA no later than November 15, 2014. If GIDA accepts Mr. Darkey's offer, he plans to solicit the USAID-funded ADVANCE project for financial and technical assistance to write his business plan for scheme management that would be submitted to GIDA within the following 60-day period.

### ***Torgorme***

In contrast to the present weak institutional structure of the irrigation schemes at Bontanga and Golinga, the Torgorme irrigation project is well organized, with a strong institutional framework. The scheme will operate as a public private partnership (PPP), under the direction of GIDA. Once the construction phase of the Torgorme irrigation project has been completed, GIDA will assume ownership of the infrastructure as well as the regulatory authority over its operations.

During the period when the Compact was in force, MiDA provided extensive training to the Torgorme farmers in association development, farming as a business, and crop production. After the Compact ended, EDAIF provided funds for smallholder training on the production of irrigated fresh vegetables as required by Vegpro. The scheme farmers are now organized into 15 different farmer-based organizations that are led by the umbrella organization, the Torgorme Area Cooperative Farmers Union (TACFU). The scheme farmers are well prepared to engage in irrigated production and to actively participate in scheme operations.

The Stakeholders Governing Board (SGB) at Torgorme was inaugurated by MiDA in November 2011 to provide oversight for irrigation operations. However, the Board was not active until after the contract for scheme management was signed in April 2012. Since that time, the Board has convened regular meetings with good attendance by its members.

The SGB has seven voting members and four non-voting observers representing numerous organizations, as shown in the table below:

<b>Table 3: Composition of Torgorme Stakeholder Governing Board</b>	
<b>Board Position</b>	<b>Representing</b>
Chairman	GIDA
Vice Chairman	MOFA, North Tongu District
Member	Anchor Farmer
Member	Torgorme Area Cooperative Farmers Union
Member	Farmer Based Organizations
Member	Mid-size Scheme Farmers
Member	Private sector representative (GIDA Lawyer)

**Table 3: Composition of Torgorme Stakeholder Governing Board**

<b>Board Position</b>	<b>Representing</b>
Executive Secretary (non-voting)	Scheme Management Entity
Observer (non-voting)	Ministry of Trade
Observer (non-voting)	Representative of Torgorme Traditional Area
Observer (non-voting)	Representative of Fodzoku Traditional Area

The primary functions of the Board include:

- ✓ Formulate and approve policies related to scheme management functions
- ✓ Oversee the implementation of approved policies
- ✓ Provide strategic direction for scheme operations
- ✓ Monitor the overall operations and maintenance of the scheme
- ✓ Oversee scheme management and financial control
- ✓ Resolve emergency issues that arise

The private company, Post Agric Associates, Limited, (PAAL) won the competitive tender issued by MiDA for SME at Torgorme. This company works under the direction of the SGB to manage scheme operations in partnership with the farmers’ organizations whose members have been assigned farm plots at the scheme.

The contract to provide management services for the Torgorme irrigation project was signed by GIDA and PAAL on April 3, 2012. The contract, which has a seven-year life, requires PAAL to operate and manage the irrigation scheme to ensure its sustainability. The conceptual framework for the contractual arrangement is a PPP between GIDA and PAAL. The structure of the management system is a collaborative venture between private agribusinesses and participating farmer organizations for the operation of the irrigation scheme.

When PAAL responded to MiDA’s tender for management services in early 2012, it did so under the understanding that the MOFA would provide up-front funding in an equivalent amount as the irrigation service charge that would be earned by the SME during its first three years of scheme management. This was to be the GOG’s investment in “seed capital” to ensure effective scheme management. After the management contract was awarded, it was revealed that MOFA did not have funds available to provide the anticipated working capital for the company’s startup operations. Since that time, PAAL has been able to provide only minimal scheme management services since the company’s liquidity, as well as its credit capacity, is severely limited. Furthermore, since the irrigation system has yet to be completed, the company has earned no income from irrigation service charges. Consequently, PAAL has been forced to develop creative methods to fund its main activities – for example, to fund the land surveying cost of ₦36,000 required to distribute the individual farm plots to the 877 smallholders and the 14 medium-scale farmers, the company assessed a “commitment fee” on the anchor farm and the medium-scale farmers, and also requested advance payment from them of their future irrigation service charges.

PAAL also submitted a proposal to EDAIF, the funding agency that is financing the post-Compact construction of the Torgorme scheme, for grant funding in an equivalent amount to the scheme irrigation service charge that would be earned during a period of three years. However, despite the endorsement of the company's grant request by MOFA, the EDAIF Board of Directors refused the request by PAAL on the grounds that the company, as a for-profit entity, should be able to finance its own operations.

During the period when the consultant was conducting the field work for the interim assessment, the Minister of Trade and Industry intervened with a written request to the EDAIF Chairman requesting that its Board favorably consider the grant to PAAL for grant funding equivalent to three years' irrigation fees, amounting to ø690,000 (approximately \$230,000). However, the favorable outcome of this initiative is not assured even though EDAIF is a funding agency within the Ministry of Trade and Industry. First, EDAIF is a semi-autonomous organization with its independent Board of Directors, and furthermore, the Minister who made the request will soon be replaced as the result of yet another cabinet reshuffle. However, if the grant to EDAIF is eventually approved, it should remove a severe stumbling block that has until now had a negative effect on the performance of the SME.

### **3.3 Scheme Operations**

#### ***Bontanga and Golinga***

At Bontanga and Golinga, GIDA water management and operations is carried out primarily by the scheme farmers on behalf of GIDA at a token fee. As a result, water management is rudimentary. No measurements are made by either GIDA or the farmers, data is not collected by either of the two parties on the amount of water that is applied at the schemes, and no calculations are made on the amount of water required for the crops that are grown. Original calibration data for the main canal intake gates, which is required to measure the amount of irrigation water that flows into the main canals, have been lost. Consequently, the water bailiffs at the two schemes follow simple rules to determine the amount of water to apply, such as "lateral canals 1-7 receive water from 8am to 4 pm from Monday to Wednesday". However, there are no guidelines on the amount of water that should flow through the canals during the specified period as determined by the depth of opening by the canal intake gates. Consequently, the amount of water applied is based on individual judgment and rules of thumb, without benefit of precise measurement. This irrigation method functions to provide irrigation water to the smallholders, but undoubtedly provides either too much or too little water for the crops that are grown. However, water does flow through to the irrigation systems to reach all scheme farmers at both Bontanga and Golinga, which is the basic requirement.

At Bontanga there is a further problem in that upstream farmers often "steal" water from their downstream neighbors, by diverting the flow of water from the main canal to their farms at times when they are not authorized access to irrigation water. This has a negative effect on the farming operations of the downstream farmers, including the anchor farm. This has led to strong conflicts between the affected parties, with GIDA rarely getting involved to resolve the problems. There is no penalty for this behavior by the upstream farmers.

In conclusion, there is an element of anarchy in the distribution and management of irrigation water by the smallholders, particularly at the Bontanga scheme.

### ***Torgorme***

As described earlier, the Torgorme irrigation scheme is still under construction and has not yet been turned over to GIDA for commercial farming operations. However, at the beginning of the current rainy season (May 2014) the SME arranged for the smallholders at the scheme to plant their farm plots within the scheme for rainfed crop production. Under its contract with MiDA, Erdmark (the scheme construction contractor) was required to plow the fields within the scheme in preparation for turning the scheme over to the smallholders for crop production. Unfortunately, due to contractor delays and the limited availability of land preparation equipment by the contractor, progress was extremely slow and only about half the assigned area was plowed in time for the smallholders to plant their crops for the current rainy season. However, almost all those who were able to plant their crops during the current rainy season planted maize.

The use of the Torgorme scheme during the forthcoming dry season (November 2014) will depend on the construction completion date of the irrigation project. If the smallholders are unable to use their plots for crop production during the next dry season, they will be bitterly disappointed.

### **3.4 Irrigation Service Charges**

The initial studies conducted by SNV Lavalin made detailed calculations on the required amount of irrigation service charge that should be imposed for water use at Bontanga and Golinga. For the Bontanga scheme, the recommended ISC was ¢493 per hectare per year for smallholders and ¢276 for the anchor farm. For Golinga, as a small, stand-alone operation, the initial recommendation was ¢700 per hectare per year, but it was later decided that the administration of the two schemes would be merged, and the same amount charged for both schemes. The GIDA scheme office is responsible for setting the ISC. After the two schemes were rehabilitated, GIDA initially proposed the recommended rate of ¢493 per hectare per year, but the farmers protested the more than ten-fold increase over the previous rate of ¢40 per hectare per year. GIDA then proposed a lower rate of ¢250 per hectare per year and the farmers again protested. GIDA eventually established the current rates of ¢100 per hectare per year at Bontanga and ¢150 per hectare per year at Golinga, which were negotiated with the farmers as “temporary” rates. However, even these low rates are not being fully paid by the farmers.

Under GIDA policy, it is the farmers themselves who are responsible for ISC collection. At the end of the 2011 season, the Bontanga smallholders voted to have the GIDA scheme office receive the funds collected by the farmers for deposit into a bank account to ensure better accounting and financial controls, instead of having the funds deposited with the farmers’ organization, the FBO Union. The smallholders were concerned over the lack of accountability and transparency in the collections process that was handled entirely by the farmers’ organization. Consequently, at Bontanga there are accounting records available only for the past two years on the amount of ISC that has been collected at the scheme. At Golinga, the only available records are the bank statements showing the

amounts deposited into the ISC bank account, with no record of the amounts paid by the individual farmers. Furthermore, the treasurer of the Golinga farmers' union who is responsible for handling the funds obtained from the irrigation service charge was said to be illiterate (although he is apparently numerate).

The team's interviews with the GIDA accountant at Bontanga revealed that during the past two crop years (November – October) since GIDA has been involved in the collection of the irrigation service charge at Bontanga, the repayment rate by scheme farmers has been very low: the amount paid during 2012-2013 was only 14% of the amount due, whereas in 2013-2014 the amount paid was 22% of the amount due. Farmers cited inadequate revenue generation as the primary reason for nonpayment; it is also worth mentioning here that a culture of non-payment of irrigation charges by smallholders, particularly at Bontanga and Golinga, exacerbated by the lack of sanctions imposed on defaulters also contributed to the low repayment rates.

At Golinga, the ISC payment history is only slightly better: based on a verbal report by the treasurer of the farmers' union (no financial records were available), the amount collected during 2012-2013 was 35% of the total amount due. For the 2013-2014 crop year the amount collected was 50% of the amount due.

The unavoidable conclusion is that in view of the limited collection of the ISC, the Bontanga and Golinga schemes will not be adequately managed or maintained, and they will not be sustainable over the long run.

At Torgorme, the SME has yet to initiate the process of determining the amount of ISC that would be charged for irrigation services. As was the case for Bontanga and Golinga, the final determination of amount to be charged to the producers for irrigation services will be made by GIDA, after what will likely be a lengthy negotiation with the smallholders. The recommended charge<sup>3</sup> for irrigation services at the Torgorme scheme developed by SNC Lavalin, MiDA's consulting engineering company, was ₦476 per hectare per year for smallholders, and ₦148 per hectare per year for the anchor farmer.

### **3.5 Scheme Maintenance**

At both Bontanga and Golinga, the GIDA scheme office is responsible for maintaining the main canals, whereas the smallholders are responsible for maintaining the secondary (lateral) canals that provide water to their farms. Since the canals at both schemes were recently rehabilitated, little corrective maintenance has been required. Preventative maintenance such as removing weeds from the canal banks and canal cleaning is scheduled quarterly, and is organized by the GIDA scheme manager along with one of the executives of the farmers' union. During the assessment team's visits to the two schemes, the canal networks were seen to be in good condition.

External maintenance services that are required must be paid by GIDA from the modest fees that are collected from the ISC. If funds are not available for required maintenance or repairs, the farmers are requested to make a contribution in cash to pay the required services. For example, in recent months a failure occurred in the wall of a lined section of one of Bontanga's main canals, and the farmers responded with a contribution of ₦500 to

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<sup>3</sup> Millennium Development Authority (MiDA), *Organisation & Management Report Final - Kpong Irrigation Scheme- Lot 3*, August 18, 2011

purchase the cement needed for the repair. The Bontanga scheme manager informed the team that in case the canal network required substantial repair, the only option would be to request the GIDA office in Accra to arrange funding from the central government to correct the problem.

At Torgorme, no system maintenance has been carried out because the irrigation project is still under the control of the construction contractor and has not yet been turned over to GIDA for irrigation operations. After the irrigation system begins operating, maintenance will be one of the responsibilities of the SME. Funding for routine maintenance and any required repairs would be covered by the ISC. However, as described earlier, considerable work will be required to correct the deterioration that the scheme has suffered since the Compact ended, and to bring the network of canals, drains, and roadways back to a satisfactory operating condition. There is no cost estimate available for the required rehabilitation, but based on the consultant's observations, the cost could well be as much as \$1 million.

### **3.6 Smallholder perceptions**

Over the course of the assessment, the evaluation team conducted FGDs with smallholders at the three irrigation schemes to gain an understanding of their attitudes and perceptions of scheme operations. The summary reports for the FGDs at the three irrigation sites are included in Annex 2. The following section provides a summary of the most important points raised by the smallholders at the FGDs.

#### ***Bontanga Focus Group Discussions***

About 600 farmers are currently cropping the 495-hectare irrigation site with about 2 acres (0.8 hectares) each. Farmers are generally middle aged with an average age of 47 years. It must be noted that those interviewed were not sure of their actual ages and thus used estimates. Farmers tended to cultivate the irrigable land during the dry season with only about 40% of those present using their plots during the rainy season. The interviewees had plots outside the scheme (with an average size of around 4 acres or 1.6 hectares) which they cropped during the rainy season. The farmers who were interviewed had farmed at the irrigation scheme for an average of 17 years. This probably reinforced their perception that they owned the land, even though it is being leased. All farmers interviewed are members of farmer organizations that were formed approximately three years ago during the implementation of the Ghana Compact. About 90% of the smallholders interviewed had received training in good agricultural practices and FBO capacity building. Crops grown by scheme farmers mainly comprise rice, maize, pepper, onion, and okra. Of the lot, farmers indicated that pepper was the most profitable, although they also noted that onions are the most profitable crop produced at the scheme, but that this crop is cultivated mostly by migrant farmers. Farmers at the scheme generally indicated a lack of skills for the cultivation of onion. Recently, there has been a drift towards green leafy vegetables as a result of the incidence of disease at the Bontanga irrigation site. Farmers are confident that the irrigation scheme would continue to function for at least the next five years. However, they proposed that scheme management should be improved, collection of the irrigation service charge should be increased, relationships with the anchor farmer should be strengthened, and further support should be provided to scheme farmers to help obtain land preparation equipment

and to gain access to crop marketing outlets. On a scale of 1 – 10, Bontanga farmers ranked the scheme at 8.69 (average for all farmers present) indicating that they were very satisfied with the renovations carried out and with scheme operations. They also noted that, in general, their amount of income earned from rice production had doubled after the scheme was renovated.

### ***Golinga Focus Group Discussions***

About 156 farmers (of which 18% are female) are currently cropping the 40 hectare scheme area developed for irrigation at Golinga. Each farmer has access to an average producing area of 0.5 acres (0.2 hectares). Since land was not sufficient to go round, the female farmer's group attending the FGDs had been allocated an amount of 3.5 acres (1.4 hectares) at the site as a communal farm. Some of the female farmers were also farming the plots that had been assigned to their husbands. Those interviewed were generally middle-aged with an average age of 48 years. It must, however, be noted that interviewees were not sure of their actual ages and thus used estimates. Scheme farmers cultivate their plots during both the dry season and the rainy season and had farmed at the scheme for an average of 16 years. All farmers interviewed said they were members of the Farmers' Union but not all those attending were affiliated with the individual FBO organizations that make up the Farmer's Union. The interviewees had been trained in good agricultural practices and FBO capacity building during the Compact implementation period. Crop production mainly comprises rice, maize, pepper, onion, okra, and leafy vegetables. Of the lot, farmers indicated that leafy green vegetables were the most profitable. The shift to leafy green vegetables was a means to avoid the diseases that affect other vegetables at the irrigation site. Farmers expressed confidence that the irrigation site would continue to function at least for the next five years. However, they indicated that water is in short supply during the last two months of the irrigation season and expressed concern over the constant overflow of the dam spillway, which could be an indication of reservoir silting. According to the farmers, their incomes have increased since the irrigation facility was rehabilitated because their rice yields had doubled. They have also introduced leafy green vegetables which made them very happy because they are now able to "see money every day". The Golinga farmers rated the irrigation services after rehabilitation an impressive 9.0 of a possible 10.0.

### ***Torgorme Focus Group Discussions***

The first FGD at the Torgorme scheme was attended by FBO leaders from seven different farmers' organizations, of the total number of 15 FBOs that are active at the scheme. The first session had a total of 18 attendees, including 3 females, while the second session was composed of 16 members from a single FBO, including 12 females. At Torgorme, the available irrigable land consisting of 386 hectares is allocated to 887 small scale and 14 medium scale farmers. Farmers who had earlier farmed plots within the irrigated area (from Nakpoe, Azagonokorpke and Fozdoku) were each provided one acre, while migrant farmers who did not previously farm at the irrigation site were provided 0.5 acres (0.2 hectares) each. The 14 medium-scale farmers have been assigned a total of 50 hectares. The average age of the farmers attending the discussions was 45 years. Approximately 250 scheme farmers who are affiliated with five FBOs are now working as contract farmers with Viva City Farms. These farmers received funding support from the company and produced crops for the first time at Main Canal one during the current

rainy season. About 38% of farmers interviewed do not have access to land outside the irrigation scheme. However, those farmers with access to land outside the scheme reported holdings that were, on average, 1.6 acres (0.6 hectares) each. All farmers interviewed were members of FBOs that had been formed approximately three years ago during the implementation of the Ghana Compact. All those interviewed had received training in good agricultural practices and FBO capacity building. Compensation was paid for the year 2010 crop losses by those farmers who were displaced from their plots due to the construction of the Torgorme irrigation project. Those farmers displaced by scheme construction were unable to use their assigned area within the scheme for crop production until the 2014 rainy season, when limited planting for maize production was permitted. Farmers expressed their disappointment with the way the scheme development process has been carried out, since compensation was paid for only the 2010 cropping season, while scheme construction has continued throughout 2014. After they were displaced, most of the farmers interviewed said that they had engaged in charcoal production, fishing, small-scale gold mining, or in some cases, farming for their livelihood. Those interviewed are hopeful that the availability of the anchor farm, Vegpro Ghana Limited, and the medium scale farmers (Viva Farms and others) would provide good farming and marketing opportunities for them. The index of farmer satisfaction with scheme operations was only 3.7 on a scale of 1 to 10, which indicates the extent of their dissatisfaction with construction progress and the fact that the system is still incomplete.

### **3.7 Proposed Indicators**

One of the required outputs of the interim assessment of MCC's irrigation investments is a methodology for a third party to remotely monitor scheme performance, thereby enabling MCC to determine if the three irrigation systems meet the criteria for proceeding with the required final impact evaluation, and when the evaluation should take place. As described in Annex 1, the recommended methodology would essentially consist of periodic monitoring visits to the three schemes by a local irrigation engineer to compile the required information for reporting the indicators that are described in the continuing section. A maximum of five visits per year by the irrigation engineer should be sufficient to monitor scheme performance and to report on the status of agricultural production.

The proposed indicators are grouped into five different categories: a) scheme management indicators; b) completion of irrigation water requirements; c) land use at the schemes; d) crop productivity at the scheme; and e) indicators of scheme sustainability.

The following is a description of the specific indicators for the five different categories. Unless otherwise indicated, indicators would be reported for the immediate past season and the current season to date, covered by the review period. Information required by the irrigation engineer to report on the monitoring indicators would be obtained from the respective GIDA scheme office or the SME, if available; from interviews with anchor farm staff, and interviews with selected scheme smallholders.

#### **1. Scheme Management Indicators**

- The percentage collection rate of irrigation service charges that must be paid by scheme smallholders and the anchor farm (separate indicators) (%). (This is a proxy for management capability).



- Is a professional scheme manager responsible for operations and maintenance at the scheme? Yes \_\_\_\_ No \_\_\_\_.
  - Rating of scheme management performance as provided by scheme smallholders, the anchor farm, and the irrigation engineer (separate ratings) (scale 1 – 10).
2. Delivery of Irrigation Water Requirements
- Engineer's calculation of crop water demand for crop production during the crop growing season (cubic meters).
  - Engineer's estimate of irrigation water applied to crop production area during the crop growing season (cubic meters).
  - Amount of rainfall that fell on crop production area during the crop growing season (cubic meters).
  - Number of days that irrigation water was provided during the survey period compared to total available days (%).
  - Number of hours that irrigation water was provided during the survey period compared to total available hours (%).
  - Engineer's calculation of amount of shortfall/excess water available based on crop requirements during the survey period (%).
  - Engineer's calculation of scheme irrigation efficiency (%).
  - Rating of scheme irrigation performance provided by scheme smallholders, the anchor farm, and the irrigation engineer (separate ratings) (scale 1 – 10).
3. Land Use Indicators
- Area cropped at the scheme (specify the area cropped for each crop grown and also the fallow area) compared to total available crop area (%).
4. Crop productivity indicators

Note: productivity indicators would be provided during the current season for only those crops that have been harvested.

- Provide a listing of crops produced and crop area, the amount produced for each crop, and the calculated yield per crop. The calculated crop yield would be compared to MOFA's standard yield performance for each of the listed crops.
5. Sustainability indicators
- Number of preventative maintenance cycles performed on canal network during the survey period, compared to best practices.
  - ISC collection rate percentage for smallholders and the anchor farm (described under scheme management indicators).
  - Rating of perceived scheme sustainability beyond five years by scheme smallholders, the anchor farm, and the irrigation engineer (separate ratings) (scale 1 – 10).
  - Rating of the current condition of scheme infrastructure by smallholders, the anchor farm, and the irrigation engineer (separate ratings) (scale 1 – 10).

### 3.7.1 Impact Evaluation Criteria

The indicators described in the previous section would be used to determine whether or not each scheme has met the criteria for proceeding with the final impact evaluation. The methodology would be a simple pass-fail system, based on a minimum passing score of 75% for the following criteria to be determined at each visit by the irrigation engineer. To meet the standard for conducting a final impact evaluation, each scheme must obtain three “passes”, which correspond to three consecutive visits by the irrigation engineer. The criteria that compose the scoring system are the following:

Table 4: Criteria for Proceeding with Final Impact Evaluation at Each Scheme		
No.	Description	Minimum Passing Score
1	Is professional management in place (Yes/No)	Yes
2	ISC payment up-to-date (% of total amount due)	75%
3	Scheme water needs met (% of amount required)	75%
4	Productive land use (% of available land used)	75%
5	Crop yields (% of MOFA standard crop yields)	75%
6	Avg. Smallholder rating of scheme operations	75%
7	Anchor farm rating of scheme operations	75%
8	Avg. respondent rating of scheme management	75%
9	Avg. respondent rating of scheme sustainability	75%
10	Overall scheme rating by irrigation engineer	75%

Note: Ratings are made by the respondents based on a scale of 1 – 10 (10 high)

### 3.8 Recommended Action if Schemes do not meet Evaluation Criteria

The Scope of Work for the interim assessment required that the consultant analyze and recommend how and whether the final impact evaluation for a particular scheme should proceed if only one or two irrigation schemes meet these criteria for the final impact evaluation. The views of the consultant are the following:

- Once the operations of the respective irrigation schemes have been underway for a sufficient length of time, reaching a normal, steady-state operating condition, and if there is little chance that changed circumstances would affect scheme operations, then the final impact evaluation could be carried out at any time at that scheme with valid results. However, if changed circumstances would likely have an effect on scheme operations, then the final impact evaluation should be delayed until sufficient time has passed for the scheme to reach a new, steady-state condition under the changed circumstances.
- This is essentially the situation at the Bontanga and Golinga irrigation schemes. The same group of farmers, or their successors, has been farming at the two schemes since

the early 1990s. The present institutional structure at the schemes, and the management system that is now in place, are the same as that in effect before the schemes were rehabilitated. Nearly three years have passed since the schemes were rehabilitated with the capability of providing an adequate flow of irrigation water under the joint management of GIDA and the scheme farmers. By now, sufficient time has passed for both schemes to reach a normal, steady state operating condition under renovated conditions.

- The only known event that might possibly occur that could have a considerable impact on the two irrigation schemes would be the appointment of the Emmanuel Darkey agribusiness group as scheme manager for Bontanga and Golinga. Should this occur, it would likely require a time period of around 2-3 years for the two schemes to reach a new normal, steady state condition under the positive influence of professional scheme management. With professional management, scheme performance should substantially improve and the likelihood of a long-term sustainable operation by the two schemes would considerably increase. These improvements would likely take place over a 2-3 year period after the scheme manager is appointed, and progress could be monitored by the local irrigation engineer on behalf of MCC during that period. After the scheme operations reach a new steady-state condition, the impact evaluation could be scheduled, say, during the 4<sup>th</sup> year after the SME has been named.
- However, if a SME is not appointed in the near future, the schemes have already reached a steady-state condition under the limited management that now exists, and the MCC final impact evaluation could take place at any time with valid results. This would be a case where “what you see is what you get” since little change would be likely to occur in the future that would impact scheme operations. In other words, without professional scheme management there would likely be little change over the foreseeable future in either scheme operations, or of the impact the scheme would have the livelihood of smallholders.
- At Torgorme, in contrast, the condition of the scheme is in a state of flux due to its continuing construction and the deterioration that has occurred since the Compact ended. Even if scheme construction could be fully completed during 2014 and the scheme turned over to GIDA for farming operations by year end, considerable time would be required to bring the scheme up to its optimum operating condition. Furthermore, if the GCAP project does, in fact, move forward with its anticipated activity of providing financial and technical support to complete the on-farm work needed to ensure that smallholders are able to adequately irrigate their plots at the Torgorme irrigation scheme, this work would not likely start until late 2015. Afterwards, the work would likely require approximately two years to complete and a third year for the scheme farmers to reach a steady-state operating condition. Under this scenario, MCC’s impact evaluation of its investment in the Torgorme scheme would not likely take place until the 4<sup>th</sup> or 5<sup>th</sup> year after the scheme had been turned over to GIDA.
- The three irrigation schemes are operated as separate entities with no overlap between the farmers who are active at each scheme. The impact evaluations could be performed separately, as two activities: one for the Golinga and Bontanga schemes

together, and a separate evaluation for the Torgorme scheme when each scheme reaches a steady state condition. This has already occurred for the Golinga and Bontanga schemes. In each case there would be samples large enough to detect the effects and therefore, the evaluations could take place separately at different times with equally good results. The only negative factor would be a slight increase in the mobilization cost for carrying out two separate impact evaluations at different time periods, instead of one concurrent impact evaluation that encompasses all three schemes.

## **4.0 Findings, Conclusions, and Recommendations**

### **4.1 Major Findings**

MCC's investment for renovating the Bontanga and Golinga schemes was \$3.38 million. The Bontanga smallholder area is 495 hectares, farmed by approximately 600 smallholders affiliated with 10 FBOs. The anchor farm, Solar Harvest, has an assigned area of 305 hectares. The irrigation capacity for flood at Bontanga is 800 hectares, which is the actual size of the scheme.

Golinga has only 40 hectares available for irrigation due to the limited reservoir capacity. The average smallholder area is .5 acres (0.2 hectares). Even with the limited area there is a shortage of water during the dry season when demand is highest. There are a total of 183 scheme smallholders who are affiliated with four FBOs at Golinga.

At the Compact's end, construction of the Torgorme scheme was 71% complete. MCC's investment for scheme construction under the Compact was \$15.4 million, while the post-Compact investment funded by GOG is \$6.6 million. The scheme was turned over to MiDA as being completed on December 19, 2013, but with numerous construction deficiencies and considerable required work remaining. The scheme is now in a one-year "construction completion and defects correction" period. However, during the period since the scheme was turned over to MiDA in December 2013, remedial construction work has lagged and little progress has been made toward final completion.

The Torgorme scheme has a net farmed area of 386 hectares. Fourteen medium-size farmers within the scheme have been assigned a total area of 50 hectares, leaving 877 smallholders with an area of 336 hectares. Farmers who were displaced from the irrigation scheme during construction have been assigned one-acre plots, while new scheme farmers have been assigned plots of only .5 acres (0.2 hectares).

Before construction of the schemes began, MiDA designed an extensive institutional structure to oversee and manage their operations. The different institutions included a SGB, SME, LAC, and different committees formed with leaders of the FBOs. MiDA was unable to name a scheme manager for Bontanga and Golinga, which caused the collapse of the planned structure. Scheme management there reverted to the pre-Compact method of scheme co-management by GIDA and the farmers' organizations, with the farmers playing the leading role.

At Torgorme the institutional structure is operating as originally planned but the limited capitalization of the SME has severely limited effective scheme management. When the SME assumed its position it was anticipated that the MOFA would provide an up-front

operating subsidy as “seed capital” for scheme management, equivalent to three years’ operating income from irrigation service charges. This subsidy has not been provided by MOFA.

Since GIDA has limited staff and budget for field operations at Bontanga and Golinga, it uses the method of farmer-operated and farmer-managed irrigation services. However, scheme farmers are not prepared for these tasks; they have not been trained, and most are illiterate. GIDA is extremely passive in dealing with management issues at the two schemes, and has essentially abdicated authority for scheme management to the smallholder associations.

The Golinga scheme is fully utilized year round for rice and vegetable production. At Bontanga, the scheme is used mainly for rice and vegetable production during the dry season. However, during the dry season some scheme farmers lease their farm plots to migrant farmers to grow high-value vegetable crops such as onions. Land use during the rainy season is only slightly more than 50% due to farmers’ preference for upland farming and their feeling of ownership and entitlement to their irrigated farm plots. At Torgorme, approximately 50% of the smallholders have been able to grow rainfed crops, mostly maize, during the current rainy season. Otherwise, the scheme has not been used for farming operations since its construction began.

The production of high-value vegetable crops has lagged at Bontanga and Golinga, even though farmers recognize their economic benefits, due to a combination of factors: a) there is a tradition of rice production at the schemes and rice is a popular crop for food security; b) smallholders have inadequate knowledge on the production of vegetable crops and are concerned about the greater susceptibility of vegetables to pests and disease; and c) there is no “champion” to support vegetable production at the schemes. At Golinga, the limited availability of irrigation water near the end of the dry season limits the production of a second vegetable crop during that period.

At Bontanga and Golinga, water management is controlled by the farmers’ associations. No measurements are made, nor are data collected, on the amount of water applied at the schemes. Water is provided to blocks of farm plots based on a pre-set schedule, with the flow of water controlled by water bailiffs and canal leaders. Discipline is weak, with no action taken against those farmers who divert water to their farms without regard to the irrigation schedule. At Torgorme, irrigation services are not provided because the scheme is still under construction.

At Bontanga and Golinga, GIDA is responsible for maintaining the main canals, whereas the smallholders are responsible for maintaining the secondary (lateral) canals. Since the canals were recently rehabilitated, little corrective maintenance has been needed. Preventative maintenance (i.e. de-weeding of the canal banks; canal cleaning) is done quarterly. The canals at the two schemes appear to be in good condition. At Torgorme, the earthen canal network, roadways, and drains have deteriorated considerably due to erosion and silting caused by heavy rains during the extended construction period. Scheme maintenance and upkeep will be the responsibility of the SME once scheme construction has been completed.

The original studies completed by SNC Lavalin recommended an irrigation service charge for scheme operation and maintenance at Bontanga amounting to ₦493 per hectare

per year for smallholders, and ¢276 for the anchor farmer. For Golinga, as a stand-alone operation, the recommended charge was ¢700 per hectare per year. After negotiations between GIDA and the smallholders were completed, the “temporary” amounts fixed by GIDA were ¢100 per hectare per year for Bontanga and ¢150 per hectare per year for Golinga. The ISC payment rate is extremely low – for the past two crop years, Bontanga producers have paid 14% and 25% of the respective amounts owed, while at Golinga, the annual payment rates were 35% and 50% respectively. At Torgorme, the recommended ISC amount is ¢524 per hectare per year for smallholders, although the actual amount to be assessed has not yet been established. However, based on a net area in production by small- and medium-scale farmers of 386 hectares, the amount anticipated by the SME to be collected is ¢596 per hectare per year.

The smallholders at Bontanga and Golinga are generally satisfied with the performance of the irrigation schemes, although they recognize that the low assessment and the poor collection rate of the irrigation service charge jeopardizes the sustainability of the schemes over the long term. Smallholders at Torgorme are angry and embittered over the lengthy delays in scheme construction that is keeping them from crop production at the scheme.

MiDA’s policy at the Torgorme scheme was to provide irrigation water at an access point adjacent to the smallholders’ plots and leave it to the initiative of the individual farmers on how to best irrigate their farms. In some cases, the undulating terrain within the smallholder plots limits the effectiveness of flood irrigation and, in extreme cases, water must be pumped from the access point onto the smallholder farms.

Additional investment would be required at the Torgorme scheme for smallholders to fully utilize their irrigated farm plots, either for land leveling as required for flood irrigation, or to install small-scale, pumped, pressurized irrigation systems such as sprinkler or drip irrigation. Technical assistance such as engineering surveys would also be needed to help the smallholders lay out a drainage network for the removal of excess water from their plots.

The USAID and World Bank-funded GCAP project is now in the process of awarding a \$500 K, 80% matching grant to the Vegpro anchor farm at Torgorme and a similar grant to the Solar Harvest anchor farm at Bontanga to jump-start their outgrower programs. This project is also preparing to finance the expansion of the irrigated area at the Torgorme irrigation project from its present 387 hectares to its potential area of 2,000 hectares. The GCAP project management team also expressed its interest in having the project complete the remaining work at Torgorme that would be required for efficient smallholder irrigation on their individual plots.

A system for third party remote monitoring of irrigation performance at the three schemes by MCC would involve periodic visits by a local irrigation engineer to collect data, conduct interviews with scheme users, observe scheme performance, and report on the results.

Several of the mid-size farmers that have been assigned farm plots at Torgorme are developing their own outgrower programs with smallholders at the scheme. These farmers will be allowed to develop large blocks of land as anchor farmers within the expansion area that is planned under the GCAP project.

## **4.2 Conclusions**

- Without professional management, the operation of the irrigation schemes at Bontanga and Golinga will not move beyond the present, ineffective level.
- The slow development of the Solar Harvest contract farming program has limited the opportunities for high-value crop production at Bontanga.
- MiDA's withdrawal from active involvement in the operation of the irrigation assets provided under the Compact has created a leadership vacuum that is jeopardizing the successful operation of the investments.
- MiDA's inability to select the SME for Bontanga and Golinga before the Compact ended has jeopardized the operations of these irrigation schemes.
- There is an element of anarchy in the distribution and management of irrigation water by scheme smallholders, particularly at the Bontanga scheme.
- In view of the low assessment amount of the ISC at Bontanga and Golinga, and the extremely poor payment record by scheme farmers, the irrigation systems will not likely be adequately managed and maintained, and they will not be sustainable over the long run.
- MiDA placed the Bontanga and Golinga irrigation schemes in operation at the end of the Compact without the required institutional and administrative structure in place for effective scheme operation.
- To increase the intensity of vegetable production at Bontanga and Golinga, it would be necessary to a) provide training on production techniques for vegetables produced for local markets, particularly for pest and disease control; b) provide market linkage and marketing support for marketing the fresh vegetables produced at the schemes, and c) provide support and encouragement for smallholder fresh vegetable production by the anchor farm or by third parties.
- To increase the use of the Bontanga scheme during the rainy season would require a) an increased availability of land preparation equipment for scheme smallholders, and b) strengthening the hand of the Land Allocation Committee to remove scheme occupants who do not fully utilize the land that they have been assigned.
- Construction delays at the Torgorme Irrigation Project have delayed crop production by small-scale farmers at the scheme and have severely affected their livelihood. Furthermore, government startup financing for irrigation operations at this scheme that was planned by MiDA under the Compact is not available, which will limit scheme management functions.
- Once the Torgorme irrigation project has been completed, for smallholders to effectively irrigate their fields it will be necessary to carry out land leveling within the individual smallholder farm plots and to provide support for the installation of small-scale, pressurized irrigation systems such as sprinkler or drip irrigation at the individual farms.

- Most Torgorme smallholders would require technical assistance to plan and design an appropriate means for irrigating their plots and for removing excess water from their fields.
- Without further investment after construction work has been finished to correct the deterioration that has occurred in the network of earthen canals, in-farm roads, and drains at the Torgorme scheme, the irrigation system will not perform as planned.
- At Torgorme, there presently appears to be a problem of bureaucratic gridlock, with none of the responsible government institutions providing the leadership needed to complete the construction of the irrigation system on a timely basis.
- Under the present circumstances, the most likely scenario once the construction of the Torgorme irrigation project has been completed will be the following:
  - During the dry season, only about 50% of the scheme smallholders will be able to effectively irrigate their farm plots by flood irrigation as a result of the irregular, undulating terrain that exists within their fields. As financing becomes available for land leveling or alternative methods of irrigating the smallholder plots, these problems would be gradually overcome although the process would require several years to complete.
  - Scheme smallholders will generally be able to farm the entire area of their assigned plots as rain-fed crop production during the rainy season, with the exception of approximately 20 hectares located in low-lying areas that are subject to flooding.
- In view of the limited working capital that is available to PAAL, the Torgorme SME, a favorable response by EDAIF to the request by the Minister of Trade and Investment for a subsidy payment on behalf of scheme smallholders to the company will be necessary for effective scheme management. The requested grant funding would alleviate the cash flow shortage that has thus far hampered the operations of the SME.

MCC's investments in Bontanga and Golinga are only partially successful. MCC's investment in the Torgorme irrigation scheme is not yet successful.

### **4.3 Recommendations**

It is recommended that MCC apply as much pressure as possible on the GOG through the second Ghana Compact to ensure the resolution of the pending items that continue to delay the effective operation of MCC's investments in the three irrigation schemes that were initiated under the first Ghana Compact. Critical, pending issues that must be resolved are the following:

- (a) Re-initiate the process of selecting a viable SME candidate for Bontanga and Golinga, with an assured up-front government subsidy equivalent to three years' irrigation service fees to provide adequate working capital for scheme management;
- (b) Appoint a full-time manager at MiDA with the decision-making authority required to resolve the current construction and management issues that are delaying the completion at the Torgorme irrigation project;



- (c) Arrange financing and construction services as required to correct the deterioration of the Torgorme scheme that has occurred due to the lack of maintenance and upkeep of the network of in-farm roadways, irrigation canals and drains during the construction phase of the Torgorme irrigation project;
- (d) Develop a new project activity in collaboration with the GCAP project to provide matching grant funding for the installation of on-farm irrigation and drainage for 887 smallholders and 14 medium-scale farms that will operate at the Torgorme scheme; and
- (e) Follow through with EDAIF on the grant request by the Minister of Trade and Industry to ensure that grant funding equivalent to three years' irrigation service charges is provided to the Torgorme SME for working capital financing.

Furthermore, MCC should develop a strong collaborative relationship with USAID and the GCAP project staff in Accra to ensure that the remaining work required at the Torgorme scheme described in the previous paragraph would be fully completed with GCAP project funding. It is further recommended that MCC place a liaison officer as observer at the GCAP project, which would also have open access to the USAID/GCAP project management staff. The observer would influence project decisions on scheme completion at the Torgorme project and report progress to MCC.

In view of the rigid, five-year timeframe for the completion of MCC-funded initiatives, we recommend that future MCC development activities be oriented toward those categories of projects whose implementation requirements are relatively simple and straightforward, and which do not require the satisfaction of numerous Conditions Precedent before substantive work can begin. Furthermore, the assets that are provided through MCC funding should not require extensive preparation and user training for effective operation. Examples of the different types of investments that should be considered include the construction of roads or power lines that, upon completion, would be turned over to government institutions for their operation and maintenance or the construction of a turn-key facility such as a factory of a processing plant that could be operated and maintained by to a well-established private organization. Under the first Ghana Compact, the investments that most closely fit this simpler development approach are a) feeder roads; b) the PCC; and c) the agribusiness centers that are operated by a private company but are jointly owned by smallholders and a private entity.

We also recommend that for future development projects funded by MCC, the collaborative agreement between MCC and its implementation partner should specify that the latter must remain active for as long as required after the ending date of the Compact to resolve ongoing issues that might occur. If the construction work of the Torgorme irrigation scheme is not finished by the end of the contractor's defects correction period on December 19, 2014,

It is recommended that the responsibility for scheme construction completion and subsequent operation be turned over to GIDA supported by EDAIF and other partners.

## **5.0 Lessons Learned**

Continuing leadership and involvement of the development partner (i.e. MiDA) beyond the end of the Compact is required to ensure the effective operation of the assets that were provided and the resolution of ongoing problems.

For complex development efforts such as the MCC-funded irrigation schemes, the ability to effectively operate and manage the facilities and assets that were provided under the project has equal importance as the assets themselves. In other words, project “software” has equal importance as project “hardware” in providing operating results. Management systems and operating processes must be fully instituted by MiDA and GIDA to ensure the optimum performance of the asset or facility.

The users of MCC’s investments should be fully involved in the design, planning, and operation of the investments that are made. In this regard, GIDA should have been more actively involved at the initial design and planning phase and during the construction stage of all three irrigation schemes.

## **ANNEXES**

**ANNEX 1**  
**IRRIGATION MONITORING METHODOLOGY**

# **MONITORING METHODOLOGY FOR IRRIGATION SCHEME PERFORMANCE**

## **1. Introduction**

One of the requirements of the scope of work for the interim assessment of MCC's irrigation investments was to provide a means for MCC to remotely monitor the performance of the three irrigation schemes at Bontanga, Golinga, and Torgorme to enable it to determine when the final impact evaluation of the schemes should be conducted. The following section provides a framework for the recommended monitoring system as well as the report outline and an annual budget estimate for the monitoring activity.

In view of the limited availability of operating and performance data at the MCC-funded irrigation schemes it would be necessary to engage a local irrigation consultant to make periodic visits to the three schemes to compile information on their irrigation performance and to submit a report on the consultant's findings to MCC.

Five reports per year should be sufficient to monitor the performance of the three schemes. The consultant would submit a consolidated report with separate chapters for each of the three schemes at the beginning and after the end of both rainy and dry seasons, along with an additional mid-term report for the three schemes at the midway point of the dry season, when the irrigation requirement is greatest. The reports would describe the situation and outlook for irrigation performance at each scheme; the status of farming, crop production, and the perception of the users on scheme performance; provide highlights of major problems and issues related to scheme operations, and give the irrigation consultant's overall assessment of scheme management and operations.

In addition to qualitative information on irrigation performance obtained from the consultant's interviews, observations, and site visits, the reports would include quantitative data prepared by the consultant to compare the approximate daily amount of water that is required by the crops grown at each scheme with the estimated amount of water that is applied daily at each scheme. To obtain the needed quantitative data, it would first be required to source daily rainfall data from the nearest available weather station for each irrigation site. Next, to determine the amount of irrigation water applied at each irrigation system, as a preliminary step it would be necessary to calibrate the intake gates at the main irrigation canals for each irrigation scheme so that the total amount of irrigation water flowing into the respective scheme per unit of time could be determined. Once the gates have been calibrated, it would be required that the water bailiffs at each scheme provide a daily log indicating the amount of time that the water had flowed into the scheme. Finally, to obtain an estimated amount of water required daily for crop production at each scheme, the irrigation consultant would have to calculate the amount of water required by the crops that are grown, by standard calculation methods for crop water demand using software such as CROPWAT. None of this information is presently available, and would have to be sourced by the consultant.

The use of remote monitoring equipment that is commercially available to measure parameters such as soil moisture content or to monitor the amount of water flowing past different points within the canals at the three irrigation schemes is not recommended. First, it would be costly to obtain and install a sufficient number of devices to monitor the three irrigation sites. Second, some amount of maintenance would be required to keep the

devices in operation for the length of time to be covered by the irrigation monitoring program. Third, if the measuring devices are left unprotected in the open areas where crops are grown, they would be vulnerable to vandalism or theft. Finally, in light of the present, rustic methods used for water management at the irrigation schemes there would be limited use for these sophisticated devices after the performance monitoring study had ended. Hence, the use of remote monitoring equipment at the three irrigation sites would not be practical.

Mr. Collins Owusu, the Irrigation Engineer who worked with the agribusiness consultant to complete the interim assessment of MCC's irrigation investments would be an excellent candidate to carry out the periodic site visits and to compile the information needed for the monitoring reports. Mr. Owusu lives near Kumasi, Ghana, and has relatively overland access to the three irrigation schemes where the periodic visits would be carried out. He would be interested and available to work with MCC to provide the monitoring reports as required.

Mr. Owusu's contact information is the following:

Collins Owusu

PO Box AP 87, Akropong-Ashanti, Ghana

Tel. (M): + (233) 277 036 223; e-mail [coleknust@yahoo.co.uk](mailto:coleknust@yahoo.co.uk);

Skype: Collins.owusu09

## **2. Data Collection for Irrigation Monitoring Report**

### ***2.1 Interviews with smallholder irrigation scheme farmers***

Around 6-10 farmers would be selected at random for interviews during each visit. The following questions would be posed to the smallholders.

- a. What is the amount of crop production and revenue earned during the most recent crop season: area farmed, crops produced, production yield, amount sold, sales revenue?
- b. Do you have problems with the delivery of irrigation water to your farm? What kind of problems do you have? Are you getting the water you need?
- c. On a scale of 1 – 10 (10 highest), how would you rate the irrigation service you are now being provided?
- d. What do you feel is needed to improve the irrigation services at the scheme?
- e. Have you made any changes in your farming practices (i.e. growing different crops, or producing more crops per year) as a result of the improved irrigation scheme?
- f. How many crops per year do you produce?
- g. Which crops would be the most profitable for you? Are you able to grow these crops?
- h. Does any group or organization help you obtain farm inputs (seed, fertilizer) land preparation, technical assistance, or markets for your crops?
- i. If you have a contract farming arrangement with an anchor farmer, what services does it provide? Are you satisfied with your contract farming arrangement?

- j. What marketing arrangements do you have? Where do you sell your products? Are you satisfied with your marketing arrangement?
- k. What is your rating of the performance of scheme management (scale 1 – 10)?
- l. What is your rating of the physical condition of scheme infrastructure (scale 1 – 10)?

## **2.2 Information required from Anchor Farmers**

### **2.2.1 Data requirements**

- ♦ Total area farmed (ha) and irrigated area (ha)
- ♦ Anchor farm area in crop production, number of contract farmers, and area farmed under contract
- ♦ Anchor farm information for the most recently ended production season: Crops produced (list), area farmed per crop (ha), crop yields per crop (tons/ha), amount sold per crop (tons), revenue obtained per crop (Cedi)
- ♦ Contract farming information for the most recently ended production season: Crops produced (list), area farmed per crop (ha), crop yields per crop (tons/ha), amount purchased per crop (tons), revenue paid per crop (Cedi)
- ♦ Irrigation records: Number of days and number of hours irrigated over the survey period. Estimated amount of water applied during the period (cubic meters)
- ♦ The irrigation engineer will compare the amount of water applied with the calculated crop water requirements

### **2.2.2 Open-ended interview questions – Anchor Farmer**

- a. How satisfied are you with the performance of the irrigation scheme? What are the main problems you have experienced?
- b. How would you assess the overall operations of the irrigation scheme? (Scale of 1 – 10; with 10 highest).
- c. How would you assess the performance of scheme management? (Scale 1 – 10).
- d. How would you rate the sustainability of the scheme for a time period greater than 5 years? (Scale 1 – 10).
- e. How would you rate the current condition of scheme infrastructure (scale 1 – 10)?
- f. In your opinion, is the scheme being operated and maintained appropriately? What changes are required?
- g. How sustainable do you see the operations of the scheme? What will the situation likely be, five years into the future?
- h. What are the main problems that exist in terms of scheme operation, maintenance, and management? What solutions should be provided, and by which organization?
- i. What is the current role of the anchor farm in irrigation scheme management and operations?

## **2.3 Information Required from GIDA or the Scheme Management Entity**

### **2.3.1 Data Requirements**

- ♦ Total irrigable area farmed at the scheme (ha)
- ♦ Number of farmers and the area farmed per crop during the current season (ha)
- ♦ Amount of irrigation water provided daily during the survey period (cubic meters) at each main canal at the scheme (based on daily log recording of canal gate openings and duration of water flow by water bailiffs for each main canal)
- ♦ Calculated daily crop water demand during the survey period (based on crops grown). These calculations will be completed by the irrigation engineer.
- ♦ Information for the most recently ended production season for all scheme farmers: Crops produced (list), number of scheme farmers per crop, area farmed per crop (ha), crop yields per crop (tons/ha), amount sold per crop (tons), revenue obtained per crop (Cedi)
- ♦ Problems impacting scheme farmers during the survey period (flooding, poor drainage, insufficient water flow) (hectares affected).
- ♦ The amount of irrigation service charges (ISCs) collected during the current crop year compared to the amount due.

### **2.3.2. Open-ended Interview Questions – GIDA or Scheme Management Entity**

- a. What are the major problems the SME has encountered in terms of scheme operations and maintenance?
- b. What are the main problems the SME has encountered related to water management? Are the farmers getting the water they need?
- c. Please describe the scheme maintenance provided during the survey period. Is scheme maintenance being carried out regularly, on a timely basis? Is it presently up to date?
- d. How well do you believe the scheme is being managed (Scale 1 – 10; 10 highest)?
- e. What support is being provided to smallholders by government organizations, NGOs, anchor farmers, and others during the survey period (number of beneficiaries)?
- f. Is the amount of user fees presently assessed sufficient to pay the full cost of operating and maintaining the scheme?
- g. How sustainable are the operations of the irrigation scheme? What will the situation be within five years?

During his visit, the irrigation engineer will make a visual survey of the physical condition of the scheme to form an opinion on the effectiveness of the scheme operations and management.

### **2.4 Information Required from Third Parties**

- ♦ Ghana Meteorological Agency: Daily rainfall at the three schemes during the current cropping season.

## **3. Irrigation Monitoring Report**



After the irrigation engineer's periodic visits to the three irrigation schemes he will be required to prepare and submit a summary report to MCC of approximately 5 – 10 pages in length, describing the current situation and outlook for the three scheme. After each monitoring visit the irrigation engineer will seek to compare the daily amount of irrigation water that is calculated for each irrigation scheme based on the crops produced there, with the daily amount of water that is actually provided either from rainfall or from irrigation water that is applied through the scheme. The irrigation engineer's report will also present a summary of findings and conclusions for each of the three schemes based on the data provided to him and his open-ended interviews with the Scheme Management Entity (SME), the anchor farm, and the 6-10 randomly selected smallholders at each scheme.

The proposed format of the monitoring report for the irrigation schemes will be the following:

#### Scheme Monitoring Report

1. Introduction
2. Irrigation Situation and Outlook
  - a. Bontanga
  - b. Golinga
  - c. Torgorme
3. Summary of Findings and Conclusions
  - a. Bontanga
  - b. Golinga
  - c. Torgorme

#### 4. Irrigation Monitoring Budget

The annual budget for the irrigation engineer's travel expenses, consulting fees, and payments to third parties for data collection is shown in the following Table 1. It is assumed that five monitoring visits per year to the three sites would be required.

Table 1	Annual Budget for Irrigation Monitoring Costs		
Description of Expense		Amount (Local Currency)	Amount (USD)
<b>1. Cost of services provided by third parties</b>			
Calibration of water flow through irrigation intake gates at main canals at Bontanga and Golinga (one-time, initial charge)		¢3,000.00	\$1,000.00
Annual cost of acquiring rainfall data		360.00	120.00
Annual cost of daily data log by four water bailiffs		420.00	140.00
<b>Total annual cost</b>		<b>3,780</b>	<b>1,260</b>
<b>2. Consultant travel expenses for monitoring visits to Bontanga, Golinga, and Torgorme:</b>			
Bus transport home - irrigation sites and return		300.00	100.00
Hotels – Tamale and Torgorme (5 nights)		1,250.00	417.00

<b>Table 1</b>	<b>Annual Budget for Irrigation Monitoring Costs</b>	
<b>Description of Expense</b>	<b>Amount (Local Currency)</b>	<b>Amount (USD)</b>
Vehicle hire Tamale and Torgorme (3 days)	1,050.00	350.00
Photocopies of scheme irrigation reports	30.00	10.00
Subtotal for each visit	2,630.00	877.00
<b>Total annual cost (5 visits)</b>	<b>13,150.00</b>	<b>4,384.00</b>
<b>3. Irrigation engineer fees for monitoring visits, calculations, and report writing</b>		
Seven field days per visit @ daily rate of US \$120	2,520.00	840.00
Four work days per visit – calculations; report writing	1,440.00	480.00
Subtotal for each visit	3,960.00	1,320.00
<b>Total annual cost (5 visits)</b>	<b>19,800.00</b>	<b>6,600.00</b>
<b>Total cost – first year</b>	<b>¢36,730.00</b>	<b>\$12,224.00</b>
<b>Total cost – second year</b>	<b>¢33,730.00</b>	<b>\$11,224.00</b>

**ANNEX 2**  
**SUMMARY OF FOCUS GROUP DISCUSSIONS**

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

**Focus Group Discussions Bontanga 10<sup>th</sup> September 2014**

**First Session**

**Names of FBOs present:** Naawuni Zaliku  
**Number Present:** 17 members out of which 4 were females  
**Contact Person:** Cecelia Sandow, Chairperson; +233 541 117 698  
Joseph Tonkurubil, Secretary; +233 245 124 690

**Second Session**

**Names of FBOs present:** Group A  
**Number Present:** 18 members out of which 1 was female  
**Contact Person:** Saidu Alhasan, Treasurer, +233 242 963 104

**Representing NORC** Tom Easterling, Nana Ama Oppong-Duah, Collins Owusu

**Purpose of meeting:** Focus group discussion to tease out benefits and issues on the irrigation scheme

**Person drafting notes:** Nana Ama Oppong-Duah

**General**

About 600 farmers are currently cropping at the 495 hectare Bontanga irrigation scheme site with about 2 acres (0.8 hectares) each. Farmers were generally middle-aged with average age of 47 years. It must however be noted that interviewees were not very sure of their actual ages and thus used estimates. Farmers tended to cultivate the irrigable land during the dry season with only about 40% using it in the rainy season. Interviewees had plots outside the scheme (average 4 acres or 1.6 hectares) which they cropped during the rainy season. In terms of number of years at the irrigation site, farmers had farmed at the scheme for an average of 16.7 years each. This probably encouraged farmers' perception that they owned the land, even though it is on lease. All farmers interviewed were members of Farmer Based Organizations (FBOs) formed recently (about 3 years ago) during the implementation of the Ghana Compact. About 90% of them had received training in good agricultural practices and FBO capacity building. Crops grown are mainly rice, maize, pepper, onion and okra. Of the crops grown, farmers indicated that pepper was the most profitable crop. Although farmers mentioned pepper as most profitable crop grown by them, it was noted that onion production was even more profitable at the scheme and cultivation of this crop was carried out by migrant farmers. Farmers at the scheme generally indicated a lack of skill in the cultivation of onions. Recently, there has been a drift towards green leafy vegetables as a result of the incidence of disease for other vegetable crops at the irrigation site. Farmers are confident that irrigation would continue to function in the next five years and proposed to strengthen management of the scheme and better collection of the Irrigation Service Charge (ISC); strong Anchor Farmer relations, and farmer support through proper equipment and marketing outlets.

Responses provided during the discussion at both sessions are summarized below:

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**1. *Have you seen improvements in the availability of water and irrigation services for smallholders since the irrigation scheme was renovated? What kind of improvements have you seen?***

All farmers present were very appreciative of the rehabilitation and commended the intervention. The following were the major improvements seen after the rehabilitation:

- ♦ Drains have been de-silted improving drainage at the scheme.
- ♦ Main drainage line /river has been dredged allowing full flow of drainage water, which solved flooding issues.
- ♦ Cracks in canals have been fixed.
- ♦ Laterals used to overflow its banks but have been solved by raising the banks.
- ♦ With the new culverts on the scheme accessibility to the site has improved.
- ♦ New sheds provides shade against sunshine and rain and mothers can bring their babies and babysitters to the farm.
- ♦ Locks and gates have been made available for all farm inlets which prevents flooding of farms.
- ♦ Platforms for drying pepper and threshing rice have improved the quality of rice since stones in their rice have reduced significantly.

**2. *Has your income increased since the scheme was renovated, in comparison to your income before the renovation?***

Increase in yields was remarkable as yields for rice in particular had doubled. This was attributed to both the proper drainage and water availability on all the fields in addition to training on good agricultural practices like transplanting and row planting provided during the implementation of the compact. Previously farmer's harvested about 10 bags (90Kg) of paddy on an acre of land but after the renovation, harvest has double to 20 bags (90Kg) of paddy and over. (Some farmers present recorded 26 bags per acre per cropping season).

About 40% of the 600 farmers grow vegetables as well as rice and although farmers agreed that vegetables were more profitable, incomes from vegetables were not significant because farmers planted very little vegetables. This was attributed to the incidence of nematode infection at the site. Originally farmers planted okra, tomatoes and pepper. Trials for green leafy vegetables like 'ayoyo' and 'bra' which are not susceptible to nematodes have been carried out and farmers, especially the females present indicated the likelihood of cultivating these crops in the coming season. Migrant farmers estimated to be about 50 per season, produced onions in the dry season. Farmers at the irrigation scheme indicated their lack of knowledge in onion cultivation although some farmers have acquired the knowledge now and have started.

**3. *How much were you making before the scheme was renovated? How much are you making now.***

In terms of incomes, FBO representatives indicated that incomes for rice had doubled. Other vegetables were more difficult to measure as according to them they were sold in bits. Based on crop budgets prepared by Ghana Irrigation Development Authority (GIDA) and farmers' per acre yield from 10 bags (before rehabilitation) to 20bags (after rehabilitation), the net return for rice moved from GHS305.00 to GHS940.00 per acre

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(from GHS753.80 per ha to GHS2, 322.60 per Ha). It is worth noting that some farmers present at the meeting were able to attain the yield of 26 bags. Details of crop budget are attached.

**4. *What are the additional costs to you as a result of rehabilitation of the scheme?***

Additional costs are related to the maintenance of the scheme through the dredging of field drains, maintenance of bonds and laterals. Also, irrigation service charge has moved from GHS 12 / acre/year (GHS30/ha/year) to GHS40/ acre/ year (GHS100/ha/year).

**5. *How much did it cost to cultivate an acre of your crop (name) before, and how much does it cost now?***

Farmers indicated that changes in cost of crop production were related to improved technologies like transplanting plantlets in rows, buying improved seed and increased ISC which amounted to about 30% increase in cost. However it is notable that although the cost increased by 30%, net return also increased by 208%. (Details were calculated based on data collected at the end of the focus group discussions).

**6. *Do problems now exist with the delivery of irrigation water to your farm? What kind of problems do you have? Are you getting the water you need?***

- ♦ Farmers complained about the accessibility to their farms since slabs for crossing the canals were not provided across laterals. It is thus difficult for tractors to cross to individual farms. Tractors have to cross the farms of several farmers to access other farms. Farmers have resorted to blocking laterals with stones to allow for tractor and combine harvesters to cross.
- ♦ Access roads are un-motorable when it rains. Roads were not well compacted exposing clayey slippery soils after rains.
- ♦ Concrete threshing floors (installed by MiDA) are small and few and are unable to go round all the farmers and recommended the provision of tarpaulins.

**7. *What do you like most about the renovated facility?***

Farmers indicated that they were most excited that roads had been provided in the scheme and has improved on the scheme although accessibility to individual farms was still a challenge.

**8. *What do you feel is needed to improve the irrigation services at the scheme?***

- ♦ Gates should have been provided with locks to prevent farmers who have not paid Irrigation Service Charge from accessing the water.
- ♦ Farmers suggested de-silting the dam to help improve the scheme
- ♦ The roads needs to be improved and provision of slabs for crossing intermittently on the lateral canals
- ♦ Laterite crossing between every three laterals roads.
- ♦ Additional threshing platforms need to be constructed or farmers should be supported to acquire tarpaulins.
- ♦ Plots still need to be well levelled. Farmers have resorted to bonds (small dikes) to control water on the plots.

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**9. On a scale of 1-10 (10 highest), how would you rate the irrigation service you are now being provided?**

On a scale of 1 to 10 Bontanga irrigation Scheme farmers ranked the scheme 8.69 (average for all farmers present) indicating that they were very satisfied with the renovations carried out on the scheme.

**10. How much are the water chargers you pay? How often are you required to make payments? (Annual/quarterly/seasonally). When must payment be made? Do you believe that the amount you are charged is fair and reasonable for the services you are being provided? Why?**

Irrigation Service charges are GHS40/ acre/ year (GHS100/ha/year.) although MIDA/GIDA recommended GHS230/ha/year. This decision was arrived at by GIDA and the Farmers' Union who are responsible for determining ISC rate. Farmers feel that the ISC paid currently is ideal although they alluded to the fact that current charges could not support any major works. ISC payments are due in October every year before the onset of the dry season.

Farmers present agreed that the ISC was fair and reasonable but for 2013/2014 season, only 35% of farmers had paid. Sanctions for defaulters appeared not to work. Some sanctions include reporting defaulters to chiefs and repossessing of two time defaulters. The team found out that a letter had been sent to the scheme for ISCs to be distributed as shown below:

**Table 1 Distribution of Irrigation Service Charges**

Institution/Use	Percentage apportioned
GIDA account at the Bank of Ghana	54
Operation and maintenance (stays at the scheme office)	24
Nationwide monitoring	10
Replacement fees	5
Royalties on land	3
Administration-Scheme Management	3
Water Use rights	1
<b>Total</b>	<b>100</b>

**11. Are you up to date on your payments for irrigation water? When was the last time you made a payment?**

Discussions with the accountant revealed that 35% of farmers had paid their ISC for the 2013/2014 as at August 2014. The difficulty in identifying defaulters lies in the fact that block leaders sometimes refused to identify plot owners. The GIDA accountant had however succeeded in identifying almost all plot owners to support collection of fees for

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the coming cropping season (2014/2015). The group discussed the possibility of paying ISC in-kind in future to encourage payment.

***12. Have you made any changes in your farming practices (i.e. growing different crops, or producing more crops per year) as a result of the improved irrigation scheme?***

Farmers indicated that they had made changes mainly in technology like levelling during land preparation, transplanting in rows, increased use of combine harvesters, use of improved rice varieties (Jasmine 85 and Togo marshal) and threshing on platforms/tarpaulins.

Predominantly rice is cultivated however with the successful trials of leafy vegetables; farmers are likely to engage in its cultivation in the coming season.

About 40% of farmer's crop twice a year planting mainly rice and maize with the rest cropping once a year. According to farmers most of them hesitate to plant at the site during rainy season because the land is water logged during this season and tractors are unable to till the land. Farmers complained about the lack of power tillers which would have been more suitable for the period.

***13. If famers have not changed their farming methods since the scheme was renovated (higher value crops; more crops per year), why not? What is keeping them from engaging in more intensive farming?***

Apart from issues with power tillers which prevented farmers from fully utilizing irrigable land during rainy season, management of diseases was also a challenge. Although farmers mentioned pepper as most profitable, it was noted that onions was more profitable at the scheme and cultivation was carried out by migrant farmers. Onion had a net return of GHS 22,729.00 hectare whilst pepper stood at GHS14,676.00 per hectare. (Details are shown in the attached data sheet). The main constraint according to farmers was the lack of technical know-how to cultivate onions.

***14. If you changed your farming methods, what motivated you to make the change?***

Interviewees indicated market forces as major determinants of changing varieties and threshing on platforms and tarpaulins. The also indicated that the training offered during the implementation of the compact influenced their use of nurseries and transplanting in rows.

***15. Which crops would be the most profitable for you? Are you able to grow these crops?***

According to farmers, pepper was the most profitable crop but the issue with the nematode infection prevented farmers from cultivation on large scale at the scheme. A GIDA staff at the gathering indicated that GIDA was considering long planting rotation (four years) to mitigate the situation.

***16. Are you producing three crops per year on your farm plot? If not, why not?***

Cropping three times a year would be difficult as the predominant crop is rice and there is the issue of birds feasting on the crops in between the two cropping seasons. Farmers indicated that they make nothing when birds migrate to feed on the fields. Vegetables were suggested as an option.



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**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

***17. Are there limitations that keep you from utilizing your land for the maximum possible production? What do you need to fully utilize the land you have access to?***

Disease and inappropriate land preparation technology have been the major limitations for utilizing the land fully. Farmers are mitigating the disease by trials of neem seed spray and sterilization of nursery soils, none the less the issue of power tillers is still pending.

***18. What marketing arrangements do you have? Where do you sell your products? Are you satisfied with your marketing arrangement?***

Rice marketing is no more a problem according to farmers. Marketing is usually through local buyers (market women), aggregators from Kumasi/Navorongo and a Nyankpala Mill buyer. The USAID/ADVANCE project in the Northern Region has made arrangements with aggregators to buy rice although farmers expressed dissatisfaction with measuring units and corresponding payments. According to them there was no price differential for quality. Buyers have now decided to pay premium for better rice quality for the coming season. An aggregator (Sadia) proposed to have a contract with farmers to buy rice but has not consolidated discussions yet due to some personal challenges.

***19. Does any group or organization help you obtain farm inputs (seed, fertilizer) land preparation, technical assistance, or markets for your crops?***

Apart from MIDA's technical training provided during the rehabilitation, farmers receive assistance from the following institutions

- ♦ AMSIG Resources - Technical training
- ♦ SADA-Inputs and tractor services
- ♦ ADVANCE- Marketing
- ♦ IDA-Fertilizers and combine harvesters
- ♦ TRIAS-Capacity Building
- ♦ CAMFED- Fertilizer

***20. If you have a contract farming arrangement with an anchor farmer, what services does it provide?***

According to interviewees, the anchor farmer, Solar Harvest, appeared to be struggling with production and was not fully operational. Hence no formal arrangements have been made with any farmer.

***21. Is there an active Land Committee for the scheme? How well does it function? Are there problems with land allocation?***

A Land Allocation Committee exists with District Chief Executive being the chairman. They meet when management is unable to resolve land issues (It is possible that no meeting would be called in a year). Disputes include farmers claiming lands of other farmers on the basis perceived inheritance from their deceased fathers.

Land is government acquired and plots were to be reallocated to farmers every 3 years but since this had not been carried out, farmers feel they own the land "forever" (as some farmers put it).

***22. Is the stakeholder governing board for the scheme effective? How frequently does the board convene its meetings?***

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Board has not been meeting for some time now due to logistics issues. The board has not met this year 2014.

***23. Are you a member of a farmers' association or the FBO? What services does it provide?***

All farmers present were members of FBOs and the services it provides includes the following:

- ♦ Support with loans from banks.
- ♦ Support with land preparation: Individual members either have tractors that are provided to group members (who are served first before non-group members) or the group acquires tractor services on behalf of members.
- ♦ Networking and socialization (during monthly meetings).

***24. Is there a functioning water users' group at either the secondary or tertiary canal? What are their functions?***

There is no water user group but farmers were in favour of lateral group formation as maintenance would improve if this was in place. Their function could include collections. Currently, lateral leaders inform the union chairman when there is a need for maintenance.

There are two Water bailiffs as shown in Figure 1 on the following page who open the main gates and work together with lateral leaders to ensure problems/damages with the canal are reported to the scheme management.

Although block leaders (who control about 4/5 laterals) support with ISC collection, the responsibility lies with the lateral leaders. Farmers opine that block leaders should assist with the control of locks (for recalcitrant farmers who open their gates on their non-irrigation days) and organise communal labour.

A maintenance committee goes round before every season (as was the case last year) to check on defects for maintenance.

***25. If so are you member? If not, why are you not a member? Would this be a useful step?***

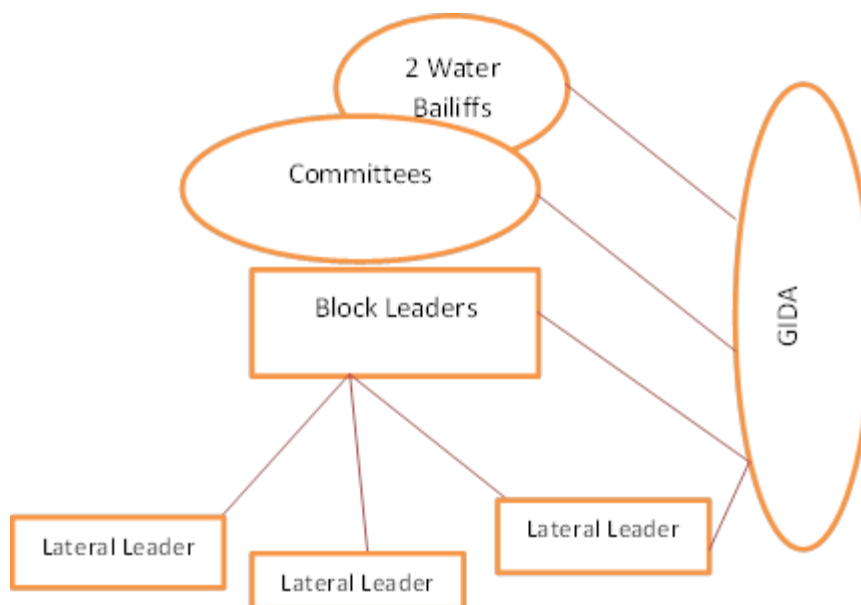
All farmers present were members of an FBO

***26. If there is no functioning water users' group, would it be useful to have one? What should be their functions?***

The water user association is described in the answer to question 24 above and farmers opine that the association should continue and be strengthened to ensure that all farmers have access to water and pay their irrigation service charges (ISCs)

*Figure 1 Perceived Structure for Water Management*

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FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**



**27. *How sustainable are scheme operations? What do you believe the situation will be in the next five years?***

Farmers were optimistic that the scheme would still be functioning in the next five years but suggested that ISC collection should revert to GIDA in order to track defaulters.

Interviewees expect that machinery would be improved within the next 5 years which is expected to quality and yield. GIDA should be also be properly equipped to manage the scheme properly.

Farmers observed that attitudinal change on both management and farmers is needed to make the scheme sustainable.

**28. *If you were not able to farm your plot, what would happen to the land? Would it be taken from you?***

Farmers said they lease the land out to the other farmers if they do not farm their land. A friend or a child inherits the land in the case of death. However the issue is that when land is taken away from anyone (by the land allocation committee) on the site, other community members are unwilling to take up those plots.

**29. *Who will inherit the land after you are gone?***

The current practice is for Land committee to look for someone within the family to inherit the land.

**30. *What are your plans for the future? Do you anticipate changing your farming methods or crops produced?***

Farmers are thinking of going into other alternative vegetables - leafy vegetables. Other vegetables would be considered when the issue of diseases is solved. Nurseries according to them could also be located at the irrigation sites to avoid bringing in diseases from other farm plots.

The continuing pages show the GIDA crop budgets for the Bontanga scheme farmers.

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

<b>CROP BUDGET FOR ONE HECTARE OF RICE ON BONTANGA PROJECT</b>							
<b>Comparison of Results Before Renovation with After Renovation</b>							
<b>No.</b>	<b>Item</b>	<b>Unit</b>	<b>Qty.</b>	<b>Unit Cost (GH¢)</b>	<b>Total Cost (GH¢)</b>	<b>Per Acre Before Rehab.</b>	<b>Per Acre After Rehab.</b>
1	Irrigation Service Charge	Ha	1	50	50	4.86	20.23
2	Seed	Kg	20	20	20	0.00	8.09
3	Land Preparation						
	1 <sup>st</sup> rotovation	Ha	1	125	125	50.59	50.59
	2 <sup>nd</sup> rotovation	Ha	1	125	125	50.59	50.59
4	Nursery Operation						
	Planting	Man-day	2	3	6	2.43	2.43
	Nursery care	Man-day	14	3	42	17.00	17.00
5	Transplanting	Contract		350	350	0.00	141.64
6	Weed Control						
	Herbicide (Pre)	Lt	5	15	75	30.35	30.35
	Herbicide (Post)	Lt	3	15	45	18.21	18.21
	Labour for spraying	man-day	2	7.5	15	6.07	6.07
7	Fertilizer						
	NPK	Bag(50kg)	6	52	312	126.26	126.26
	Urea	Bag(50kg)	2	51	102	41.28	41.28
	Labour	Man-day	6	4	24	9.71	9.71
8	Harvesting						
	Combine harvester	Ha	1	250	250	101.17	101.17
	Drying & bagging						
	Sacks	Man-day	10	3	30	12.14	12.14
			60	1	60	24.28	24.28
9	Total Cost				1,631	494.94	660.06
	Gross revenue	Bag(90kg)	65	80	5,200.00	800.00	1,600.00
	Net return				3,569.00	305.06	939.94
	Production benefits from scheme rehabilitation						
	Farmers were not transplanting rice in rows before the scheme rehabilitation						
	Rice yield before rehabilitation	10 bags					
	Rice yield after rehabilitation	20 bags					
	Additional costs include seed, transplanting, and increased ISC:						165.12
			Percentage increase in total cost				33%
			Increase in net revenue				635
			Percentage increase in net return				208%

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**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

<b>CROP BUDGET FOR MAIZE AT BONTANGA SCHEME</b>					
<b>PRODUCTION COST FOR 2014 WET SEASON CROPPING ONE HECTARE</b>					
<b>No.</b>	<b>Item</b>	<b>Unit</b>	<b>Qty.</b>	<b>Unit Cost (GH¢)</b>	<b>Total Cost (GH¢)</b>
1	Irrigation Service Charge	Ha	1	50	50
2	Land Preparation				
	Plowing	Ha	1	75	75
	Harrowing	Ha	1	37.5	37.5
3	Planting				
	Seed	Ha	1	25	25
	Labour	Man day	10	4	40
4	Fertilizer				
	NPK	Bag(50kg)	5	40	200
	Urea	Bag(50kg)	2	39	78
6	Weed Control				
	1 <sup>st</sup> weeding	Man-day	25	4	100
	2 <sup>nd</sup> weeding	Man-day	25	4	100
7	Harvesting				
	Labour	Man-day	15	4	60
	Processing				
	Drying and Bagging	Man-day	10	4	40
	Bags	Each	25	3	75
8	Total Cost per Hectare				880.5
	Gross Revenue per Hectare	Bag(100kg)	25	50	1,250.00
9	Net Return per Hectare				369.5

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

<b>CROP BUDGET FOR ONION AT BONTANGA PROJECT</b>					
<b>PRODUCTION COST FOR ONE HECTARE 2012/2013 DRY SEASON</b>					
<b>No.</b>	<b>Item</b>	<b>Unit</b>	<b>Qty.</b>	<b>Unit Cost (GH¢)</b>	<b>Total Cost (GH¢)</b>
1	Irrigation Service Charge	Ha	1	100	100
2	Land Preparation				
	Slashing	Man-day	20	5	100
	Ploughing	Ha	1	75	75
	Harrowing	Ha	1	37.5	37.5
	Bed construction	Man-day	20	5	100
3	Nursery				
	Seed	Kg	7	42.86	300
	Slashing	Man-day	2	5	10
	Bed construction	Man-day	5	5	25
	Nursery care	Man-day	5	5	25
4	Transplanting	Man-day	84	3	252
5	Fertilizer				
	NPK 1 <sup>st</sup> application	Bag(50kg)	4	39	156
	NPK 2 <sup>nd</sup> application	Bag(50kg)	4	39	156
	Urea top dressing	Bag(50kg)	2	38	76
6	Pest and Disease Control				
	Insecticide	Lt	2	8	16
	Fungicide	Kg	3	6	18
7	Weed Control				
	· Weeding/stirring	Man-day	80	3	240
	· Herbicide(stomp)	Lt	5	15	75
8	Farm boy	Man-day	120	3	360
9	Harvesting	Man-day	50	3	150
10	Total Cost Per Hectare				2,271.00
	Revenue Per Hectare				
	Gross revenue Per Hectare				25,000.00
	Net return Per Hectare				22,729.00

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

<b>CROP BUDGET FOR PEPPER AT BONTANGA PROJECT</b>					
<b>PRODUCTION COST FOR ONE HECTARE 2012/2013 DRY SEASON</b>					
<b>No.</b>	<b>Item</b>	<b>Unit</b>	<b>Qty.</b>	<b>Unit Cost (GH¢)</b>	<b>Total Cost (GH¢)</b>
1	Irrigation Service Charge	Ha	1	100	100
2	Land Preparation				
	Slashing	Man-day	15	3	45
	Ridging	Man-day	25	3	75
3	Nursery				
	Seed	Kg	0.5	50	25
	Slashing	Man-day	2	3	6
	Bed Construction	Man-day	3	3	9
	Nursery Care	Man-day	14	3	42
4	Transplanting	Man-day	50	3	150
5	Fertilizer				
	1st Application NPK	Bag (50kg)	4	39	156
	2nd Application NPK	Bag (50kg)	4	39	156
	3d Application Urea	Bag (50kg)	2	38	76
	4th Application NPK	Bag (50kg)	2	39	78
	5th Application Urea	Bag (50kg)	1	38	38
	Labour	Man-day	60	3	180
6	Pest & Disease Control				
	Insecticide	Lt	5	8	40
	Fungicide	Kg	2	6	12
	Labour	Man-day	12	3	36
7	Weed Control				
	Six applications	Man-day	180	3	540
8	Harvesting				
	Twelve Cycles	Man-day	300	3	900
9	Total Cost per Hectare				2664.00
	Total Revenue per Hectare	Bag (45kg)	289	60	17,340.00
	Net Return per Hectare				14,676.00

## Focus Group Discussions, Golinga 12/13<sup>th</sup> September 2014.

### First Session

**Names of FBOs present:** Gupkatimale, Tibunya , Non-FBO members of the Farmers' Union  
**Number Present:** 14 male members

### Second Session

**Names of FBOs present:** Collective Unity Group, Tibunya, Non-FBO members of the Farmers' Union  
**Number Present:** 15 members of which 8 were female  
**Contact Person:** Mr. Yamali Saljibu, Chairman of Farmers Cooperative at Golinga; +233 548 995 406  
**Representing NORC** Tom Easterling, Nana Ama Oppong-Duah and Collins Owusu  
**Purpose of meeting:** Focus group discussion to tease out benefits and issues on the irrigation scheme  
**Person drafting notes:** Nana Ama Oppong-Duah

### General

About 156 farmers (out of which 18% are females) are currently cropping the 40 hectare land developed for irrigation at the Golinga irrigation scheme. Each farmer has access to an average of 0.5 acres (0.2 hectares). Since land was not enough to go round, the female farmer group had been allocated a communal producing area of 3.5 acres (1.4 hectares) at the site. Some of them were also farming their husband's plots. Farmers were generally middle aged with an average age of 48 years. It must however be noted that interviewees were not very sure of their actual ages and thus used estimates. Farmers at the scheme cultivated both in the dry season and the rainy season and had farmed at the scheme for an average of 16 years each. All farmers interviewed were members of the Golinga Farmers Union but some were not members of Farmer Based Organizations (FBOs). Interviewees had been trained in good agricultural practices and FBO capacity building during the Compact implementation period. Crops grown are mainly rice, maize, pepper, onion, okra and leafy vegetables. Of the lot, farmers indicated that leafy green vegetables were the most profitable. The shift to leafy green vegetables was due to diseases affecting some vegetables at the irrigation site. Farmers are confident that the irrigation site would continue to function in the next five years however they indicated that water runs short during the last two months of the dry season and expressed concern with the constant overflow of the dam spillway which could be an indication of silting, since the holding capacity of the reservoir is low.

Responses provided during the discussion at both sessions are summarized below:

1. *Have you seen improvements in the availability of water and irrigation services for smallholders since the irrigation scheme was renovated? What kind of improvements have you seen?*

Farmers made the following observations:

- ♦ Renovation has helped to solve flooding problems within the irrigation scheme.



- ♦ The condition of roads within the scheme has improved.
- ♦ There has been improvement in the water supply and control of the water through the provision of gates and locks at the scheme.
- ♦ There has been an improvement in access to the scheme.

**2. *Has your income increased since the scheme was renovated, in comparison to your income before the renovation?***

According to all farmers, their incomes had increase as a result of the irrigation facility because their yields for rice had doubled. They have also introduced leafy green vegetables which they were very happy about because they are able to ‘see money every day’.

**3. *How much were you making before the scheme was renovated? How much are you making now.***

As was the case in Bontanga, farmers yield had doubled from about 10 bags (90kg) to 20 (90kg) yielding net returns of GHS305.00 to GHS940.00 per acre (from GHS753.80 per ha to GHS2,322.60 per ha)<sup>4</sup>. For leafy green vegetables, farmers (predominantly females) iterated that the leafy green vegetables was very useful because the families consumed some at home but they could still make over GHS1000.00 net returns per acre per cropping. Female farmers have been able to acquire a mini truck to convey their vegetables on market days with their profits earned.

**4. *What are the additional costs to you as a result of rehabilitation of the scheme?***

Irrigation service charge (ISC) has moved from GHS 30/acre/year (GHS75/ha/year) to GHS60/acre/ year (GHS150/ha/year). Additional costs are related to the maintenance of the scheme through the dredging of field drains, maintenance of bonds and laterals carried out through communal labour.

**5. *How much did it cost to cultivate an acre of your crop (name) before, and how much does it cost now?***

As was the case in Bontanga, interviewees at Golinga recorded changes in cost of crop production related to improved technologies like transplanting in rows, and using improved seed. Additional costs were also associated with the increase in ISC bringing the total additional costs to about 30% of the original cost of production in rice. However it is notable that although the cost increased by 30%, net return also increased by 208%. (See the Bontanga crop budgets in the previous section).

**6. *Do problems now exist with the delivery of irrigation water to your farm? What kind of problems do you have? Are you getting the water you need?***

Their major concerns were as follows:

- ♦ The spillway is too low and as a result, the reservoir is unable to store adequate water for the season.
- ♦ The reservoir is silted and needs to be cleaned.
- ♦ Land irrigated at the site is inadequate and the female farmers do not have individual farms.
- ♦ There is a shortage of water during the final two months of the dry season. The height of the dams needs to be increased to store more water.

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<sup>4</sup> This was calculated based on GIDA crop budgets for Botanga since both schemes participated in the same markets

- ♦ The bridge constructed across the main drain for foot traffic and motorcycle use is too small and needs to be widened for passenger vehicles as villagers are cut off when the IRISH crossing is flooded.

**7. *What do you like most about the renovated facility?***

Farmers here liked everything about the renovated facility because before the rehabilitation, they had no access to water from the facility because the spill way was completely broken and there was no water in the reservoir.

**8. *What do you feel is needed to improve the irrigation services at the scheme?***

- Farmers were of the opinion that de-silting the dam will solve the problem of the shortage of water during the dry season.
- They also felt that it was necessary to increase the area served by the irrigation scheme especially as the females had no individual plots at the site.

**9. *On a scale of 1-10 (10 highest), how would you rate the irrigation service you are now being provided?***

Farmers at this site rated the rehabilitation an impressive 9 out of 10.

**10. *How much are the water chargers you pay? How often are you required to make payments? (Annual/quarterly/seasonally). When must payment be made? Do you believe that the amount you are charged is fair and reasonable for the services you are being provided? Why?***

ISC charges are GHS 150/ hectares per year and payment is made in January till December. Even though they felt the rate was fair, they acknowledge that the charges (set by them and GIDA) could not support major repairs. Farmers contribute to repair works below GHS500 and expect GIDA to pay repairs above that amount. In addition, farmers carry out maintenance of tertiary canals with the last maintenance being carried out during the dry season of 2013.

**11. *Are you up to date on your payments for irrigation water? When was the last time you made a payment?***

In 2013, 21% farmers paid ISCs and 2012 recorded a similar payment rate of 20%. It was not quite clear how many people had paid their ISCs at the time of the visit as the collection was carried out by the Farmers' Union that had not as yet provided accounts to GIDA.

**12. *Have you made any changes in your farming practices (i.e. growing different crops, or producing more crops per year) as a result of the improved irrigation scheme?***

By regulating the opening of gates, farmers believe that water is better managed at the site. Scheme members also used to plant rice by the broadcasting method but now transplant rice plants in rows as a result of the training they received during the scheme rehabilitation. Farmers have also adopted improved crop varieties (Before rehabilitation, the Afele variety was prevalent, while after rehabilitation the most popular varieties are Jasmine 85 and AGRA rice). Vegetables like Alefu, okra, ayoyo are also now cultivated, where previously it was only okra, pepper and tomatoes.

Some female farmers have also tried cabbage, green pepper and carrot and have found that markets for these are challenging.

**13. *If famers have not changed their farming methods since the scheme was renovated (higher value crops; more crops per year), why not? What is keeping them from engaging in more intensive farming?***

Farmers are constrained by the shortage in water during the dry season and thus they are unable to crop three times a year.

**14. *If you changed your farming methods, what motivated you to make the change?***

Motivations for changes are cited as follows:

- ♦ New varieties have good markets, and the maturity period is short
- ♦ Now using new varieties because of the quality, there is market for it and also the flavour is good.
- ♦ Education provided by MiDA. For example, rice weeding is much easier now because the rice is planted in rows.

**15. *Which crops would be the most profitable for you? Are you able to grow these crops?***

Even though the farmers agreed that vegetables were more profitable, they indicated that the preferred rice because they were able to receive the full amount of income and recoup their investments and profits after the single rice harvest. Since vegetables must normally be harvested over several weeks, the income from vegetable production is spread over the harvest period and is not available all at once.

**16. *Are you producing three crops per year on your farm plot? If not, why not?***

The availability of irrigation water is not sufficient to produce three crops per year.

**17. *Are there limitations that keep you from the utilizing your land for the maximum possible production? What do you require to fully utilize the land you have access to?***

Apart from the shortage of water, there are issues with farming vegetables because of the problems of pests and disease.

Farmers farm in both the rainy season and the dry seasons since the number of plots are not enough to go round. Female farmers have to wait their turn to plant.

**18. *What marketing arrangements do you have? Where do you sell your products? Are you satisfied with your marketing arrangement?***

The vegetables are sold in Tamale (Picon gardens) and the farmers have built a brand in the process. Farmers have arrangements with ‘chop bars’ to deliver every week however there is no market for cabbage, lettuce, and carrot. Rice is procured by local buyers and also the buyer AMSIG Resources (a beneficiary of MCC’s post-harvest investment in agribusiness centers in the Tamale area). Farmers are satisfied with the marketing arrangements for rice.

**19. *Does any group or organization help you obtain farm inputs (seed, fertilizer) land preparation, technical assistance, or markets for your crops?***

Apart from the training over the life of the Compact, farmers have access to the following institutions and services:

- ♦ USAID/ADVANCE project - Technical assistance, marketing, and training
- ♦ Savanna Agriculture Research Institute - Technical Assistance Demonstration of Crops
- ♦ Ministry of Food and Agriculture - Technical Assistance

- ♦ AMSIG resources- Technical Assistance
- ♦ Advance- Marketing, Training

**20. *If you have a contract a contract farming arrangement with an anchor farmer, what services does it provide?***

They have neither contract farming arrangements nor is there an anchor farmer at the site.

**21. *Is there an active Land Committee for the scheme? How well does it function? Are there problems with land allocation?***

There is a land committee that determines the time to start planting and also makes the rules for farmers. In the case of non-compliance (mainly non-use of the land), a warning is served three times after which land is reallocated. The GIDA scheme manager present iterated that ISC defaulters would be served with a notice and afterwards, measures would be taken against defaulters that do not comply.

**22. *Is the stakeholder governing board for the scheme effective? How frequently does the board convene its meetings?***

There is a stakeholder governing board but due to challenges with logistics, there have been no meetings this year.

**23. *Are you a member of a farmers' association or the FBO? What services does it provide?***

All farmers were members of the farmers union and thus benefitted from the union. 84% of farmers present were members of FBOs. At the FBO level, networking and sharing of ideas was also more intense. Self-help activities, loan guarantees and marketing were similarly more distinct at the FBO level.

**24. *Is there a functioning water users' group at either the secondary or tertiary canal? What are their functions?***

There are no water user groups for the lateral canals, but farmers agreed that it would be useful to form one for the purposes of maintenance of the laterals. There are currently, lateral leaders who help with ISC collection and inform the chairman when maintenance is required.

**25. *If so are you member? If not, why are you not a member? Would this be a useful step?***

Some farmers stated that their groups are disintegrated and others had no particular reason.

**26. *If there is no functioning water users' group, would it be useful to have one? What should be their functions?***

As discussed in (24) above, farmers think it would be useful to have a water users group.

**27. *How sustainable are scheme operations? What do you believe the situation will be in the next five years?***

Farming became interesting after the rehabilitation but there are concerns about water shortages. According to them, the height of dam wall was reduced from the original height and silt is blocking the entrance of the main gate leading to less water for cultivation. Due to water shortages farmers are not sure they would be able to grow rice in the next 5 years. Raising the spill way and expanding the dam will sustain the scheme.

***28. If you were not able to farm your plot, what would happen to the land? Would it be taken from you?***

Although GIDA indicated that measures for non-compliance would include taking farmers plots, farmers indicated that currently if they are not able to farm their land, they would lease their plots to other farmers.

***29. Who will inherit the land after you are gone?***

Land committee looks for someone within the family usually a child to inherit the land but a friend could also be an heir.

***30. What are your plans for the future? Do you anticipate changing your farming methods or crops produced?***

Farmers plan to continue to use new/ improved varieties in the future and continue lettuce and carrots if the trials are successful. They also plan to get tractors to manage the scheme in the next five years.

Note: The Crop Budgets for crop production at Golinga are similar to those shown in the previous section of Annex 1 for Bontanga.

**Smallholder Focus Group Discussions**  
**Togorme Irrigation Project, 19<sup>th</sup> September 2014.**

**First Session**

**Names of FBOs present:** Veviedodo, Wordenenyo, Nenyo, Evado, Nusedodo, Aglelegor, Norvisiyingo  
**Number Present:** 18 members, of which 3 were females  
**Contact Person:** Christian Amanyoo, Chairman, +233 509 797 008

**Second Session**

**Names of FBOs present:** Miator Nakpoe, Apenya, Nenyo  
**Number Present:** 16 members, of which 12 were female  
**Contact Persons:** Anthony Tsidi, Chairman, +233 248 857 760; Moses Dorsu, Secretary, +233 548 949 796  
**Representing NORC** Tom Easterling, Nana Ama Oppong-Duah and Collins Owusu  
**Purpose of meeting:** Focus group discussion to tease out benefits and issues on the irrigation scheme  
**Person drafting notes:** Nana Ama Oppong-Duah

**General**

The first focus group discussion was attended by FBO executives from 7 different FBOs at the scheme out of the 15 FBOs operating at the scheme. Participants were 18 members with 3 females whilst the second session had 16 members of one FBO with 12 females present. Available net irrigable land of 386<sup>5</sup> hectares is allocated to 887 small scale and 15 medium scale farmers. Farmers whose lands were located at the irrigation site (from Nakpoe, Azagonokorpke and Fozdoku) were given 1 acre and other farmers received 0.5 acre each. The 15 medium scale farmers altogether are to receive a total of 50 hectares. The average age of the farmers at the site was 45 years.

About 250 farmers from 5 FBOs received funding support from Viva City Farms, and during the current rainy season they cultivated farm plots as Viva City outgrowers that were in the service area of Main Canal One. All the farmers interviewed were previous farm owners at the irrigation site whose farms were taken to develop the irrigation scheme. About 38% of farmers interviewed had no land outside the irrigation scheme. Farmers with land outside the scheme averaged 1.6 acres or 0.6 hectares land holding each. All farmers interviewed were members of Farmer Based Organizations formed about 3 years ago during the implementation of the Ghana Compact. All received MiDA training in good agricultural practices and FBO capacity building. Compensation for production loss was paid to those farmers whose farms within the irrigation scheme were taken for scheme construction. Compensation was paid only for the year 2010, when the land was taken.

Farmers who have been assigned farm plots within the Torgorme scheme were able to use the scheme (for maize) to a limited extent for rainfed farming during the current 2014 rainy season. Farmers were therefore disappointed with the way the process had gone. Interviewees are expectant that the presence of the anchor farmer Vegpro Ghana Limited and the medium scale

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<sup>5</sup> Originally, irrigable land was calculated as 450 hectares

farmers (currently VIVA farms Limited) will provide good farming and marketing opportunities for them.

Their responses to the interview questions are summarized below:

- 1. *Have you seen improvements in the availability of water and irrigation services for smallholders since the irrigation scheme was renovated? What kind of improvements have you seen?***

Farmers have not seen changes since the scheme was still incomplete at the time of the focus group meeting, and the objectives of the scheme had not been fully realized.

- 2. *Has your income increased since the scheme was renovated, in comparison to your income before the renovation?***

Interviewees have not recorded any income increase and were actually worse off during construction as compensation for lost production was paid for only the 2010 cropping season whilst construction has dragged on until 2014. Farmers in Azagonorkopke, Nakpoe and Fodzoku whose land was within the irrigation sites had to move elsewhere to support themselves and their families with the hope of coming back when the water starts flowing. Some went to Kete Krachi for fishing; others to Twifo Praso for galamsey (small scale gold mining), still others went to farm on other lands and the rest resorted to charcoal burning. Farmers received crop specific trainings in the production of butternut squash and chili peppers for both the local and export market by Vegpro Ghana who is currently producing baby corn for the export market. Farmers cultivated butternut squash for the local market after training. Whilst awaiting the completion of the scheme, the Ghana Commercial Agricultural Project (GCAP) is assisting 75 farmers to farm on 64 hectares of Vegpro's irrigated land for the production of baby corn for export. Vegpro currently cultivates 256 hectares of baby corn annually and exports 20 metric tons monthly.

- 3. *How much were you making before the scheme was renovated? How much are you making now.***

Some farmers (about 250) were about to harvest maize produced under rain fed conditions within the scheme. As outgrowers, they were provided support (fertilizer, herbicide and seed maize) from Viva City Limited that must be repaid in-kind after harvest. At the time of our visit, some of the farmers were in the field shelling their maize they had cultivated with support from Viva City. According to a representative of the anchor farmer who was mechanically shelling maize for the farmers at the time of visit, about 4 bags of 100 kg each will be taken from each farmer to pay for the total cost of all inputs supplied to cultivate one acre. After which farmers may sell the rest of their produce to them at an agreed price of Ghc 80.00 per bag of 100kg. Normal production is 15 bags per acre, which provides a net income of  $\text{Ghc } 80.00 \times 11 \text{ bags} = \text{Ghc } 880$  per acre per crop season.

- 4. *What are the additional costs to you as a result of rehabilitation of the scheme?***

As a result of the construction of the irrigation scheme, farmers in Nakpoe now have access to drinking water from a water purification station (provided with funds from the compact) and are required to pay GHS0.05 per 20 liters of water obtained from the station. Additional costs would be required when actual production with irrigation commences.

- 5. *How much did it cost to cultivate an acre of your crop (name) before, and how much does it cost now?***

From discussions with the anchor farmer, the present cost of all the inputs required by a smallholder to cultivate one acre of maize is about GHS 320 per acre. However, in the past farmers did not normally use fertilizer (whose cost is GHS 60\*3 bags =GHS 180/acre) nor did they use improved seed (which costs GHS9.00/acre). Thus, with limited fertilizer and with the farmer's own seed, production cost for an acre of maize was previously around GHS130. With the support of the anchor farmer, current production costs are around GHS 320 per acre. The farmers believe that their increased yield would offset the higher production cost during this cropping season.

**6. *Do problems now exist with the delivery of irrigation water to your farm? What kind of problems do you have? Are you getting the water you need?***

Farmers do not have irrigation water yet but they complained about undulating land coupled with no drainage within the plots which has caused flooding on some farms during the rainy season. About 50% of farmer's fields became submerged due to inadequate drainage during the current rainy season. Land preparation was not done for all the lands, in particular, for those members of the Fodzoku group.

**7. *What do you like most about the renovated facility?***

Farmers indicated that water on fields would be the most exciting news to them as they mostly depended on natural rains which could not be controlled. However, that has yet to happen.

**8. *What do you feel is needed to improve the irrigation services at the scheme?***

- ♦ The road from Torgome to the site should be improved to provide all-weather access to the irrigation scheme. Presently the surface is slippery and the road becomes nearly impassable during rainy weather. Also, Torgorme is not accessible from Nakpoe when it rains. These roads need to be improved.
- ♦ The main drain Nyinfla should be dredged, and the drain should be connected properly to the Alabo stream that flows into the Volta River.
- ♦ Fields within the scheme should be levelled to improve drainage in the plots. Also the water access gates within the tertiary canals are higher than many fields, making it difficult to get water into the fields
- ♦ The upper, lined edges of the main canals should be protected. The canal lining is so low that silt washes into the canal when it rains.
- ♦ Provide technical support to create field ditches and furrows for the movement of water within the farm plots. Farmers currently lack the technical knowhow to do this.
- ♦ Find ways to improve the soil on some of the farms where the top soil was removed in the course of the construction.
- ♦ The earthen secondary and tertiary canals should be lined to prevent silting and filling with earth due to erosion.
- ♦ Mechanical harrowing is needed to lay out furrows within the farm plots.
- ♦ A sprinkler irrigation system would be a good option to draw water from the secondary/tertiary canals onto the plots.

**9. *On a scale of 1-10 (10 highest), how would you rate the irrigation service you are now being***

On a scale of 1 to 10, the average ranking for the scheme was 3.7 and this was evident of the dissatisfaction with the lengthy construction process and the fact that the system was still incomplete.



**10. How much are the water chargers you pay? How often are you required to make payments? (Annual/quarterly/seasonally). When must payment be made? Do you believe that the amount you are charged is fair and reasonable for the services you are being provided? Why?**

They are aware of the required payment of ISC but do not yet know the amount. They will likely have to begin paying the ISC some three years after irrigation starts.

**11. Are you up to date on your payments for irrigation water? When was the last time you made a payment?**

Interviewees emphasized that they will pay for the water when it starts flowing to their fields, providing good income earning activities.

**12. Have you made any changes in your farming practices (i.e. growing different crops, or producing more crops per year) as a result of the improved irrigation scheme?**

There have been no changes in crops cultivated apart from the butternut squash trials with Vegpro. For maize production, farmers used improved seed and fertilizer. (Farming methods according to them have changed after the Compact funded training: maize is planted in rows whilst high on-farm crop sanitation is maintained. Agrochemicals and fertilizers are also properly stored and chemical containers are properly disposed of).

Future crops will depend on the requests from anchor and medium scale farmers assigned to the various FBOs. (Each FBO is assigned to an anchor or medium scale farmer). Upon further probing into profitability, farmers enunciated that agreements would be made with anchor farmers to allocate some of their land to more profitable crops if medium scale farmer's crop was not as profitable as envisaged. These were expected to be sorted out after the scheme has been completed.

**13. If farmers have not changed their farming methods since the scheme was renovated (higher value crops; more crops per year), why not? What is keeping them from engaging in more intensive farming?**

Export crops, especially vegetables would be more profitable than maize. Farmers have been trained in the growing of vegetables like butternut squash. They have also received training from EDIAF through ASI (the business development arm of the international NGO, ACDI-VOCA), and the Vegpro anchor farm. Farmers and anchor/Medium scale farmers are ready but the major constraint to intensive farming is the non-functioning irrigation facility.

**14. If you changed your farming methods, what motivated you to make the change?**

Farmers are motivated by the opportunity for participation in export markets (driven by their corresponding incomes) and meeting the required market standards.

**15. Which crops would be the most profitable for you? Are you able to grow these crops?**

Butternut squash which we just produced after the training by the anchor farmer will be more profitable as it has a long shelf life and easy to handle after harvest.

**16. Are you producing three crops per year on your farm plot? If not, why not?**

The farmers are currently producing only maize. They hope to add more crops when the water starts flowing from the scheme onto our fields.

**17. Are there limitations that keep you from the utilizing your land for the maximum possible production? What do you require to fully utilize the land you have access to?**

Water is the major challenge at the moment. The farmers require regular flow of water from the scheme to enable them to make maximum use of their lands as well as land leveling to ensure that water will flow by gravity to irrigate their fields.

**18. What marketing arrangements do you have? Where do you sell your products? Are you satisfied with your marketing arrangement?**

An agreement has been reached with Viva City Farms and a gentleman's agreement with the anchor farmer, Vegpro. According to farmers interviewed, Viva City Farms provides them with input credit for cultivation of maize, and also provides services for mechanical shelling the maize after harvest. Farmers pay in kind (with sacks of maize) after harvesting. The agreed price for a 100kg bag of the maize produced is GHS 80.00. Farmers are happy with this arrangement.

**19. Does any group or organization help you to obtain farm inputs (seed, fertilizer) land preparation, technical assistance, or markets for your crops?**

- ♦ Viva City Farms provided 5 FBO of about 50 members each with agro inputs (fertilizers, herbicides and seed maize) amounting to about GHC200 for each farmer.
- ♦ The Ghana Agricultural Commercialization Project (GCAP), working through the Vegpro anchor farm and the ASI organization provides training and support to approximately 75 farmers who will serve as contract farmers to Vegpro, using a center-pivot irrigation system funded by GCAP.

**20. If you have a contract a contract farming arrangement with an anchor farmer, what services does it provide?**

The medium scale farmer (Viva City Farms) provides the following services:

- ♦ Provides inputs (fertilizers and weedicides) and seeds
- ♦ Provides land preparation services i.e. ploughing
- ♦ Provides maize mechanized shelling services after harvest

**21. Is there an active Land Committee for the scheme? How well does it function? Are there problems with land allocation?**

There is a land committee at the Board level and the farmers have a representative on the committee. The land committee has allocated blocks of land to the different FBOs, and the FBOs allocate the plots to their individual members. The process of land allocation went smoothly.

**22. Is the stakeholder governing board for the scheme effective? How frequently does the board convene its meetings?**

There is a Stakeholder Governing Board (SGB) with farmer representation that meets monthly.

**23. Are you a member of a farmers' association or the FBO? What services does it provide?**

All present were members of FBOs. With the exception of the current, limited rainfed farming activity, there has been no active farming during scheme construction, and no significant services have been rendered.

**24. Is there a functioning water users' group at either the secondary or tertiary canal? What are their functions?**

There is no active water user's group for now. Farmers hope that water users group would be created and become active when scheme operations begin.

***25. If so are you member? If not, why are you not a member? Would this be a useful step?***

Farmers hope to be active members as soon as one is put in place. Their membership will be crucial to ensure accountability and the provision of quality service.

***26. If there is no functioning water users' group, would it be useful to have one? What should be their functions?***

Although they didn't have water users' associations, interviewees indicated that they would recommend such an association that would be responsible for the following:

- ♦ Make sure all members pay their Irrigation Service Charge (ISC)
- ♦ Make sure water is not mismanaged.
- ♦ Prevent unauthorized use of the water. There is land committee within the farmers to help solve land issues among farmers and also with management.

***27. How sustainable are scheme operations? What do you believe the situation will be within the next five years?***

The scheme is not presently in use so the farmers cannot project what will happen in the next 5 years. However, they believe the following:

- Their lives would improve if things go well with the scheme (i.e. poverty reduction).
- If problems of the scheme are solved, the scheme would be fully sustainable beyond a five-year horizon.

***28. If you were not able to farm your plot, what would happen to the land? Would it be taken from you?***

If a farmer is unable to farm his plot, the plot would be allocated by the land allocation committee to another farmer who could use the land.

***29. What are your plans for the future? Do you anticipate changing your farming methods or the crops you produce?***

What farmers would plant would depend to a large extent on the agreements between farmers and the anchor farm or the medium scale farmers.

**ANNEX 3**  
**CONSULTANT'S WORK PLAN**

## **WORK PLAN**

### **Interim Assessment of MCC Irrigation Investments**

The interim assessment of MCC irrigation investments will build on the earlier work carried out by the NORC consultant in December 2013 in order to provide an expanded description of the implementation history and current status of each irrigation system that was rehabilitated or newly constructed under the first MCC/Ghana Compact that was implemented between February 16, 2007 and February 15, 2012.

The deliverable for this activity will be a consultant's report providing the following information:

- a) An assessment of the current state of the infrastructure and maintenance regime for the Bontanga, Golinga, and Torgorme Irrigation Schemes.
- b) A detailed description of the current institutional situation (i.e. water users' associations, scheme management entities, tariff regimes) and any previous attempts to address institutional issues that may have failed at the three sites.
- c) Recommendations for a set of specific measurable indicators that MCC could use to determine when the three irrigation systems meet suitable operating criteria for proceeding with a formal impact evaluation of irrigation results. Factors to be considered include the adequacy of irrigation operations, the viability of scheme management, and evidence of sustainability.
- d) A methodology for periodic performance monitoring of the of the three irrigation systems that could be routinely reported to MCC, to inform its decision on the timing of the final impact evaluation of irrigation operations.
- e) A determination of what factors limit the use by small-scale farmers (and therefore, the benefits obtained by them) of improved irrigation water availability resulting from MCC's investments in the three irrigation schemes. The report will also provide recommendations on action that could be taken to increase irrigation benefits to smallholders.
- f) A description of how (or whether) the post-compact impact evaluation could proceed if only one or two irrigation schemes meet these criteria established for adequacy of irrigation operations, the viability of scheme management, and evidence of sustainability.

These tasks will require field visits by the NORC international agribusiness consultant along with a Ghana consulting irrigation engineer to the three MiDA irrigation sites at Bontanga, Golinga and Torgorme. During their site visits, the two consultants will observe the flow of irrigation water within the three irrigation schemes and assess the methods and procedures used for managing the distribution of water to the users at the three locations. They will also observe the physical conditions and the state of maintenance and repair of the three irrigation systems, and will assess the current state of infrastructure and the maintenance regime at the irrigation sites. Furthermore, they will obtain an in-depth understanding of the current institutional situation and of the institutional issues that may affect the performance of irrigation operations. Finally, through technical discussions with the scheme management officials as well as a review

of the irrigation records at each site and an analysis of other available data, the two consultants will develop a recommended set of indicators and targets that can be used to monitor irrigation performance at the three sites.

In addition, the international consultant along with a Ghana Focus Group Leader will conduct focus group discussions (FGDs) with two groups of small farmers at each of the three irrigation sites to determine their farming experience within the irrigation schemes, and to what extent they have obtained greater crop production, or have diversified into higher value crops as the result of better irrigation services. Since the new Torgorme scheme is only now reaching completion, FGDs will be conducted with smallholders there who have been assigned irrigated plots and have been trained in crop production, but have not yet engaged in crop production. These discussions will be structured primarily to determine the smallholders' expectations from the opportunity to participate in irrigated agriculture, their main concerns, and their plans for crop production.

The work of the consultants will include interviews with the following key informants:

#### MiDA Staff

- ♦ Mr. Matthew Armah, Chief Operating Officer
- ♦ Ms. Abigail Abandoh-Sam, Director, Monitoring and Evaluation

#### Ghana Irrigation Development Authority

- ♦ Mr. Augustine Opoku-Annin, Bontanga Scheme Manager
- ♦ Mr. C. B. George, Golinga Scheme Manager
- ♦ TBN, Torgorme Scheme Manager

#### Anchor Farms

- ♦ Mr. Jagdish Patel, General Manager, Vegpro Ghana Limited, Torgorme Irrigation Site
- ♦ Mr. Steiner Kolnes, Mr. Steinar Kolnes, Chairman and CEO, Solar Harvest Ltd.
- ♦ Mr. Awal Adam, Operations Manager and Board Member, Solar Harvest Ltd.

#### Torgorme Irrigation Scheme Support

- ♦ Mr. Satch Avudzi, Training Program Manager, ACDI/VOCA
- ♦ Mr. Sammy Abagher, Director, Post Agriculture Associates, Scheme Management Entity (SME). Torgorme Irrigation Scheme

In addition, the consultants will interview the following, additional key informants whose names and contact information remain to be determined:

- ♦ Interview water users at the three sites
- ♦ Interview a senior member of the Stakeholder Governing Board for the different irrigation schemes
- ♦ Interview the responsible officer from the district office of the Ministry of Food and Agriculture (MOFA) that is involved with each irrigation site
- ♦ Interview the responsible officer from the Land Committee at each irrigation site

This work will be carried out in Ghana from approximately September 6 to September 23, 2014.

The output of this work will be approximately a 25-page assessment report that includes an executive summary, a background summary, analysis, and a presentation of findings, conclusions, recommendations, and lessons learned, along with an annex containing information tables and interview guides.

The proposed report outline is the following:

Cover Page

Acronyms

Table of Contents

Executive Summary

Introduction

Background

Analysis

- a. Assessment of the current state of the infrastructure and maintenance at the three schemes
- b. Description of the current institutional situation at the three schemes
- c. Recommended indicators to determine when the three irrigation systems meet suitable operating criteria for proceeding with a formal impact evaluation
- d. Methodology for periodic performance monitoring of the of the three irrigation systems
- e. Limiting factors on the use by small-scale farmers of improved irrigation water availability
- f. Recommendations on how MCC impact evaluation could proceed with limited irrigation operations

Summary of Findings, Conclusions, and Recommendations

Lessons Learned

Annex

- Consultant's Scope of Work
- Consultant's Work Plan
- People Met

The draft report is scheduled to be submitted by the consultant to NORC on October 24, 2014. The final draft report is scheduled to be submitted by NORC to MCC on November 3, 2014.

### **Interview Guide for GIDA Scheme Offices**

1. Please clarify the roles and responsibilities of the different organizations involved in the MCC-supported irrigation schemes:  
1) GIDA    2) MiDA    3) Scheme Management Entity    4) Local Chiefs  
5) MoFA District Represent.    6) Stakeholder Governing Board    7) Land Committee
2. How well do you believe these organizations are filling their responsibilities? Are they actively involved in scheme operations; convene meetings, and take decisions?
3. Have you seen an increased use of irrigation water and a greater number of crops grown by small farmers since the irrigation schemes were renovated?
4. Land use: Has there been any change in land use and cropping patterns by smallholders since the scheme began operating? Please describe.
5. Are the farmers better off now than they were before the schemes were renovated?
6. GIDA is now managing the operations and maintenance of the irrigation scheme. Can you please describe the process of operating and maintaining the scheme? Who is responsible for the different functions?
7. Is scheme maintenance being carried out regularly, on a timely basis? Is it presently up to date?
8. What are the major problems that GIDA has encountered in terms of scheme operations and maintenance?
9. How well do you believe the scheme is being managed (Scale 1 – 10; 10 highest)?
10. Can you please describe how user fees are fixed, and collected? Is the amount of user fees sufficient to pay the full cost of operating the scheme?
11. What are the components of the user fee, in terms of a) water cost, b) operations and maintenance charges, c) asset replacement, d) chief's royalties, etc.? Are the different components of the user fee assigned to the indicated recipient?
12. What is the current amount of fees that smallholders and the anchor farm must pay (GHC/Ha)? Over the course of a year, when are they due?
13. What is the amount (percentage of total) of overdue fees? What is the penalty if farmers do not pay their required fee? How many farmers have actually been penalized?
14. How sustainable are the operations of the irrigation scheme? What will be the situation within five years?
15. How is the flow of water to the scheme farmers managed? Who is responsible? Does the management entity use water balance calculations for comparing daily water requirements against actual water deliveries? What are some of the management problems that presently exist?
16. How is the flow of water to the scheme farmers monitored? Who is responsible? What is the reporting requirement? Are there flow meters that operate at different



scheme locations? Are data being collected on the amount of water flowing through the scheme?

17. Would it be possible for GIDA to provide a routine, written, monthly monitoring report on irrigation scheme performance to MCC's agent, to help MCC determine the appropriate timing for an in-depth survey of small-scale farmers at the irrigation scheme? If so, what format and content of the monthly monitoring report could you provide?

GIDA Information request:

- ♦ Sample monitoring and operating reports for the scheme
- ♦ Annual financial results

### **Interview Guide – Anchor Farms**

1. What is the current status of your farming operations at the irrigation scheme?
2. Have the results of your farming operation met your early expectations?
3. Does your anchor farm have an outgrower program? If so, how many smallholders and how many hectares are involved, for which crops? What services do you provide?
4. How satisfied are you with the performance of the irrigation scheme? What are the main problems you have experienced?
5. How would you assess the overall operations of the irrigation scheme? (Scale of 1 – 10; with 10 highest).
6. What is your opinion of the water management capabilities of the scheme operator? What improvements are needed?
7. In your opinion, is the scheme being operated and maintained appropriately? What changes are required?
8. How sustainable do you see the operations of the scheme? What will the situation likely be, five years into the future?
9. How do you see the financial picture of the scheme? Is sufficient revenue being generated to finance the operations, maintenance, fees, and asset replacement for the scheme?
10. What are the main problems that exist in terms of scheme operations and management? What solutions should be provided, and by which organization?
11. What are the greatest problems and constraints to effective scheme management, operations, and maintenance? What would be needed to overcome these problems?
12. How do you view the present institutional situation for the irrigation scheme?
13. What is the current role of the anchor farm in irrigation scheme management and operations?
14. How much are you being charged for irrigation services? Do you think the charge for water and irrigation services is fair and reasonable?
15. How profitable are your farming operations – have you yet achieved financial breakeven?
16. Does the stakeholder governing board (SGB) function well? How frequently does the board convene its meetings?
17. What are your plans for the future with regard to farm production?
18. What are your plans for the future with regard to outgrower operations?
19. Based on your experience to-date, what would you do differently, if you were starting anew?
20. Would it be possible for the anchor firm to provide a routine, written, monthly monitoring report on irrigation scheme performance to MCC's agent, to help MCC determine the appropriate timing for an in-depth survey of small-scale farmers at the

irrigation scheme? If so, what format and content of the monthly monitoring report could you provide?

Information request – anchor farm

Can you please provide a crop production history for the crops produced by the anchor farm since it began operating?

Can you please provide operating data for your outgrower program – crops, farmers, area, and output?

### **Interview Guide Irrigation Third Parties**

**(MoFA District Representative, Stakeholder Governing Board, Land Committee)**

1. What are the purpose, and the mission of your organizations?
2. What is its role of your organization in the irrigation scheme?
3. What is your opinion of the operations of the irrigation system– it the irrigation scheme functioning as expected?
4. What are the main benefits the irrigation scheme has provided to smallholders who farm within the scheme?
5. What major problems have you seen in scheme operations? What needs to be done to overcome the problems?
6. How effective are the administrative and institutional structures of the scheme? Do they contribute to effective scheme operations?
7. What is your general assessment of the operations of the irrigation scheme (scale 1 – 10; 10 highest)
8. In your view, has the irrigation scheme had an impact on commercial agricultural production by smallholders who operate within the scheme?
9. In addition to irrigation, what other support, if any, would be required for smallholders to engage in commercial agricultural production?
10. How sustainable are scheme operations? What will be the situation in the next five years?
11. Based on your experience, what, if anything, should have been changed in the irrigation design, administrative structure, or operations of the irrigation scheme?

### **Interview Guide Irrigation Smallholders Focus Group Discussions**

1. Have you seen improvements in the availability of water and irrigation services for smallholders since the irrigation scheme was renovated? What kind of improvements have you seen?
2. Has your income increased since the scheme was renovated, in comparison to your income before the renovation?
3. How much were you making before the scheme was renovated? How much are you making now?
4. What are the additional costs to you as a result of rehabilitation of the scheme?
5. How much did it cost to cultivate an acre of your crop (name) before, and how much does it cost now?
6. Do problems now exist with the delivery of irrigation water to your farm? What kind of problems do you have? Are you getting the water you need?
7. What do you like most about the renovated facility?
8. What do you feel is needed to improve the irrigation services at the scheme?
9. On a scale of 1 – 10 (10 highest), how would you rate the irrigation service you are now being provided?
10. How much are the water charges you pay? How often are you required to make payments? (annual/quarterly/seasonally) When must payment be made? Do you believe that the amount you are charged is fair and reasonable for the services you are being provided? Why?
11. Are you up to date on your payments for irrigation water? When was the last time you made a payment?
12. Have you made any changes in your farming practices (i.e. growing different crops, or producing more crops per year) as a result of the improved irrigation scheme?
13. If farmers have not changed their farming methods since the scheme was renovated (higher value crops; more crops per year), why not? What is keeping them from engaging in more intensive farming?
14. If you have changed your farming methods, what motivated you to make the change?
15. Which crops would be the most profitable for you? Are you able to grow these crops?
16. Are you producing three crops per year on your farm plot? If not, why not?
17. Are there limitations that keep you from utilizing your land for the maximum possible production? What do you require to fully utilize the land you have access to?
18. What marketing arrangements do you have? Where do you sell your products? Are you satisfied with your marketing arrangement?

19. Does any group or organization help you obtain farm inputs (seed, fertilizer) land preparation, technical assistance, or markets for your crops?
20. If you have a contract farming arrangement with an anchor farmer, what services does it provide?
21. Is there an active Land Committee for the scheme? How well does it function? Are there problems with land allocation?
22. Is the stakeholder governing board for the scheme effective? How frequently does the board convene its meetings?
23. Are you a member of a farmers' association or other FBO? What services does it provide?
24. Is there a functioning water users' group at either the secondary or tertiary canal? What are their functions?
25. If so, are you a member? If not, why are you not a member? Would this be a useful step?
26. If there is no functioning water users' group, would it be useful to have one? What should be their functions?
27. How sustainable are scheme operations? What do you believe the situation will be in the next five years?
28. If you were not able to farm your plot, what would happen to the land? Would it be taken from you?
29. Who will inherit the land after you are gone?
30. What are your plans for the future? Do you anticipate changing your farming methods or crops produced?

Information requested from each participant:

- ♦ Name, contact information, and FBO affiliation, if any
- ♦ Data sheet with relevant information for irrigated property: size, ownership, type of ownership document, and size of other (non-irrigated) plots farmed
- ♦ Data sheet comparing cropping patterns, crops produced, production, and farm income before and after scheme renovation

## PARTICIPANT INFORMATION

Information requested of each participant:

Name..... \_\_\_\_\_

Telephone ..... \_\_\_\_\_

Community..... \_\_\_\_\_

District..... \_\_\_\_\_

Contact; postal information..... \_\_\_\_\_

Are you affiliated with an FBO? ... \_\_\_\_\_

What is the name of the FBO? ..... \_\_\_\_\_

When was the FBO established? .... \_\_\_\_\_

When membership began? ..... \_\_\_\_\_

How long have you farmed  
at the irrigation site? ..... \_\_\_\_\_

Do you farm there year round? ..... \_\_\_\_\_

If not, when do you farm? ..... \_\_\_\_\_

Did you receive MiDA training? ... \_\_\_\_\_

If so, in which topics? ..... \_\_\_\_\_

\_\_\_\_\_

## FARM PROPERTY INFORMATION

### For irrigated scheme property:

Do you own or lease the land? ..... \_\_\_\_\_

Type of ownership document..... \_\_\_\_\_

How was property acquired?..... \_\_\_\_\_

If purchased, amount paid?..... \_\_\_\_\_

If leased, who is the owner?..... \_\_\_\_\_

For how long is the property leased? \_\_\_\_\_

Leasing cost per year?..... \_\_\_\_\_

### For external, non-irrigated property:

Total area farmed..... \_\_\_\_\_

Do you own or lease the land? ..... \_\_\_\_\_

Type of ownership document..... \_\_\_\_\_

Wet season crops..... \_\_\_\_\_

Dry season crops..... \_\_\_\_\_





## CURRENT IRRIGATED FARMING PRACTICES

Name of participant ..... \_\_\_\_\_

Area farmed..... \_\_\_\_\_

### Dry Season

First Crop:

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Second Crop:

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

### Wet Season

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**FOR BOTANGA AND GOLINGA SCHEME FARMERS**  
**FARMING PRACTICES BEFORE SCHEME RENOVATION**

Name of participant ..... \_\_\_\_\_

Area farmed..... \_\_\_\_\_

**Dry Season**

First Crop:

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Second Crop:

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**Wet Season**

<u>Crops Grown</u>	<u>Amount Produced</u>	<u>Amount Sold</u>	<u>Income (GHS)</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**ANNEX 4**  
**WORK CALENDAR**

Consultants' Work Schedule for Phase 1: Review MCC's Investments in Irrigation, PCC, and SPEG Loans							
Month 2014	Date	Day	Location	Activity	Time	Contact	Tel.
August	30	Sat	Travel	International consultant Travels Home-New York-Accra			
August	31	Sun	Accra	International consultant arrives Accra			
September	1	Mon	Accra	Meet with MIDA staff re. PCC, irrigation scheme status, and SPEG loan status	9:00 AM	Matthew/Abigail	0202010201; 0202010408
September	2	Tue	Accra	Consultant analyzes PCC and Air Ghana data			
September	2	Tue	Accra	Meet with PCC staff; obtain financial and operating data	1:00pm	Micheal Yegoya	024 4 20 27 21
September	3	Wed	Accra	Meet with Air Ghana staff; obtain air cargo export data for refrigerated cargo	9:00am	Rob Killick	0540115790
September	4	Th	Accra	Meets with Blue Skies	9:00am	Mr Ablor	0244333699
September	4	Th	Accra	Meets with EDAIF officials; obtain loan repayment data	3:30pm	Mrs. Sarah Arhin	0501322899; 0244 97 35 21
September	5	Fri	Accra	Meet with ACDI/VOCA for Overview including Southern Horticultural Zone	10:00am	Kwasi Korboe	0244895760
September	6	Sat	Accra	International consultant, engineer and facilitator plan for irrigation visits	12:00pm	Nana Ama; Collins	
September	7	Sun	Travel	Int. consultant and local engineer travel Accra - Tamale			
September	8	Mon	Tamale	Visit Bontanga irrigation scheme; meet with scheme officials; Facilitator travels Accra-Tamale	9:00am	Mr. Stephen Adegle	0245 87 0325; 0202 419 8180
September	9	Tue	Tamale	Visit Bontanga irrigation scheme; visit anchor farm	9:00am	Steiner Kolnes/ Awal Adam	0200 313 133; 0243 062 276
September	10	Wed	Tamale	Conduct Bontanga focus group discussions with scheme farmers, chaired by facilitator	9:00am	Mr. Stephen Adegle	0245 87 0325; 0202 419 8181
September	11	Th	Tamale	Visit Bontanga irrigation scheme; develop irrigation monitoring procedures	9:00am	Mr. Stephen Adegle	0245 87 0325; 0202 419 8182
September	12	Fri	Tamale	Visit Golinga irrigation scheme; meet with scheme officials	9:00am	Ibrahim Luvlyraba	0249 22 68 98
September	13	Sat	Tamale	Conduct Golinga focus group discussions with scheme farmers, chaired by facilitator	9:00am	Ibrahim Luvlyraba	0249 22 68 99
September	14	Sun	Tamale	Facilitator travels Tamale-Accra			
September	15	Mon	Tamale	Visit Golinga irrigation scheme; develop irrigation monitoring procedures	9:00am	Ibrahim Luvlyraba	0249 22 68 99
September	16	Tue	Travel	Consultant and engineer travel Tamale - Accra; plan Torgorme irrigation visit with Facilitator	2:00pm	Nana Ama; Collins	
September	17	Wed	Torgorme	Visit Torgorme irrigation scheme; meet and visit anchor farm	10.00am	Mr. Jagdish Patel	0549 940 606

Consultants' Work Schedule for Phase 1: Review MCC's Investments in Irrigation, PCC, and SPEG Loans							
Month 2014	Date	Day	Location	Activity	Time	Contact	Tel.
September	18	Th	Torgorme	Visit Torgorme irrigation scheme; meet with scheme officials	9.00am	Sammy Akargbor	0208 132 484
September	19	Fri	Torgorme	Visit Torgorme irrigation scheme; develop monitoring procedures; Facilitator prepares focus groups	9.00am	Sammy Akargbor	0208 132 484
September	20	Sat	Torgorme	Conduct Torgorme focus group discussions with scheme farmers, chaired by facilitator	9.00am	Sammy Akargbor	0208 132 484
September	21	Sun	Accra				
September	22	Mon	Torgorme	Visit Torgorme irrigation scheme; develop irrigaton monitoring procedures	9.00am	Sammy Akargbor	0208 132 484
September	23	Tue	Accra	Consultant follow-up meeting with MiDA staff for project information and background briefing	9.00am	Matthew /Abigail	020 2010201; 020 201 0408
September	24	Wed	Accra	Consultant and Facilitator meet with SPEG officials; obtain loan repayment status	9.00am	Mr. Stephen Mintah	0244 23 78 05
September	25	Th	Accra	Consultant and Facilitator meet with SPEG officials; obtain loan repayment status			
September	26	Fri	Accra	Consultant analyze SPEG and EDAIF data			
September	27	Sat	Accra	Analyze SPEG data ; international consultant travels Accra-New York-W/DC			
September	28	Sun	Travel	International consultant arrives W/DC			
September	29	Mon	W/DC	Meeting with NORC senior officials and MCC staff: debriefing and background review of SPEG loans			
October	6	Mon	Away	Consultant writes draft report on SPEG loans			
October	7	Tue	Travel	Consultant writes draft report on SPEG loans			
October	8	Wed	Home	Consultant travels home			
October	9	Th	Home	Consultant submits draft report on SPEG loans to NORC			
October	10	Fri	Home	Consultant writes draft report on Perishable Cargo Center			
October	13	Mon	Home	Consultant writes draft report on Perishable Cargo Center			
October	14	Tue	Home	Consultant writes draft report on Perishable Cargo Center			
October	15	Wed	Home	Consultant submits draft report on Perishable Cargo Center to NORC			
October	17	Fri	Home	NORC submits final reports on SPEG loans and Perishable Cargo Center to MCC			
October	21	Tue	Home	Consultant writes draft report: Interim Assessment of Irrigation Systems			

Consultants' Work Schedule for Phase 1: Review MCC's Investments in Irrigation, PCC, and SPEG Loans							
Month 2014	Date	Day	Location	Activity	Time	Contact	Tel.
October	22	Wed	Home	Consultant writes draft report: Interim Assessment of Irrigation Systems			
October	23	Th	Home	Consultant writes draft report: Interim Assessment of Irrigation Systems			
October	24	Fri	Home	Consultant submits draft report: Interim Assessment of Irrigation Systems to NORC			
November	3	Mon	Home	NORC submits report: Interim Assessment of Irrigation Systems to MCC			

**ANNEX 5**  
**PEOPLE MET**

People Interviewed by the Consultant		
People met, and titles	Address	Telephone, Fax, E-mail contact
<b>Millennium Development Authority (MiDA)</b>		
Ms. Abigail Abandoh-Sam Director, Monitoring and Evaluation	4th Floor, Heritage Tower, PMB MB 56, Stadium Post Office, 6th Avenue, Ridge, Ministries, Accra, Ghana	<a href="mailto:AAbandoh-Sam@mida.gov.gh">AAbandoh-Sam@mida.gov.gh</a> Mobile +233 (0) 202-010408 Tel +233 (0) 2160 66624 Ext. 108
Mr. Matthew Armah Previous Chief Operating Officer	4th Floor, Heritage Tower, PMB MB 56, Stadium Post Office, 6th Avenue, Ridge, Ministries, Accra, Ghana	<a href="mailto:Marmah@mida.gov.gh">Marmah@mida.gov.gh</a> ; <a href="http://www.mida.gov.gh">www.mida.gov.gh</a> Mobile +233 (0) 20 201 0401 Tel +233 (0) 21 666534 ; +233-(0) 21 666 619
<b>Millennium Challenge Corporation (MCC)</b>		
Mr. Timothy J Breitbarth (DPE/EE-EA), Senior Program Officer, Department of Policy and Evaluation Economic Analysis	875 Fifteenth Street, NW, Washington, DC 20005-2221	<a href="mailto:breitbarthtj@mcc.gov">breitbarthtj@mcc.gov</a> Mobile + (1) 202 250 0765 Tel + (1) 202 521 3600 ; (1) 202 521 2648
Mr. Jack Molyneaux	875 Fifteenth Street, NW, Washington, DC 20005-2221)	<a href="mailto:Molyneauxjw@mcc.gov">Molyneauxjw@mcc.gov</a> Tel + (1) 202 521 3600 ; (1) 202 521 2648
Deidra Fair James Ghana Country Team Lead Department of Compact Operations Africa	875 Fifteenth Street, NW, Washington, DC 20005-2221	<a href="mailto:Fairjamesd@mcc.gov">Fairjamesd@mcc.gov</a> ; <a href="http://www.mcc.gov">www.mcc.gov</a> Tel + (1) 202 521 3905
<b>Ghana Irrigation Development Authority (GIDA)</b>		
Dr. Ben Vas Nyamadi, Chief Executive	PO Box MB 154, Ministries, Accra, Ghana	(O) + (233) 302 662 050; (M) + (233) 247 265 900; 208 200 722; <a href="mailto:benvay@yahoo.com">benvay@yahoo.com</a> ; <a href="mailto:benvay@ghanairrigation.com">benvay@ghanairrigation.com</a> ; <a href="http://www.gida.gov.gh">www.gida.gov.gh</a>
Ing. Wilson K. Darkwah, Deputy Chief Executive	PO Box MB 154, Ministries, Accra, Ghana	O) + (233) 302 682 2920; (M) + (233) 208 112 564; 268 112 564; <a href="mailto:wilskdk@gmail.com">wilskdk@gmail.com</a> ; <a href="mailto:wildarza@yahoo.co.uk">wildarza@yahoo.co.uk</a>
Vitus Ayingayure, Regional Director, Tamale	PO Box 425, Tamale, Ghana	(M) + (233) 244 802 956
Stephen Adegle, Bontanga Scheme Irrigation Manager; Agronomist	PO Box 425, Tamale, Ghana	(M) + (233) 245 870 325; (M) + (233) 204 198 180 <a href="mailto:skpohor@yahoo.com">skpohor@yahoo.com</a>
Alfred Addo-Siaw, Bontanga Irrigation Scheme Accountant	PO Box 425, Tamale, Ghana	(M) + (233) 242 288 7021
Rabiu Ibrahim, Golinga Irrigation Scheme Manager	PO Box 425, Tamale, Ghana	(M) + (233) 249 226 898; <a href="mailto:luvlraba@gmail.com">luvlraba@gmail.com</a>
Mustapha Iddrisu, retired Water Bailiff, Bontanga Irrigation Scheme	Union of Bontanga Farmer-Based Organizations (FBOs), Golinga Irrigation Scheme	M) + (233) 24 924 2525



People Interviewed by the Consultant		
People met, and titles	Address	Telephone, Fax, E-mail contact
Issah Abukari, Water Bailiff, Bontanga Irrigation Scheme	Union of Bontanga Farmer-Based Organizations (FBOs), Golinga Irrigation Scheme	(M) + (233) 24 672 8396
Mustapha Iddrisu, retired Water Bailiff, Bontanga Irrigation Scheme	Union of Bontanga Farmer-Based Organizations (FBOs), Golinga Irrigation Scheme	M) + (233) 24 924 2525
Abukari Tidow, Water Bailiff, Golinga Irrigation Scheme	Golinga Farmers' Cooperative (GFC) Golinga Irrigation Scheme	(M) + (233) 24 077 0490
<b>Torgorme Irrigation Scheme</b>		
Sammy Akagbor, Manager, Scheme Management Entity	Post Agric Associates, Scheme Management Entity, Torgorme, Ghana	(M) + (233) 208 132 484; postagric@yahoo.com
Mr. Lawrence Kuwarnu, Irrigation Engineer	Post Agric Associates, Scheme Management Entity, Torgorme, Ghana	(M) + (233) 262 365 725
Christopher Sitsole Amelio, Officer	Post Agric Associates, Scheme Management Entity, Torgorme, Ghana	(M) + (233) 242 589 195; sitsoam@yahoo.co.uk
Emmanuel W. Esso, Chairman	Torgorme Area Cooperative Farmers Union (TAC), Torgorme, Ghana	(M) + (233) 240 407 0465; + (233) 244 578 350
<b>Vegpro Ghana Limited</b>		
Jagdish Patel, General Manager	After Kpong Powerhouse, Torgorme-Fodzoku-Juapong Road, PO Box PMB MD 201, Madina, Accra, Ghana	(O) + (233) 269 547 415; (M) + (233) 549 940 606; jagdish@vegpro-group.com; www.vegpro-group.com
<b>ACDI-VOCA</b>		
Kwesi Korboe, Country Representative	ACDI-VOCA/ASI, Block B7, Business Plaza, A&C Mall, East Legon, Accra, Ghana	(O): +233 (0) 302 520 231; (M): +233 (0) 244 895 760; kkorboe@acdivocaghana.org
<b>Ghana Commercial Agricultural Project (GCAP)</b>		
Alabi Bortey, Project Coordinator	ACDI-VOCA/ASI, Block B7, Business Plaza, A&C Mall, East Legon, Accra, Ghana	(O) +(233) 200 198 921; (M) +(233) 501 341 701; abortey@gcap.org.gh; www.gcap.org.gh
Bloomfield C. Attipoe, Senior Rural Infrastructure Engineer	Ministry of Agriculture and Food Annex, PO Box M37, Ministries, Accra, Ghana	(O) +(233) 302 686 944; (M) +(233) 244 775 842; battipoe@gcap.org.gh
<b>Solar Harvest Limited</b>		
Mr. Awal Adam Operations Manager and Board Member	Bontanga Irrigation Site, Tolon-Kumbungu District, PO Box TL 1908, Tamale, Ghana	(M) +233 243 062 276 Adam@solarharvest.eu; www.solarharvest.eu
<b>Kumbungu District Assembly</b>		
Mohammed Al-hassan Adama, District Coordinating Director	PO Box 40, Kumbungu, Ghana	(M) + (233) 207 619 767; + (233) 265 888 amohass@yahoo.com
<b>Other</b>		
M. Emmanuel Darkey, agribusiness entrepreneur; President AAFEX Ghana	E. Darkey and Associates, PO Box 7155, Accra, Ghana	(M) + (233) 507 040 666 ; + 233 24 262 71 97 67 ; <a href="mailto:ghana@aafex.com">ghana@aafex.com</a> ; edarkey001@yahoo.com

People Interviewed by the Consultant		
People met, and titles	Address	Telephone, Fax, E-mail contact
Gary Merkley, Project Engineer	Millennium Challenge Corporation, Chisinau, Moldova	Tel.: +373 692 118 28; gary.merkley@gmail.com; Skype: Iliads
Herve Plusquellec, Irrigation Specialist	World Bank (Retired), Washington, DC, USA	Tel.: +1 202 966 5956; plusquel@earthlink.net
<b>SNC-Lavalin UK Limited</b>		
Mr. Oliver Taylor, Project Manager - Senior Engineer, Environment & Water	Obsidian Offices, Chantry Court, Chester, Cheshire, United Kingdom CH1 4QN	(Tel.: +44 (0)1244 394 238; Cell.: +44 (0)782 684 5642 olivercctaylor@live.co.uk; oliver.taylor@snclavalin.com Skype oliver-taylor-tl-snclavalin
<b>Ministry of Food and Agriculture (MOFA)</b>		
Ms. Hawa Musah, District Director	Ministry of Food and Agriculture, Tolon District, Tolon, Ghana	(M) + (233) 244 420 986; hawamusah83@ahoo.com
Ms. Amidatu Adam, District Extensionist	Ministry of Food and Agriculture, Tolon District, Tolon, Ghana	(M) + (233) 242 053 625; Amidatu_a@yahoo.com
Iddrisu Musah, District Director	Ministry of Food and Agriculture (MOFA), Kimbungu District, Kimbungu, Ghana	(M) + (233) 243 669 042; + (233) 208 568 802

**ANNEX 6**  
**MEETING NOTES**

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**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

Date of Meeting: September 1, 2014

People met, and titles: Matthew Armah, Previous Chief Operating Officer,  
Abigail Abandoh-Sam, Director, Monitoring and Evaluation

Organization: Millennium Development Authority (MiDA)

Address: 4th Floor, Heritage Tower, 6th Avenue, Ridge, Ministries, Accra,  
Ghana

Telephone, fax, e-mail: Mr. Armah: (M) + (233) 20 201 0201 matthewarmah@gmail.com;  
Ms. Abandoh-Sam: + (M) (233) 20 201 0408;  
abigailasam@gmail.com

Representing NORC Tom Easterling

Purpose of meeting: Introductory meeting with MiDA for an overview of the projects to  
be evaluated: Bontanga, Golinga, and Torgorme Irrigation  
Schemes; the Perishable Cargo Center at KIA, and the loan  
program administered by the Sea Freight Pineapple Exporters of  
Ghana (SPEG)

Person drafting notes: Tom Easterling

## **1. SPEG Loan Program**

In 2008, MiDA provided a conditional grant program in the amount of US \$5.3 million that was administered by SPEG for lending to its members to construct cold rooms, install automated packing lines, and provide stand-by generators for their pack houses. In September 2008, MiDA approved all of the first loan tranche in the amount of US \$2.17 million for seven SPEG exporters who made up the first phase of the loan program.

The financial analysis for the equipment loans that were provided to some of the SPEG members also included a budget for production loans for SPEG members that were also being considered at that time. The consultant asked Mr. Armah to please provide the details of the production loan program for SPEG members.

He responded that production loans never materialized for the pineapple exporters. Had they materialized, they would not have been funded under the Compact, although the initiative would have been supported by the Compact. At that time, MiDA and SPEG were negotiating with United Brands Company (Chiquita bananas) to initiate a fruit purchase arrangement in Ghana for pineapples, and the loans were contemplated as a means to ensure that the pineapples produced by SPEG members met international quality standards. One idea that was considered was to deposit seed capital in the amount of US \$2 million with Stanbic Bank that would be leveraged to provide producer loans amounting to US \$20 million. However, Chiquita was unwilling to guarantee a minimum purchase price for SPEG exporters and the deal eventually fell through. Without the loans, the producers have not been able to recover the export levels they enjoyed before the industry shock resulting from the required conversion to the MD2 pineapple variety.

During the period when the discussions with Chiquita were taking place, the equipment loan program was developed. An analysis was conducted that showed the loans could be recovered through a per-pallet charge to SPEG exporters, which was the method being used to recover the cost of SPEG export services. The exporters requested a loan recovery period of 4-5 years.

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However, MiDA required a three-year recovery period, since it wanted to recover the entire loan amount before the Compact ended. The required milestone was to recover 25% of the amount of the US \$2.2 million loan in order for the grant to become a “total” grant instead of a conditional grant. Since it was not possible to achieve the hurdle amount of 25%, the loans fell into default.

The underlying problem was that the exporters were unable to achieve the export volumes that they needed to repay the loans. After the loans went into default, MiDA began pressuring SPEG and the exporters, but they were simply unable to pay. The companies were in distress and were not able to reach their anticipated level of output.

The latest numbers that MiDA has available for the loan program are shown on the December 22, 2011 document entitled “Post-Harvest Activity: Closure of SPEG Grant Agreement”. The consultant should obtain from SPEG the list of payments that were made by each borrower.

The consultant should request updated information from EDAIF on the value of the outstanding loans that were turned over to that organization as a grant that was provided on December 31, 2011. There appears to be a discrepancy between the outstanding loan amounts that the exporters owed to SPEG, and the amount of the grant to EDAIF.

## **2. Perishable Cargo Center**

MCC had provided the consultant a copy of the document “Viability Statement Kotoka International Airport Perishable Cargo Centre” prepared by Adviesburo Verhoef dated January 2010. This was an economic feasibility study for the PCC. In addition, Mr. Armah had earlier provided the consultant, through MCC, a spreadsheet analysis conducted by ACDI/VOCA that gave less optimistic projections of the financial results for the Perishable Cargo Center (PCC). The consultant requested Mr. Armah’s confirmation as to which study should be used as the basis for comparison with the actual PCC results. Mr. Armah explained that the Verhoef analysis was the definitive study for the PCC. However, the ACDI/VOCA document provided a good analysis of the throughput for the PCC, and it helped the MiDA team to decide that a smaller size for the completed facility would be appropriate.

The consultant noted that the underlying assumption of the PCC’s operation was that the facility would be authorized to handle 100% of the perishable cargo that passes through the airport. Mr. Armah explained that this assumption was based on a statement by the Ghana Airports Company, Limited (GACL) that it planned to cancel the contract held by the competing air cargo handler, Aviance International, once the PCC was on stream. However, the anticipated consolidation never occurred and the Aviance contract was extended, and presently continues to be a major competitor of the PCC. Aviance is the exclusive handler of cargo shipped by Blue Skies, Ltd., the largest shipper of perishable airport cargo in Ghana, whose exports amount to approximately 25% of the entire amount of perishable exports shipped from KIA. As a positive development for the PCC, GACL authorized the facility to handle complementary, non-perishable cargo as well as perishable cargo. In effect, since it is the airline that contracts with a freight handler such as Aviance or PCC (not the exporter), there is a built-in inertia that makes it difficult for one freight handler to take customers from a competing freight handler.

Mr. Armah emphasized that after the management contract for the PCC was awarded to Air Ghana, the company made several improvements to the Verhof facility design, at its own cost.

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The improvements included improved security, a product scanner, increased office space, and improvements in the paving for the parking lot and the warehouse floor.

MiDA does not receive operating results from the PCC. The consultant must obtain these from the Ghana Airports Company. Since GAC charges royalties for the movement of cargo, the company maintains accurate records of cargo handling volume.

## **2. Irrigation Schemes**

The technical hand over of the Torgorme irrigation scheme by the scheme management entity (SME), Post Agric Associates, has taken place, but the operational handover is still pending. The construction contractor remains an obstacle to construction completion, and also, continues to suffer cash flow problems. SNV Lavalin continues to do the contract supervision (part of the cost of the supervision has been offset by the penalties assessed the contractor). Everyone involved is tired of the continuing delays. Hopefully, the scheme will be fully completed by the end of the year (Mr. Armah would not venture an estimate for the actual completion date). The contractor is now in the “defects liability liquidated damages” phase. The contract supervisor has been paid the next-to-last payment due for supervisory services.

The SME is permitting Torgorme scheme smallholders to farm their plots without access to irrigation water during the current rainy season. ACDI-VOCA continues to provide training to smallholders on the production of crops required by Vegpro, the anchor farm at the scheme. Mr. Armah provided the consultant with the latest SME progress report for the scheme, dated August 28, 2014.

Mr. Armah mentioned that the Ghana Commercial Agriculture Project (GCAP), which is jointly funded by The World Bank and USAID, will soon begin work to expand the irrigated area at Torgorme to a total area of 2,000 hectares (not including the area planned for the Vegpro anchor farm). The project is now looking for contractors and consultants.

In addition to future outgrowers at the Torgorme smallholder irrigation area, Vegpro is also developing outgrowers located within its own irrigated area. It will provide center-pivot sprinkler irrigation for these smallholders with which it is associated.

The SME for the Bontanga and Golinga scheme was never selected. The anchor farm, Solar Harvest, was invited to submit a bid for this service, but its bid was non-responsive. Afterwards, Mr. Armah invited the company to submit a bid for a scaled-down program for scheme maintenance, but the estimated cost of the service was felt to be beyond the reach of the smallholders (Mr. Armah considers the limit on irrigation charges to be 20% of the smallholders' incomes).

The institutional structure for Torgorme is operating as planned. However, Mr. Armah is not sure of the institutional status of the Bontanga and Golinga schemes. He feels strongly that Solar Harvest should assume a leadership role at these two schemes, particularly with regard to SME services.

In terms of smallholder credit at the three irrigation schemes, EDAIF has verbally expressed its interest in providing credit. This would likely have to be provided through the anchor farms, for the added repayment security. It is not likely that EDAIF would provide smallholder credit through the scheme SMEs.

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

Date of Meeting: September 26, 2014

People met, and titles: Matthew Armah, Previous Chief Operating Officer

Organization: Millennium Development Authority (MiDA)

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Representing NORC Tom Easterling

Purpose of meeting: Follow-up meeting with the previous Chief Operating Officer at MiDA to clarify pending issues and new questions that had arisen since the consultant's previous interview with Mr. Armah at the MiDA office on September 1, 2014

Person drafting notes: Tom Easterling

This meeting took place at the Royal Riechester Hotel in Accra, upon the return from a trip by Mr. Armah to the Torgorme irrigation scheme. He provided the following comments on the pending items:

**SPEG loan program:**

With regard to the legal document that would be required to transfer the SPEG loans to the Export Development and Agriculture Investment Fund (EDAIF), he said that once again a cabinet reshuffle is taking place within government, and a new Minister of Trade and Industry (MOTI) is now the process of being appointed, but has not yet taken office. The new Minister would have to initiate the transfer process of the SPEG loan receivables from MiDA to EDAIF, since the process was never completed.

Mr. Armah explained that EDAIF is a semi-autonomous agency within MOTI, with an extremely powerful Board of Directors (BOD). EDAIF is funded by a 5% import tax that is used for export development. He said that the Board is extremely cautious in approving investments, almost to the point of paranoia, and it has been extremely reluctant to fund new projects. Until now, the BOD has been undecided on its lending policy. The new Minister will have to change this policy when he assumes authority.

At MiDA, there are very few people still available to provide the necessary leadership to resolve pending issues such as the transfer of the loan program receivables to EDAIF. The new Minister at MOTI would have to assume responsibility for these pending issues. However, the implication of taking up this issue at this stage could bring into question the fiduciary responsibility of those involved in the transfer of these assets when the Compact was underway. Technically, this asset remains on MiDA's books.

Furthermore, it is highly unlikely that the pineapple exporters would make any further payments on these SPEG loans. The fundamental problem is that pineapple export volumes are down. The exporters need more production to be able to repay their loans. On the other hand, they should repay what they borrowed.

**Kpong Irrigation Scheme**



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Mr. Armah was somewhat defensive of MiDA's philosophy for the Kpong irrigation scheme. He said that the policy was to "help people to help themselves"; that is, to bring water close to the farms so that the small-scale farmers could have access to the water and do whatever was needed. MiDA did "public" funding, which was getting the water to the farms, and it is up to the smallholders to use the water to irrigate their crops as a private initiative. The on-farm irrigation arrangements are entirely up to the smallholders.

The contractor did land clearing for the smallholders. It was never intended to "spoon feed" the small-scale farmers. They have to make investments. They will be provided access to water sources, and then it is up to the smallholders. "Where there is a will, there is a way".

He applauds the approach that is being taken by the GCAP project to promote and encourage center pivot irrigation in the expansion area. He said that for vegetable production, flood irrigation "is not the way to go".

The GCAP project is moving into the Kpong area on the heels of MiDA's investment, after the difficult work has been done. They will come out "smelling like a rose" in view of all the work that has been already done.

The contractor has a weak financial base, and has had considerable financial challenges. The contractor previously did earth moving in the gold sector, but his operation was too small to continue once the availability of gold declined. He is motivated, and will complete the project. The amount of work that has been completed (or not) is now a legal issue. The only legal basis for any action against the contractor is to determine the extent to which the contractor has discharged his contractual obligation and to determine the remedies for any deficiencies. The contractor has not been paid the latest installment payment due him; payment of US \$500K is still pending. Once he receives his payment, the contractor will have the liquidity to pay his workers and continue with the project until he satisfies all the pending defects. In Mr. Armah's opinion, "the situation is not too bad".

EDAIF is under MOIT, but the fund's operations are relatively autonomous. Both the Minister and the EDAIF BOD have to approve disbursements for the Kpong irrigation contractor's work.

We discussed the estimated cost by the GIDA regional manager of US \$4,000 per acre for smallholder drip irrigation systems within the Kpong irrigation scheme (\$10,000 per hectare). He considers that cost estimate to be exorbitant, and a "Rolls Royce solution" to smallholder irrigation.

In terms of the best way to proceed to break the bureaucratic impasse between MiDA, GIDA, EDAIF and MOTI where nothing is moving and none of the organizations are showing any leadership to finalize the Kpong irrigation scheme, he suggested that the funding for the contractor would break the log jam. Once the scheme has been completed, then everything else will fall into place. Also, GCAP will fund the Vegpro outgrower scheme, under an 80-20 matching grant project that will provide US \$500k to stimulate outgrower production. The supplier of the Vegpro irrigation scheme should be approached to finance the sale of center pivot irrigation systems to the anchor farms and their outgrowers.

Mr. Armah agreed that a "champion" is needed to bring the Kpong irrigation system to a successful close. He suggested that a consortium composed of ASI (the local business development office of ACDI-VOCA) along with the consulting company that is now being

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operated by Nana Ama Aning Oppong-Duo could team up and approach EDAIF for a grant and loan program to finalize the remaining work at the Kpong scheme.

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Date of Meeting: September 5, 2014

People met, and titles: Mr. Kwesi Korboe, Country Representative

Organization: ASI/ ACDI-VOCA

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Representing NORC Tom Easterling

Purpose of meeting: Discussion with ACDI-VOCA's representative to understand this organization's role in the MCC Ghana Compact investments related to the irrigation schemes at Bontanga, Golinga, and Torgorme; the Perishable Cargo Center at KIA, and the SPEG equipment loan program

Person drafting notes: Tom Easterling

Based on the discussion with Mr. Korboe, ACDI-VOCA provided technical assistance to MiDA during the duration of the equipment loan program for SPEG exporters. ACDI-VOCA's involvement in the MCC-supported irrigation schemes was limited to the Torgorme irrigation scheme where it has provided post-compact training to smallholders who are potential suppliers of fresh vegetables under a possible contract farming arrangement with Vegpro, the anchor farm at Torgorme. ASI, an affiliate of ACDI-VOCA is currently providing technical assistance under a World Bank and USAID-funded Ghana Agriculture Commercialization Project (GCAP) for the installation of a center-pivot irrigation system at Vegpro's farm that will irrigate 60 hectares of irrigation plots to be farmed by 75 smallholders. For the Perishable Cargo Center (PCC) at KIA, ACDI-VOCA carried out field research and conducted a financial analysis of the PCC operations that was used as input for MiDA's final KIA Viability Statement that was prepared by the Verhoef Company from Holland.

#### PCC

ACDI-VOCA reviewed the initial study prepared by Verhoef on request from MiDA and analyzed the actual movement of perishable air cargo through KIA for approximately one week in early 2010. The information that was derived from the field analysis was used to appropriately scale the size of the PCC from an initial plan of around 3,000 square meters to a final recommended floor area of around 350 square meters. The initial Verhoef study was inadequate in that it did not consider the actual amount of cargo that moved through KIA during a given period of time and also conduct analysis of the horticulture sector in Ghana. The final design of the PCC facility conformed to annual perishable cargo exports of 20,000 tons per year, with at least 30 tons holding capacity at any given time.

A key assumption for the design of the facility was that the PCC would have the exclusive right to handle all perishable cargo exports from KIA. This was the information provided by the Ghana Airports Company (GAC) when the design and planning for the PCC was being carried out. Consequently, the financial and economic analyses were based on an annual cargo throughput of 20,000 tons of perishable cargo, with a 2% annual growth rate. Unfortunately, when the study took place, GACL informed neither ACDI-VOCA nor MiDA that it had a

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contract with two other carriers, Menzies and Aviance, for perishable cargo handling. Also, ACDI/VOCA developed the financial template to decide user fees for GACL to use for negotiating with potential concessionaires.

**Torgorme Irrigation Scheme**

ACDI-VOCA identified the area for the Torgorme irrigation scheme and led the original conceptual discussions under its contract with MiDA. ACDI-VOCA was primarily involved in the “software” side of the irrigation scheme involving cooperative development and farmer training, whereas SNC Lavalin was responsible for scheme construction. ACDI-VOCA also developed the model for scheme management, helped the formation of the farmer cooperative group and developed operational manuals for scheme management and guidance. After the Compact ended, ACDI-VOCA through ASI its affiliate trained the scheme farmers on crop production for vegetable crops required by the anchor farm, Vegpro. The training program (e-TIP) was funded by EDAIF through the Ministry of Trade & Industries.

ASI is presently working under contract with the GCAP to organize and train farmers that will produce vegetable crops under Vegpro’s center-pivot irrigation system, as contract farmers. The company now has in operation four center-pivot systems, and the new system that is being provided by GCAP will be the fifth system. This smallholder initiative will be a one-year pilot program, that can be expanded during the three following years (until the end of the GCAP) if the initial results are favorable.

Mr. Korboe provided the consultant the following contact information for individuals working at the Torgorme irrigation scheme:

Satchmo (ASI e-TIP Program Manager) 0244 089677

Mr. Roger Tse (ASI SCPIMP) 020 408 1164

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Date of Meeting: September 29, 2014

People met, and titles: Timothy J Breitbarth (DPE/EE-EA), Senior Program Officer,  
Department of Policy and Evaluation Economic Analysis  
John (Jack) Molyneaux, Director, Impact Evaluations

Organization: Millennium Challenge Corporation (MCC)

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Mr. Molyneaux: [Molyneauxjw@mcc.gov](mailto:Molyneauxjw@mcc.gov) Tel + (1) 202 521 3600 ; (1) 202 521 2648

Representing NORC Tom Easterling

Purpose of meeting: The consultant's presentation of findings and conclusions to the MCC evaluation team upon return from the field trip to Ghana to review the progress of MCC investments in the irrigation schemes, the SPEG loan program, and the PCC operations at KIA.

Person drafting notes: Tom Easterling

The following is a summary of the feedback received from these two individuals during the presentation of findings and conclusions on MCC's investments:

Mr. Molyneaux emphasized at the beginning of the meeting that the consultant must protect his independence and assume responsibility for the content of the evaluation report: "you and you alone are responsible". He said that the consultant is a sub-contractor to MCC with suitable technical skills and work history to complete the evaluation. As previous employees and

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consultants to MiDA, neither Nana Ama Oppong Duo nor Collins Owusu should write the report. He also emphasized that the consultant should “document what we (MCC) told you”.

Mr. Molyneaux stated that it would be important to distinguish between the viability of the investments that were made and the economic returns that were gained from the investments; that is, survivability vs the economic rate of return of the investment.

He emphasized that MCC wants to use the evaluation as a learning process, and therefore, it would be important to determine what questions should be addressed, and not necessarily the answers to those questions.

The analytical approach of MCC is to determine the economic rate of return (ERR) considering a cutoff rate of 10 percent. The projects should yield a threshold rate of return. It will be important to determine how they compare to the original plan.

He noted that the Office of General Counsel (OGC) will resist any efforts to further implement the project beyond the end of the Compact.

MCC needs lessons about this Compact – in other words, what could have been done with \$5-6 million more cost, beyond the end of the Compact (here, he was apparently referring to the Kpong irrigation scheme).

Mr. Molyneaux asked what were the main problems that affected the implementation of the Compact. The consultant responded that the 5-year, drop-dead ending date of the Compact was the main cause for not being able to fully complete the “software” and training to use the facilities that were provided. His response was “this is the model we had”, and there was no way that all the problems could have been settled in five years. The only option is to “do smaller stuff” such as infrastructure for power lines or roads. Another example is the PCC – that did not require five years to put into place. Are there other models we can use? MCC wants to use the evaluation to learn how to invest more wisely; that is; to avoid doing what will not work. How can we invest more effectively? How can we get better at what we do?

In terms of what is desired from the evaluation reports, Mr. Breitbarth said that first; it would be required to answer the questions in the SOW. Second, for irrigation, what to advise would need to happen for it to work.

There is now considerable interest in the irrigation projects. MCC needs lessons learned and how to salvage the schemes. Think in terms of 5 – 10 year increments, in terms of sustainability (financial survivability) and the ERR questions. MCC would also want to know the incremental effect of increased investment – that is, would it provide a much larger benefit. Is the

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investment meeting the objective, or is it used in a way that was not intended. Is it succeeding, but not achieving the same benefit?

Questions-

- ♦ How did things go?
- ♦ How does it compare to what is planned?
- ♦ Do the benefits justify the costs?
- ♦ What are the big mistakes or lessons learned, and how to avoid them in the future?
- ♦ What is the future of this investment?
- ♦ What are the conditions for sustainability?

The final evaluation draft reports will be circulated internally, to ensure that they answer all questions. MCC has an evaluation management committee that will review the reports. Before the final report is written, it will be necessary to get input from MiDA and other stakeholders.

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Date of Meeting: September 4, 2014

People met, and titles: Alabi Bortey, Project Coordinator  
Bloomfield C. Attipoe, Senior Rural Infrastructure Engineer

Organization: Ghana Commercial Agricultural Project (GCAP)

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Representing NORC Tom Easterling

Purpose of meeting: Meeting with GCAP officials to learn of the project's plans for  
expanding the Torgorme irrigation scheme.

Person drafting notes: Tom Easterling

The GCAP is a US \$145 million agricultural project in Ghana that is partially funded by USAID (US \$45 million) with the remaining World Bank funding amounting to US \$100 million. It is being implemented by a Project Management Unit at the Ministry of Food and Agriculture (MOFA). One of the project activities calls for the development of the Accra Plains Irrigation scheme as a Public-Private-Partnership (PPP). Under this initiative, the project will expand the Kpong Left Bank irrigation scheme for smallholders to its full, potential area of 2,000 hectares.

The concept of the GCAP is similar to that of the MCC-funded Kpong Left Bank irrigation project. Project support for agriculture investments is planned to include the following elements:

- ♦ A substantial irrigation investment would be managed under a PPP to supply irrigation water to both large commercial farms as well as smallholders operating under an out-grower scheme.
- ♦ Support would be provided to extend nucleus investments for the benefit of small-holders including assistance to expand necessary infrastructure into out-grower lands as well as direct support to smallholders to ensure they are capable out-growers
- ♦ This would provide assistance for the establishment of large commercial farms as nucleus farms with appropriate linkages under out-grower schemes. Support to the nucleus would include critical access infrastructure including roads, power connections and primary irrigation facilities.
- ♦ This would include support to warehousing and storage through the rehabilitation and assignment of publically owned marketing infrastructure (including the development of warehouse receipts system).
- ♦ It would also include support for agri-business centers that provide essential services and inputs to small-holder farmers.
- ♦ Project activities would include developing a framework for out-grower schemes and contract farming arrangements.
- ♦ Smallholder support would include organizing small-holder participants into groups and building their capacity; providing grants to meet the establishment costs of small-holder



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farmers (land preparation, planting material, etc.); and/or working capital for out growers to procure necessary farm inputs (improved seed, fertilizer).

Mr. Attipoe previously worked with SNC Lavalin, the consulting engineering group that worked with MiDA for the MCC-funded Kpong Left Bank irrigation scheme. He explained that during the time since the MCC Compact ended, the Export Development Agricultural Investment Fund (EDAIF) has funded the costs of the remaining scheme construction for the Kpong Left Bank scheme (also known as Torgorme). However, no government or private organization has provided the starting capital required by the Scheme Management Entity to initiate its work of scheme management. This lack of funding is having a negative effect on scheme startup and operations. The smallholders at the scheme are presently producing rainfed crops within the irrigated area, since irrigation water is not yet flowing. The contractor is in a one-year “defects correction period” that will last until December 2014. However, the scheme should best be operating presently, since that is the only means to identify any remaining deficiencies and to determine if previously-identified deficiencies have been adequately corrected. Furthermore, if the scheme remains unused for a long period, the canal system is subjected to weather erosion and to sustain damage to the concrete lining. For example, canal cleaning has never been done and will be a requirement before the scheme can operate effectively.

Mr. Bortley showed the consultant an advertisement in today’s ACCRA newspaper, *The Daily Graphic* that requested expressions of interest for “Consultancy services to update the feasibility studies and supervise the completion of Kpong Left Bank Irrigation Project (KLBIP)”. The advertisement stated that “the ultimate target for development is for 2,000 hectares of gravity fed irrigation and 1,000 ha of overhead centre-pivot skrinkler irrigation, being implemented by VegPro (Ghana) Limited”. He explained that the intent is to develop the entire irrigated potential area that had been identified under the previous MiDA studies for Torgorme. Similar to the MCC-funded irrigation system, the expanded irrigation scheme would incorporate small- and medium-scale farmers and several anchor farms. He also mentioned that an aquaculture (pond) production area of approximately 450 hectares is also being planned.

Mr. Attipoe emphasized that the work of the GCAP would essentially be a repeat of the work carried out by MiDA, within the expansion area adjacent to the MiDA smallholder irrigation scheme. The new contractor would install the irrigation system including the main canals, as well as secondary and tertiary canals; control gates and mechanisms for water distribution, and a system for collector drains. The GCAP would also create a public-private-partnership method for scheme operations and maintenance. Most likely, the maintenance and operation for the large, 2000 hectare scheme would absorb scheme maintenance and management for the 450-hectare scheme that was funded by MCC.

Mr. Attipoe believes that part of the work of the GCAP would be to finalize the work that has not been carried out by the MCC-funded irrigation scheme. This includes a myriad of details to ensure that irrigation water flows efficiently within the plots of the individual smallholders, that excess water is channeled from the smallholder plots into the drainage network, and that the irrigation network is adequately maintained. He believes that the MCC-MiDA scheme will never operate at its full potential unless effective scheme management is in place – and scheme

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maintenance would depend on the SME having access to working capital, as was initially planned.

The budget for the new Torgorme irrigation scheme is approximately US \$25 million. It will involve extending the main canal for 13 additional kilometers, as well as constructing secondary and tertiary canals. It will also require extensive land development (i.e. land clearing and leveling, to ensure that the irrigation system works properly). Each smallholder plot is different, and must be developed on an individual basis. The entire area must be covered, field by field.

Unfortunately, the land development of the individual smallholder plots is not being done within the Torgorme MCC-MiDA scheme. Some outside entity (such as a project) must guide the farmers to help them prepare their respective plots for irrigation, and to fund the cost of land development within the individual plots.

The GCAP has not yet decided if it will be possible to fully irrigate the entire 2000 hectare project area using flood irrigation. In some cases, it may be better to use sprinkler irrigation, such as the large center-pivot irrigation sprinklers that are now being installed by VegPro.

Mr. Attipoe estimates that GCAP will have its consulting engineering team on site in approximately one year, or during the third quarter of 2015. This means that if any finishing work would be required by the GCAP to complete the Torgorme system, that work could not be completed sooner than eighteen months from now, or during the first half of 2016.

Mr. Attipoe recommends that MCC attempt to influence the GOG to provide working capital to the SME in order that this company can begin the work of managing the scheme. There must be people on the ground to be able to work with the farmers.

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Date of Meeting: September 18, 2014

People met, and titles: Dr. Ben Vas Nyamadi, Chief Executive  
Engineer Wilson K. Darkwah, Deputy Chief Executive

Organization: Ghana Irrigation Development Authority (GIDA)

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Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with GIDA Chief Executive to review the situation and outlook at the Torgorme irrigation scheme.

Person drafting notes: Tom Easterling

The GIDA officials made the following observations:

The general access road to the Torgorme irrigation scheme should have been renovated and graveled as part of scheme construction. The road is now impassible when it rains, beyond the Vegpro office when one enters the scheme. The soils in the area are mostly heavy clay and the road requires gravel for stability. The access road was not part of the compact, but should have been.

A fundamental issue is the relationship between MCC/MiDA and relevant government institutions during the Compact. This is a key factor in what is happening now at Torgorme. GIDA should have had an opportunity to fully review the design of the scheme before it was constructed. Although it can be said that “MOFA was somehow involved” in the irrigation schemes, its level of involvement was very low. Had there been greater involvement, the basic design flaws would have been uncovered.

When the Torgorme scheme was conceptualized, it was decided to use surface irrigation. This is a large scheme – one of the biggest in the country – which should have been designed to permit the use of other means of irrigation that is more efficient. Furthermore, the requirement to move the water around within the smallholder plots is extremely labor intensive. Land leveling was not done within the smallholder plots, which is needed for effective flood irrigation. Furthermore, greater quantities of water must be removed from the smallholder plots after irrigation has been done, which is also a problem. Smallholders should have been introduced to other types of irrigation practices, including as drip irrigation.

When the Compact ended, the Torgorme scheme was only 71% complete. The Government of Ghana has provided US \$6.6 million to complete the scheme.

MiDA has encountered numerous problems with the construction contractor who is presently working at the scheme. The contract is presently within the period when remaining construction work must be completed and constructions defects must be corrected. MiDA remains in charge of the construction; GIDA senior management thought that the scheme would have been turned

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over to GIDA for completion when the Compact ended. However, MiDA is still in charge of the scheme; it will not be turned over to GIDA until the construction has been completed. Considerable time has been lost during the time since the Compact ended, and MiDA has no remaining technical staff to effectively supervise the construction work at Torgorme.

The defects period of the construction contract will end in December. GIDA plans to write a letter to MiDA convening a meeting to lay out a plan of action for transferring operating responsibility to GIDA. This was planned to be completed earlier, but there was a Cabinet reshuffle that resulted in the appointment of a new Minister of Food and Agriculture. For this reason, GIDA has not pressured MiDA for the turnover of the scheme. After the defects phase has ended, some of the pressing problems at the scheme can be funded by the amount of the retention from the contractor, as well as the non-payment of performance bonuses that would have been paid with good performance.

Land development of the smallholder farm plots was not done at the Torgorme scheme, since this work was not part of the construction contract. The smallholders will find it difficult to direct the water from the canals to their crops, and will also encounter difficulty in draining the excess water from their fields.

GIDA is now anticipating that the Ghana Commercial Agriculture Project (GCAP) will assume responsibility for completing the pending completion items at the Torgorme irrigation scheme, and will also expand the scheme to its full 2,000 hectares that were initially planned. The World Bank has published its request for an expression of interest (EOI) to “make the scheme more user friendly”. Mr. Nyamadi emphasized that “we are not saying the original MCC/MiDA design was bad; it is simply that things can always be improved upon”.

We discussed the possible corrective work to be carried out by the GCAP project, and concluded that given a lengthy startup period, it will likely require from 2-3 years for this new project to finalize the remaining work at Torgorme. In the meantime, the small-scale farmers at the scheme would be able to cultivate their crops during the rainy season, as they are now doing at the scheme. During the dry season, Mr. Nyamadi estimated that no more than 50% of the farmers – and possibly a considerably fewer number – would be able to irrigate their crops as a result of the lack of land development that has been carried out for their farm plots. In other words, the scheme would likely operate only partially.

GIDA considers good scheme management a key element of the sustainability of the scheme, particularly since GIDA is not sufficiently able to supervise the scheme operations. For this reason, GIDA has supported the appointment of the scheme management entity (SME). However, the SME needs a subsidy to kick-start the management process, since it will be necessary to fund several months of operations, maintenance, and management activity at the scheme before the irrigation service charge is fully implemented and funds are collected. It was only this past Monday, September 15 that the Ministry of Trade and Industry (MTI) wrote a letter to the EDAIF chairman requesting that a startup grant be provided to the SME amounting to GHC 690,000, or an amount equivalent to the SMEs operating costs for approximately three years’ time. Since EDAIF is an agency within MTI, the grant will likely be provided. The Minister’s request must be reviewed and approved by EDAIF’s Board of Directors. The subsidy will be front-end loaded, to be paid 50% during the first year; 30% during the second year, and 20% during the third year of operations. The subsidy will be used to “top up” the amount

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collected by the SME for the ISC. The GIDA officers said that they fully supported the award of the subsidy to the SME.

The amount of the ISC has not yet been established, nor has it been negotiated between the scheme smallholders and the SME. Mr. Nyamadi said that GIDA will act as “referee” during the negotiations to ensure that the amount of the ISC is sufficient to cover the cost of operating the scheme, but that the smallholders are not over-charged for irrigation services. The SME will collect the ISC directly from the smallholders.

The primary means of enforcing the payment of the ISC will be the threat of removing a scheme farmer from his or her assigned plot. Law 1350, and its 1995 amendment, gives full authority to the Land Allocation Committee (LAC) at the scheme to remove farmers who default on their ISC payment. However, the Chairman of the LAC is the Chief Executive of the district where the irrigation scheme is located, and as such, is the political leader. Consequently, he is accountable to the voters for his action, if for example, he fails to remove a farmer for non-payment or not-performance at the scheme. The LAC is required to convene two meetings per year, and the committee meeting minutes are submitted to the SGB for the scheme.

The institutional structure for the Torgorme irrigation scheme is fully in place, and is functioning. The only thing missing is an operational irrigation scheme.

In terms of the GCAP project at Torgorme, it will be necessary for the project team to review the design for the existing irrigation system to see how to make it more “user friendly”. For the expansion area, it will be required to make a fresh design that will be a somewhat lengthy process. A reasonable estimate for the length of time required to upgrade the existing scheme would be 2-3 years.

The access road to the scheme badly needs to be graveled. If the road is not improved, it will be impossible to bring agricultural products from the downstream area of the scheme when it rains. MCC’s policy to leave the public sector out of the loop for its projects provides for a weak exit strategy. Without State involvement during the execution of the project, having the State take it up after it has been completed creates problems. The scheme facilities will not be owned by the management company; they will be owned by the State. The involvement of the State has not been sufficient.

At Bontanga, MiDA never wrote a letter to GIDA “officially” turning over the scheme to GIDA. There should have been a tripartite inspection involving MiDA, GIDA, and the contractor, but that never took place.

The expression of interest by Mr. Emmanuel Darkey to assume the responsibility for the Bontanga and Golinga schemes is a positive development.

Mr. Nyamadi lamented the limited use of the land at the Bontanga irrigation scheme, particularly during the rainy season. Mr. Darkwah said that the reasons given by the Bontanga smallholders were mere “excuses”. However, the problem can be categorized as a “cultural issue” – Bontanga farmers are difficult to deal with. One solution might be to reduce the ISC during the rainy season, to entice the farmers to make greater use of the scheme.

**NORC AT THE UNIVERSITY OF CHICAGO**  
**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

Date of Meeting: September 15, 2014

People met, and titles: Emmanuel Darkey, agribusiness entrepreneur

Organization: E. Darkey and Associates

Address: PO Box 7155, Accra, Ghana

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Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with Emmanuel Darkey to learn more of his proposal to the GIDA Regional Office in Tamale for scheme management at the Bontanga and Golinga irrigation schemes, and of his planned relationship with the anchor farm, Solar Harvest.

Person drafting notes: Tom Easterling

On September 15, 2014, Tom Easterling and Collins Owusu had a chance meeting with Mr. Emmanuel Darkey at the office of Mr. Vitus Ayingagure, the GIDA Regional Director for Tamale. After the consultants learned that Mr. Darkey is planning to market the products that are produced by the Solar Harvest anchor farm, and that he had presented a proposal to GIDA to assume the responsibility for scheme management at both the Bontanga and Golinga irrigation schemes, the consultants and Mr. Darkey agreed to meet later that day.

During the later meeting, Mr. Darkey explained to the consultants that the GCAP project had agreed to award to Solar Harvest an 80% matching grant for irrigation equipment and initial crop production expenses to train, organize, and develop an outgrower program with 205 smallholders on the property being developed by Solar Harvest at the Bontanga irrigation scheme. The total number of 205 smallholders will include 152 new farmers to be incorporated, along with 53 existing farmers that Solar Harvest “inherited” with its allocated area of 305 hectares at Bontanga scheme (the farmers were farming on the land that was assigned to Solar Harvest for its anchor farm production). The land area to be farmed by each of the 205 smallholders will range from ½ hectare to one hectare.

Solar Harvest will train the farmers for GlobalGap production and will help to obtain GlobalGap certification, which will enable the smallholders to produce their crops for export to EU markets. The crops that will be farmed include soybeans, maize, and possibly rice; chili peppers, including Scotch Bonnet pepper; root crops such as yams, as well as orange flesh sweet potato (OFSP) that would be combined with other products including cassava for milling and processing into a nutritious flour for making wholesome food products. Mr. Darkey will collaborate with Solar Harvest to market the crops that are produced at the anchor farm. Grain crops and legumes would be produced mostly for local markets and vegetable crops would be produced for export. However, he said that there is a good market for non-genetically modified (non-GMO) production of soybeans in North European markets.

Mr. Darkey advised the consultants that he is in the process of preparing a proposal to GIDA whereby he would assume the responsibility for scheme maintenance at the Bontanga and Golinga irrigation schemes. He emphasized that he does not plan to invest any of his personal funds to develop the scheme management business – instead, what he will attempt to do is to support the scheme smallholders to apply for a grant from the Export Development and Agriculture Investment Fund (EDAIF) for crop production, which would include the amount of



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their irrigation service charge (ISC) for the two year startup period. Mr. Darkey's company would obtain part of the smallholder grant as pre-payment of the ISC for the two-year period, which would provide him with the initial working capital needed for scheme management.

He wants to formally present his proposal to GIDA within 60 days. He also plans to obtain the support of the Ministry of Food and Agriculture (MOFA) for his grant proposal to EDAIF, since, he said, he is a friend of the Minister. If his proposal is accepted, he will apply to FINGAP (the financial wing of the USAID/ADVANCE project) for financial and technical assistance to write the business plan for scheme management.

For the work of scheme manager, he plans to faithfully follow the SNC Lavalin Operations and Maintenance Plan for both Bontanga and Golinga.

The consultants believe that this novel idea just might work, if EDAIF would be willing to provide the startup grant for the irrigation service charge. Should Mr. Darkey become scheme manager, he would be ideally positioned to act as marketing agent for scheme farmers at both Bontanga and Golinga schemes. Under this scenario, his main business would be marketing the crops that are produced at the scheme, instead of simply providing irrigation services. In other words, the scheme management activity would support his marketing business. We hope he will be successful in this possible venture.

To obtain financing for the commercial agriculture venture at Bontanga and Golinga, in addition to the anticipated grant for smallholders, Mr. Darkey plans to approach EDIAF as a source of credit for scheme producers. EDIAF has a line of credit for farmer production loans with an interest rate of only 12% that is channeled through commercial banks. Another source of credit is through the international donor community – for example, DFID has a Marketing Fund that is available for Tamale farmers. He is also exploring possible lines of credit from international financial NGOs. He may have to apply for production loans from commercial banks, but commercial loan interest is prohibitively high – around 28% per annum.

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**FIELD WORK FOR MCC GHANA POST-COMPACT EVALUATION**

Date of Meeting: September 11, 2014

People met, and titles: Alfred Addo-Siaw, Bontanga Accountant

Organization: Ghana Irrigation Development Authority (GIDA)

Address: PO Box 425, Tamale, Ghana

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Representing NORC Tom Easterling, Collins Owusu, Nana Ama Oppong-Duah

Purpose of meeting: Meeting with GIDA accountant to review the status of the smallholder payment of the irrigation service charge and action that is being taken to collect the amount overdue.

Person drafting notes: Tom Easterling

Mr. Addo-Siaw advised the consultants that previously, based on instructions from IDA the collection of the irrigation service charge (ISC) for the Bontanga irrigation scheme was entrusted to the farmers themselves. Consequently, the flow of funds collected was the following: Smallholders → Irrigation Block Leaders → Union treasurer → Bank account. Receipts to the farmer were issued by the Union treasurer and took several days to arrive to the paying farmer. As a result of the policy that farmers would collect and pay the ISC, the collection rate plummeted. Also, handling the funds by the Union of FBOs was not transparent.

In October 2012 the Bontanga scheme farmers voted to change the payment process and instead of depositing the funds obtained from ISC payments with the FBO Union treasurer, it was decided that they would be deposited with the GIDA accountant, who would make the deposit to the bank account. Consequently, GIDA has been responsible for ISC collection for the past two years, and has financial data only from October 2012.

The GIDA accountant has now begun to issue debit notes in the name of the individual farmers showing the amounts owed by them. The debit notes, which were not issued previously by the FBO Union, are official documents showing the amounts owed by the farmers, and provide a foundation for collection procedures. GIDA has forced some farmers to pay their ISC by linking the amounts owed to government-provided benefits: For example, farmers must be up-to-date on their ISC before they are provided combine equipment service by the Ministry of Agriculture and Food (MOAF), and farmers cannot obtain subsidized fertilizer provided by MOAF, that is stored at the GIDA warehouse. Mr. Addo-Siaw said that these changes had improved the ISC collection rate.

The amount of the ISC is GHC 100 per hectare per year. The crop year begins at the beginning of the dry season on October 1, and ends on September 30. The full amount of the ISC is due on October 1. However, since the irrigation year has two seasons – a dry season followed by a wet season – most farmers make a partial payment for dry season irrigation charges early in the crop year. When the time comes to make the ISC payment for the wet season, they refuse to pay, under the argument that they do not use irrigation water during the wet season (and a large percentage of scheme farmers do not farm at all during the wet season). Another problem is that some farmers are reluctant to pay the amount corresponding to the size of their plot, claiming that the actual area is much less than the amount registered for the farmer. A third problem is that GIDA's records are not up-to-date with regard to the names of the farmers occupying the farm plots. Since the plots that are now farmed were assigned to their original occupants in 1987,



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many of these initial occupants have died or otherwise transferred occupancy of their farm plot to remaining family members or in some cases, to third parties. Since GIDA has not tracked the changes in occupancy of the farm plots over the years, it has no record of who the present occupants actually are. This creates further confusion in the billing and collection process for the ISC.

Mr. Addo-Siaw provided GIDA's accounting records for each of the two most recent crop years for the ISC amounts paid by the smallholders and the amounts remaining to be paid:

Crop year 2012 – 2013:

Amount due: GHC 42,360      Amount paid: GHC 5,495.50      Percent paid: 14.0%

Crop year 2013 – 2014:

Amount due: GHC 44,861      Amount paid: GHC 9,879.50      Percent paid: 22.0%

Mr. Stephen Adegle, the Bontanga Scheme Manager joined the meeting and informed the consultants that GIDA has initiated a new policy for distributing funds collected from ISCs at the different irrigation schemes. Some of the FBOs have received circulars published by GIDA headquarters stating that future amounts collected for the ISC would be distributed as follows:

- 24%    will remain with the GIDA local office for scheme O&M
- 54%    will be deposited in a GIDA common account at the Bank of Ghana
- 3%    will be used for administration by the scheme management entity (SME)
- 1%    will be paid for water rights
- 3%    will be paid to the land owners (the Paramount Chiefs)
- 5%    will be accumulated for asset replacement
- 10%    will be paid to the GIDA headquarters unit for monitoring and collections
- 100%    Total amount

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Date of Meeting: September 8 2014

People met, and titles: Stephen Adegle, Bontanga Scheme Manager; Agronomist

Organization: Ghana Irrigation Development Authority (GIDA)

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skpohor@yahoo.com

Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with GIDA scheme manager officials to review the status of the irrigation scheme and the institutional arrangements that are in place for irrigation services

Person drafting notes: Tom Easterling

Mr. Adegle has worked at the Bontanga irrigation scheme since 2011. He replaced the previous scheme manager who retired in 2013. His previous position was that of Bontanga scheme agronomist. At that time GIDA had six staff members for the Bontanga scheme. Presently, it has only three staff: Mr. Adegle, the scheme Administrator, and the scheme Accountant. During out meeting, Mr. Adegle provided the following information:

The Golinga irrigation scheme is an entirely separate entity from Bontanga. There is no direct relationship between the two schemes.

The irrigation potential for the Bontanga irrigation scheme (BIS) is 800 hectares, corresponding to the smallholder rehabilitated area of 495 hectares and an additional 305 hectares assigned to the Anchor Farm, Solar Harvest. The limiting factor is the reservoir capacity. Water has to be sourced from somewhere if there is any future expansion of the scheme. The area assigned to Solar Harvest is not yet being fully utilized.

The BIS is farmed by approximately 600 small farmers who are members of ten farmer-based organizations (FBOs). Altogether, the farmers occupy the entire scheme irrigated area of 495 hectares. Initially, the scheme had 525 smallholders, but as more lateral canals were added to the irrigated area, more farmers have arrived. The net area farmed by the 600 farmers is approximately 450 hectares. The average holding for smallholder is approximately 0.75 hectares. New farmers come onboard when land owners are not ready to farm for a particular season. The plot is released to these farmers by land owners. The Bontanga catchment area includes around 20 communities.

The ten scheme FBOs have formed an umbrella organization, the Union of Bontanga FBOs. Several committees have been formed within the Union, each headed a Union executive. The committees cover areas including marketing, scheme maintenance, production, land allocation, and discipline. The District Chief Executive for the Kumbungu District Assembly is the head of the Land Allocation Committee (LAC), which is part of the Ministry of Local Government. However, the operation of the different scheme committees is extremely “relaxed”.

Solar Harvest (SH) has produced rice since it began operating at Bontanga. The company also expressed its plans to produce soybeans, but thus far, it has not produced this crop. SH has installed a single unit center-pivot irrigation system that it tested during the last dry season (October 2013 - April 2014) covering 200 hectares. Thus far it has not operated the irrigation

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system on a continuing basis. It was tested in early 2014 when SH attempted to get irrigation water from the left bank main canal of the irrigation system.

Several organizations including NGOs are presently supporting smallholder production at Bontanga. Some operate at Golinga as well. Those operating at Bontanga are summarized as follows:

- ♦ Amsig Resources is providing land preparation services for several rice producers at Bontanga, and purchases rice from these producers. It would like to establish a rice mill at the irrigation site. (Note-Amsig is the operator and principal owner of an agribusiness center for grains near Bontanga that was provided as a grant to the company by MiDA, with funding from the Millennium Challenge Corporation). Amsig provides marketing services to the smallholders as part of the AGRA project.
- ♦ The Fingap financial NGO provides matching grants to help smallholders obtain agricultural machinery. It has helped six producer groups to obtain land preparation equipment (rotovators). This organization is funded by the USAID/ADVANCE program. The ADVANCE program also trains smallholders in agricultural practices.
- ♦ The Savannah Agricultural Research Institute is a government institution that works independently to help farmers with agricultural production and productivity.
- ♦ The Ministry of Food and Agriculture (MoFA) supports the Bontanga rice farmers by providing rice harvesting services for scheme smallholders. MoFA harvests the rice crop for all Bontanga farmers.
- ♦ The Savannah Accelerated Development Authority (SADA), a GOG organization, provides inputs for smallholders. It has a subsidized fertilizer program that GIDA administers on behalf of the Bontanga scheme smallholders.
- ♦ The TRIAS project, based in Bolgatanga, also supports Bontanga farmers. This is an NGO organization that provides capacity building for all ten Bontanga FBOs. This initiative is supported by the AGRA project.
- ♦ Council for Technical and Vocational Education and Training (COTVET), a government organization, began operating in Bontanga this season. This organization is collaborating with the GIDA scheme management office to provide smallholder training for some of the scheme farmers to produce chili peppers of local markets.
- ♦ The World Bank and USAID-supported GCAP project is providing assistance to the Anchor Farm at Bontanga.

GIDA is the Scheme Management Entity (SME) for the Bontanga irrigation scheme. The scheme is managed as a joint initiative between GIDA and the executive body of the Bontanga Union of FBOs, which is the umbrella organization for the ten FBOs that operate at Golinga.

Mr. Adegle made a surprising revelation that a relatively small number of farmers produce crops during the rainy season at the Bontanga irrigation scheme. For example, during the current rainy season (May – September 2013), scheme farmers are producing 250 hectares of rice and a limited area of approximately 20 hectares of vegetable crops, consisting of mostly chili peppers. During the immediately past dry season (October 2013 – April 2014), scheme farmers grew rice on 333 hectares and vegetables on 111 hectares for a total of 444 net hectares (approximately 10 hectares had no crops). This smallholder cropping pattern is difficult to understand given that vegetable production is much more profitable for smallholders than is rice production. Furthermore, the economic justification for the Bontanga scheme assumed that one rice crop would be produced on the entire scheme during the rainy season, and that two short-cycle

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vegetable crops such as okra and peppers could be produced during the dry season. When asked to explain the present sub-optimal smallholder cropping pattern, Mr. Adegle provided the following clarification:

- a) Based on the soils survey made for Bontanga under the scheme feasibility analysis, it was revealed that based on the identified soils types, the optimum use for Bontanga soils would be to produce 240 hectares of rice and 255 hectares of vegetables on the irrigated area of 495 hectares.
- b) In other words, based on the identified soils types, an area no greater than 255 hectares should be used for a single vegetable crop. However, since rice is more tolerant of rainfall and soils types than is vegetable production it would be possible to produce rice on the entire area of 495 hectares during the rainy season.
- c) Based on the soils analysis, the optimum cropping pattern at Bontanga would be i) Rainy season – produce 495 hectares of rice, and ii) during the dry season, produce two crops of vegetables on 255 hectares and one crop of rice on 240 hectares.

Other factors that limit the production of agricultural crops at Bontanga during the rainy season include the following:

- ♦ There is a limited availability of agricultural equipment for land preparation at Bontanga during the rainy season. There is a heavy demand for land preparation equipment in general at the beginning of the rainy season, and equipment operators prefer to work in upland areas instead of bottom land such as the Bontanga irrigated area during the rainy season. Wet season farming in the lowlands is more difficult than upland farming.
- ♦ While vegetables are more profitable, they are considerably more difficult to grow than rice. Furthermore, they demand more of the farmers' time, and greater amounts of working capital investment.
- ♦ There is no “champion” for vegetable crop production at Bontanga. No entity is actively encouraging and training farmers to grow vegetables and to market their crops. (However, the Anchor Farm, Solar Harvest provided training for a few growers on pepper farming in June 2014, in preparation for a small outgrower program).

The Anchor Farm has a concept of using outgrowers for grain crops and possibly vegetable production, but until now, no contract program has been established by the company.

Despite the limited utilization of the irrigated area during the rainy season, Mr. Adegle believes that the farmers are now better off than they were before the irrigation scheme was rehabilitated and the farmers received agricultural and FBO training by MiDA. The yields are now better than before – for example, dry season rice production has an average yield of 4.5 tons per hectare. Since the Compact ended, many organizations, including NGOs, are now offering production and marketing services to smallholders.

The permanent land owners for the irrigated area are the tribal chiefs, who continue to be paid a royalty by government that was taken for the Bontanga irrigation scheme. In years past, the land allocation committee changed the land allocation to scheme farmers every three seasons or so, to provide a type of rotation among scheme farmers. However, since the early 1990 the same farmers have continued to use their assigned schemes, and today, the schemes are essentially “owned” by scheme farmers. However, if a farmer is not cropping the land, the current land allocation committee (LAC) has the authority to remove the farmer from the land. In the event that a farmer cannot farm the land (say, due to lack of funds, or illness) the

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farmer is required to inform the LAC and allow the committee members to name an alternate farmer that would use the land for the next season. However, this requirement is not vigorously enforced, and farmers tend to informally turn their land over to an alternate user if they are unable to crop the land, or alternatively, allow the land to remain idle.

The present water user fee is GHC 100 per hectare per year. Before the scheme was renovated, the irrigation service charge (ISC) was set at the amount of GHC 12 per acre per season. After the compact ended, the planned irrigation service charge was set at GHC 475/ha/year. However, the farmers protested the large increase over the previous ISC, and the amount was lowered to GHC 250/ha/yr. The farmers protested again. Finally, GIDA established the amount of annual fee at GHC 100 per hectare per year, without regard to how many crops are grown by a farmer at the scheme. The farmers finally accepted the lower rate of GHC 100/ha/yr. However, Mr. Adegle advised the consultants that the payment rate for the scaled-back rate of GHC 100 is dismally low, at only 15% of the amount owed. While some farmers may pay the GHC 50 per hectare charge that is due after the dry season, they refuse to pay the GHC 50 per hectare charge that is assessed after the rainy season, under the pretext that they do not use irrigation water during the rainy season. As described earlier, in many cases smallholders do not farm their plots during the rainy season.

GIDA's means for pressuring the smallholders to pay the ISC is to coordinate with MoFA to withhold harvesting services until their irrigation fees are paid, or to not permit delinquent smallholders to withdraw subsidized fertilizer from the GIDA warehouse until their irrigation fees have been paid.

The ISC payment mechanism is that the lateral canal leaders collect the amounts owed from the individual farmers that are served by the respective lateral irrigation canals. The canal leaders deposit the funds with the FBO Union treasury, who then transfers the funds to the GIDA accountant. For example, for the last payment that was due in April 2014, GIDA collected only GHC 6,933 of a total amount due of GHC 44,681 for the period October 2013 – September 2014. Of the total amount collected through the ISC, GIDA's allowance for scheme maintenance is 10%. Consequently, of the amount collected in April 2014, the funds available for scheme maintenance amount to GHC 693 for the entire year. Mr. Adegle explained that if farmers do not pay their ISC, they can be removed from the land (although this rule is not enforced).

GIDA's limited staff is a severe detriment to irrigation scheme maintenance and water management. For example, under its current staffing, GIDA has no extension officers, nor does it have water bailiffs (water control officers). The current GIDA staff is composed of three individuals: a) the Site Manager/Agronomist, Mr. Adegle; b) the scheme administrator, and c) the scheme accountant. GIDA uses farmers as water bailiffs, even though this practice is not recommended due to its inherent conflict of interest when a scheme farmer is responsible for the flow of water to different farms within the scheme. There is one water bailiff for the Left Bank main canal, and a second water bailiff for the Right Bank main canal. In addition, the Bontanga scheme has a total of 28 lateral canals that are equally divided with 14 lateral canals receiving water from each of the two main canals. There are 15

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Block Leaders who are also smallholders, who control the flow of water into from one to three lateral canals that receive water from either of the two main canals.

The irrigation schedule has been established such that from Monday to Wednesday, lateral canals numbered 1-7 at each main canal receives irrigation water, while lateral canals numbered 8-14 receive water from Thursday to Saturday. Sunday is a catch-up day in case any farms have not received sufficient irrigation water during the week. The Anchor Farm is located at the end of the Left Bank main canal, and receives water at night for its center pivot irrigation system. The water is stored in a reservoir constructed by Solar Harvest where it is available to be pumped for irrigation. While the water supply system for the Anchor Farm has not yet been tested, the concept appears sound. When the Anchor Farm tested the system, they saw that if water reaches the downstream Anchor Farm first, then there is sufficient water available to irrigate smallholder farms as well.

The scheme maintenance is under the direction of GIDA, but GIDA has assigned responsibility to the individual farmers the maintenance requirement for the lateral canals, and for the on-farm water distribution at each smallholder plot. GIDA is responsible for maintenance of the main canals only. When asked where GIDA obtains funding for main canal maintenance, Mr. Adegle responded that it uses the small amount that it receives from the 10% allowance from the ISC payment to provide maintenance of the main canals. He agreed that GIDA's financial capability for maintenance is extremely limited. He said (and this was verified by a later visit to the Bontanga irrigation scheme) that the scheme is in generally good condition, and water flows freely through the canals. However, weeds are growing along the canal banks and a few cracks have begun to appear in the canal walls. In addition, sediment and trash is beginning to build up within the canals in some locations.

The lateral leaders organize canal maintenance at the beginning of the dry season, when the use of the canals will be heaviest. Maintenance is done every dry season. The last time canal maintenance was performed was in October 2014.

In terms of water flow, each farmer controls the gate to his or her farm plot. Each plot has a gate to allow water to pass to the plot from the canal. Once the water reaches the plot, the entire area is flooded. It is up to the farmer to control the flow of water into his or her farm plot. Natural drainage removes excess water to the farm plot where it flows into the main drainage canal for the scheme.

A recent problem has resulted in scheme water management: Some farmers located along the lateral canals 1-7 have begun an unauthorized diversion of water into their canals when other canals require the water. This act of "stealing" water means that other farmers do not receive the water they need. GIDA cannot control the problem since it is under-staffed; nor do the lateral canal gates have locks to control the opening of the gates. The solution implemented by GIDA is to hire a third party to monitor the gates on canals 1-7 to ensure that water is not diverted.

In terms of the monitoring of water flow throughout the scheme, Mr. Adegle said that GIDA has no system in place for monitoring water flow. It is well known that when the reservoir gate into each main canal is fully opened, the amount of water flowing into the canal is 1.5 cubic meters per second. However, there is no system in place to record if the gate is not fully open, nor of the amount of time the gate remains open. The weirs and flumes installed in the system have not been calibrated to measure the flows. There is no system to calculate



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how much irrigation water is needed, just open the gates and let the water flow to flood the farms. The water bailiffs, as well as the block leaders who control the water flow into the lateral canals, are illiterate farmers who have limited capacity to maintain records of water flow, or the time that individual control gates remain open. These water control officers use general guidelines for controlling the flow of water: For example, during the dry season, water flows through the Right Bank main canal from 6:00 am to 6:00 pm, seven days per week. On the Left Bank main canal, water flows through the canal for 24 hours per day, seven days a week. The farmers control the flow of water through the canals, with no means to determine the amount of water that flows. The process is simply “we open the gate and the water flows”.

Mr. Adegle said that there is a weather station at the GIDA compound that is monitored remotely by the Meteorological Services Department. GIDA has no knowledge of, or control over the weather station or the data that is generated.

In addition, there is a weather station monitored by the Water Research Institute that is located at one of the scheme canals (Lateral No. 10). The contact person is Dr. Bekoe tel. 024 72 92 97.

The GIDA Scheme Management Office prepares monthly and quarterly reports for GIDA headquarters office in Accra. These reports provide information primarily on crop production, and the expected amount of water fees to be collected based on the crops. They also summarize the maintenance work that was completed during the reporting period, and provides information on the stock levels and movement of the subsidized fertilizer that is stored at the Bontanga site.

Should MCC wish to obtain a copy of GIDA’s monthly report as input for monitoring the performance of the irrigation scheme, it would have to contact GIDA headquarters. Should MCC require a unique report that provides additional information, it would have to fund the GIDA staff to prepare the report.

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Date of Meeting: September 12 2014

People met, and titles: Rabiou Ibrahim, Golinga Scheme Manager  
Abdulai Yapalsi, FBO Secretary  
Tamali Sayibu, FBO Chairman

Organization: Ghana Irrigation Development Authority (GIDA)

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Representing NORC Tom Easterling

Purpose of meeting: Meeting with GIDA scheme manager and FBO officials to review the status of the irrigation scheme and the institutional arrangements that are in place for irrigation services

Person drafting notes: Tom Easterling

The Golinga Scheme Manager, Mr. Rabiou Ibrahim, was appointed to the position of scheme manager only three months ago. In view of his lack of experience, he invited the two senior FBO officials to the meeting as well. He was previously assigned to the Bontanga irrigation scheme, as assistant to the scheme manager. Mr. Ibrahim and the two FBO officials made the following comments:

The potential area of the Golinga scheme area covers 100 hectares, whereas the scheme irrigated area is 40 hectares. The amount of 40 hectares is the limit of the reservoir capacity. The problem is that the reservoir is silted, and now when full, it carries only 1/3 of its original volume.

During the present rainy season, the scheme area is planted 100% in rice. During the dry season, the normal cropping pattern is 10 hectares of rice and 30 hectares of vegetables. The rice crop is mostly for seed multiplication, for commercial seed production. This distribution is based on the suitability of the soils within the Golinga scheme. Seed rice is much more profitable than rice produced for grain. For example, for a 90-Kg coco bag, rice grain sells for CDG 120 whereas a similar weight of seed rice sells for CDG 240, or double the income. In terms of productivity, transplanted rice (in rows) will yield 24 bags per acre, whereas rice planted by seed broadcast will yield around 18 – 20 bags per acre. Vegetable crops grown are mostly different types of leafy vegetables, and chile peppers. The vegetables must be harvested every week. For ¼ acre, leafy vegetables will produce an average income of GHC 60 per week, or approximately GHC 360 for the entire crop. Vegetable crops earn more income than does a rice crop. However, the income from producing seed rice is much more than vegetables.

There are a total of 183 farmers at the Golinga scheme, including around 30 female farmers. The average holding is ½ acre per farmer. With care and good production, a ½ acre plot will provide a livelihood for a farm family. Almost all the Golinga scheme farmers operate external farms, outside the scheme area. Only around 10 Golinga farmers do not operate external farms. Some of



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these have an area up to 5 acres or 2 hectares. There, they would typically grow leafy vegetables, yam, cassava, and rice.

All the Golinga farmers are members of the Golinga Farmers Cooperative (GFC). The farmers live in five adjacent communities. The GFC includes five different producer FBOs.

In terms of the institutional structure of the Golinga scheme, it is GIDA that sets the amount of the irrigation service charge (ISC). The local chiefs, the land owners, the GIDA regional office and the executives of GFC operate as a de-facto Stakeholder Governing Board, although on an informal, unofficial basis.

The local chiefs deal with land issues. The executives of the cooperative are responsible for security (apparently meaning scheme operations). Any land issues, such as dis-satisfaction with the land that is assigned to an individual are sent to the local chief, as landlord. Other issues such as the payment of the ISC and the use of inputs are handled by GIDA.

Other committees such as marketing and disciplinary committees exist but they are not functioning. For marketing, the farmers contract with and sell to local market women. The farmers are now looking at a pre-financing opportunity for crop production with an NGO, the USAID/ADVANCE project. The project will advance the required amount of crop production inputs, which must be repaid in-kind. The proposal from the project is now being reviewed. It is not yet in effect.

Several NGOs operate at the Golinga scheme. For example, the ADVANCE project works with a selected group of farmers, whereas other programs work with other NGOs. ADVANCE serves as intermediary between the group of farmers and the buyers. Advance buys inputs, buys rice, and sells the rice to a miller. For vegetables, women come to the farm to buy the products they need. There are no joint sales.

AMSIG Resources is another NGO that provides training and marketing services. Its services are similar to ADVANCE – it buys, processes, and sells to market. Whereas ADVANCE operates as an NGO, AMSIG is a business entity. In addition, the SARI research institute has production trials at the Golinga site for new seed varieties.

In terms of a before-and-after comparison of water availability, before the renovation the supply of water during the dry season was severely limited, whereas now, the farmers are very happy with the available amount of water. However, during the dry season when rice plants are making a head and there is a high demand for water, there is insufficient supply of water. More water is needed, and there is a short term shortage.

After the rehabilitation, the roads are good whereas they were in bad condition before the rehabilitation. Previously, farmers were required to block the lateral canals with mud to force the irrigation water from the canals into their fields. This resulted in quarrels between the farmer who blocked the canal and others downstream that needed the water. Now, it is a simple matter of opening a gate and water flows into the field, which is much easier.

After considerable discussion, it was decided that the ISC for Golinga is CDG 150 per hectare per year. GIDA set the rate, and farmers are willing to pay the amount. However, the challenge is that some farmers do not pay the amounts they owe. In Bontanga, farmers have to pay the ISC before they get tractor service from MOFA. However, in Golinga, there is no government tractor service. In general, the ISC recovery rate is around 45%. Enforcement of ISC payment is a

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problem. The ISC payment is due after harvest in the rainy season, and before planting in the dry season.

The scheme Lateral Leaders (there are 6 lateral canals leading from the main canal on the east side of the scheme, and 5 lateral canals leading from the second main canal on the west side of the scheme) collect the ISC from the farmers whose plots are adjacent to their lateral canal, and deposit the funds with the treasurer of the GFC. The treasurer deposits the funds into a joint account owned by GIDA and the GFC. The Golinga scheme does not have an accountant. Those interviewed referred vaguely to an existing “system to check on who is late with their payments and how much they owe”, but the consultant could never get any details on how this system operates, or even if it is operational.

If an individual farmer does not pay the ISC, the cooperative leaders threaten to “send him to the chief” in an attempt to scare the recalcitrant scheme member into paying his or her fees.

However, this is not very effective. If a member still refuses to pay, the executives request the chief’s intervention. However, since the scheme was rehabilitated, those interviewed could not recall a single case where an individual was penalized for non-payment of the ISC, or for not taking care of their plot. However, they said that “this has happened” at some time in the past.

The rate of payment is not uniform, and is spread over the entire production season. There are two distinct groups of farmers – good payers, and poor payers. The difference is related to the character of the individuals concerned.

The total amount of annual payment due is GHC 6,000 (40 hectares times GHC 150). For the 2012–2013 season (October–September), the total amount paid by the farmers was CDG 2,100 (35%). For the 2013–2014 season, the amount paid has been approximately CDG 3,000 (50%). The cooperative treasurer explained the collection process, but had no reports or other available written information on the actual amounts owed by the different members. It was explained afterwards that the treasurer was illiterate (although clearly able to read numbers). Apparently the only record that is kept throughout the entire process is the amount of funds that are deposited into the joint bank account.

The GIDA scheme manager explained that under the new GIDA ISC collection mechanism, similar to the case for Bontanga, only 27% of the amount collected will remain with the GIDA office at the scheme, while the remaining amount of 72% will be sent to GIDA headquarters.

The GIDA scheme manager expressed his opinion that the ISC collection process should be done jointly by the GIDA scheme office and the cooperative. Until now, the farmers are entirely responsible for collecting the ISC. GIDA has access to these funds only after the deposit has been made into the joint bank account.

Scheme maintenance is funded by the ISC. If major work is required, the GIDA scheme office advises the GIDA headquarters office and waits until the headquarters office responds. For minor maintenance work (i.e. a cracked canal lining) the Cooperative executive committee discusses the issue, decides on the course of action, and authorizes payment from the ISC. Any work required on the main canals (which is GIDA’s responsibility) is also paid from the ISC. Preventative maintenance is carried out quarterly, per agreement with the members. The Cooperative executives organize the preventative maintenance activity. In addition, periodic

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visits by GIDA officials from the regional office in Tamale or the headquarters office in Accra may stimulate catch-up maintenance work being completed.

In terms of the sustainability of the scheme, the main threat to sustainability is the continuously increasing amount of silting within the reservoir.

More crops are now being grown during the dry season at the scheme. Many farmers now double-crop their production of vegetables during the dry season. This was not possible before the scheme was rehabilitated.

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Date of Meeting: September 11 2014

People met, and titles: Issah Abukari, current Water Bailiff, Gida Irrigation Scheme  
Mustapha Iddrisu, previous Water Bailiff, GIDA Irrigation Scheme (Retired)

Organization: Union of Bontanga Farmer-Based Organizations (FBOs)

Address: Bontanga Irrigation Scheme, Tamale, Ghana

Telephone, fax, e-mail: Mr Abukari: 024 672 8396  
Mr. Idrissu: 024 924 2525

Representing NORC Tom Easterling, Collins Owusu, Nana Ama Oppong-Duah

Purpose of meeting: Meeting with water bailiffs to obtain information on how to determine the amount of water used in the irrigation scheme on a daily basis as against what is required to ascertain the efficiency of the scheme.

Person drafting notes: Collins Owusu

From the meeting held with the Bontanga Irrigation Scheme manager, we realized there are no records on the amount of water being used on the scheme. The means to measure this flow is to calibrate the existing weirs in the scheme which needs to be read by technical officers on daily basis. The GIDA office managing the scheme lacks technical officers to do this job even if the weirs were calibrated.

A meeting with the anchor farmer, Solar Harvest also revealed that the water bailiffs do not open the canal gates fully to get water to the extreme end of the canal where the company has its water intake point. There was therefore the need to have a meeting with water bailiffs to know how they determine the amount of water they allow into the scheme.

**Meeting with Issah Abukari**

Mr. Abukari is a farmer and member of one to the FBOs on the Bontanga Irrigation Scheme. He is the water bailiff in charge of the right bank canal of the scheme. He acts as the water bailiff because GIDA does not have technical officers on the scheme. During our meeting, Mr. Abukari provided the following information:

Mr. Abukari has been the water bailiff for the right bank canal since Mr. Iddrisu (water bailiff, GIDA) retired. According to him, he was taught on how to open the gates by the former water bailiff depending on which lateral he wants to get the water to but doesn't know how much water gets into whole system. He said the retired bailiff taught him the number of times to turn the gate key (handle) depending on the schedule of laterals to be served. He said he normally opens the

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gate from 6am-6pm but sometimes earlier. He gave his schedule of opening of the gates as follows:

Dry Season

Lateral 1-7: Monday – Tuesday

Lateral 8-14: Wednesday – Thursday

No gate opening on Fridays because they have to go to the mosque.

He opens the gate on Saturday only if some farms did not get adequate water.

Wet Season

Gate is only opened when there is no rain.

He said he picks up the key for gates from the scheme manager's office every morning. An agreement was made with him to get a simple table for ticking off the number of hours he opens the gate as a means of tracking the amount of water that goes into the system. He could be assisted by any of the GIDA's officers present when he picking the key from the office.

He said that the reason why the anchor farmer and some of the farms at the end of the canal don't get water is because some of the farmers at the upstream of the canal diverts water on days they are not supposed to. This reduces the amount of water that gets to those at the end of the canal.

He said GIDA use to give him a gallon of fuel and some engine oil for his motorbike every week but it is no more coming. He requested if we could be of any help to that effect to make his work easier.

**Meeting with Mustapha Iddrisu**

From the previous meeting with Mr Abukari, he revealed he was taught how to operate the irrigation gates by Mr Iddrisu (GIDA, Retired). A meeting was then held with Mr. Iddrisu to get more information on the operation of the canal gates. Mr Iddrisu was the water bailiff for GIDA until he went on retirement and was succeeded by Mr. Abukari. He is now a farmer on the irrigation scheme. He provided the following information:

Operation of the gate was from Monday-Friday, 7am-5pm. Operation on Saturdays are based on special request by farmers. He gave the schedule of irrigating as follows:

Lateral 1-5: Monday – Tuesday

Lateral 6-8: Wednesday – Thursday

Lateral 9-12: Friday

He said laterals 3 and 10 has sub laterals 3A and 10A respectively making a total of 14 laterals. He said the maximum number of turns of the gate key to open the gate fully is 160. His normal turns was usually 80. It only goes higher sometimes during the dry season.

When he was asked if he has any idea about the flow of water per each turn of the gate key, he said that he was been directed by the technical officers at GIDA office at that time on how many turns to be made on each day so he has no idea about the flow. He said he recalls that, the technical officers had a chart for reading the number of turns to be made which he believes

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would contain the flow per each turn. He said none of the technical officers is on the scheme now. Some have been transferred or gone on retirement.

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Date of Meeting: September 13 2014

People met, and titles: Abukari Tidow, Water Bailiff

Organization: Golinga Farmers Cooperative (GFC)

Address: Golinga Irrigation Scheme

Telephone, fax, e-mail: 024 077 0490

Representing NORC Tom Easterling, Collins Owusu, Nana Ama Oppong-Duah

Purpose of meeting: Meeting with water bailiffs to obtain information on how to determine the amount of water used in the irrigation. This is to know how the water is being managed because there has reports on shortage of water during the dry season.

Person drafting notes: Collins Owusu

Mr. Abukari Tidow is a farmer and member of one to the FBOs on the Golinga Irrigation Scheme. He is the water bailiff in charge of the right bank canal of the scheme. During our meeting, Mr. Abukari provided the following information:

Dry Season

Water is delivered on the field on three (3) days, Wednesday, Thursday and Friday. This is done for both right and left bank canal. The following shows the schedule for the scheme at the initial stages of the crops:

Lateral 1, 2:	Wednesday	7am – 4pm
Lateral 3, 4:	Thursday	7am – 4pm
Lateral 5:	Friday	7am – 12pm (7am – 4pm for the Left bank canal only)

During the late stages of the crops each canal is opened 8am – 12pm on each of the 3 days for both canals.

Wet Season

They have never irrigated during the wet season.

He stated that there is always shortage of water of during the last two months of the dry season. Water is supplied to all fields but the farmers don't get enough water as they require because the water is rationed during this period. Rationing is based on personal judgement. He added that the shortage of water is due to siltation of the reservoir and also the spillway height being too low to contain enough water during the wet season. He said that the spillway now spills almost all the time during the wet season because of the height being lower than the height before the reconstruction of the spillway. This spilled water should have been stored in the reservoir for use in the dry season.

When asked to describe how he operates the irrigation gates, Mr Abukari provided the following information:

He said the gate opening is tied to the laterals to be served on a particular day. He was trained on how to operate the gates by GIDA technical officers who used to be on the scheme. He was

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taught the number of turns to turn the gate key to get water to the laterals he is supposed to. The operation is as follows:

Lateral 1, 2: 9 turns

Lateral 3, 4: 15 turns

Lateral 5: 25 turns (full gate opening)

He said GIDA used to provide them with books in which they keep daily records of hours gate was opened and the number on turns of the gate key. This data was then sent to GIDA every month but this was stopped about 2 years ago. They are not given the books anymore. He has no idea about how much water gets into the scheme per each turn of the gate.



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Date of Meeting: September 15, 2014

People met, and titles: Vitus Ayingayure, Regional Director, Tamale

Organization: Ghana Irrigation Development Authority (GIDA)

Address: PO Box 425, Tamale, Ghana

Telephone, fax, e-mail: (M) + (233) 244 802 956

Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with GIDA Regional Manager to review GIDA scheme management for the Bontanga and Golinga irrigation schemes, and to learn of any changes that are contemplated for the operations of the two schemes.

Person drafting notes: Tom Easterling

The GIDA regional office in Tamale is responsible for around 45 water schemes located within 8 districts in the general Tamale area. These include dugout ponds for livestock and domestic use. The irrigation schemes include 1) Bontanga, 2) Libga, 3) Golinga, 4) Dipali, 5) Sogo, 6) Dinga, 7) Buipe, 8) Yapei, 9) Wambong, and 10) Karimerga. All the schemes require that water is pumped, with the exception of Bontanga and Golinga, which are gravity flow. The three schemes at Dipali, Sogo, and Dinga are under construction with funding from the African Development Bank.

Mr. Ayingayure clarified that both Bontanga and Golinga are under the technical direction of the Tamale office, although Bontanga is treated as a cost center of GIDA headquarters in Accra. The Bontanga scheme deals directly with GIDA-Accra in terms of financial issues.

During our discussions with the scheme farmers at Golinga, the consultants were informed that the new spillway at the irrigation reservoir appeared to be at lower elevation than was the previous spillway that was destroyed by a flood. When we asked Mr. Ayingayure if this is, in fact, the case, he responded that the spillway was reconstructed at the same elevation as the previous spillway. However, the reservoir now holds less water than before, due to severe silting. Furthermore, due to heavy erosion of the embankment (the reservoir dam) it was not technically feasible to raise the elevation of the spillway. Consequently, under existing irrigation practices the available water is insufficient to provide water for 40 hectares of crops (including rice production) during the height of the dry season. He further explained that MiDA's initial planning did not include the spillway renovation, which accounted for around 50% of the cost of the entire rehabilitation of the Golinga scheme. MiDA did not have funds available to increase the height of the embankment, which would have enabled the spillway to be at a higher elevation leading to greater water storage at the reservoir. Furthermore, funds were not available to extend the area of the irrigation scheme to the 100 hectares that were initially planned; nor was sufficient water available to irrigate 100 hectares during the dry season. He estimates that the water depth in the reservoir is no more than three meters, and that the reservoir holds only 40% of the amount of water that was originally intended.

He confirmed that the present amount of the irrigation service charge (ISC) is GHC 100 per hectare per year for Bontanga and GHC 150 per hectare per year for Golinga. After the two schemes were rehabilitated it was initially planned to establish high irrigation charges of around GHC 450 but the farmers strongly protested. It was later decided to establish the ISC at the

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current low rate, but with the intention to progressively increase the rates. The established amount is essentially the rate for the dry season, since hardly any irrigation is used during the rainy season.

In earlier times, until around 1999, GIDA linked the payment of the ISC with other activities such as equipment service and fertilizer distribution. In other words, an individual farmer's ISC payment had to be up to date before the farmer would be provided other services, such as land preparation. When this policy was in effect, farmers had a non-payment rate for ISC that was close to zero. However, in approximately 1999, GIDA changed its policy to make the farmers, themselves, responsible for collecting the ISC and the collection rate plummeted. That has been the situation since the current policy went into effect.

Mr. Ayingayure justified the higher rate for ISC at Golinga compared to Bontanga because the smaller scheme at Golinga is more expensive to manage and also reflects local conditions and "management issues". It is based on what is required. He also said that Bontanga farmers are "more difficult" to deal with than are Golinga farmers. Golinga farmers agreed to pay the moderately higher amount, whereas Bontanga farmers agreed to only GHC 100.

Mr. Ayingayure said that presently it is not possible to measure the amount of water flowing into the irrigation schemes at Bontanga and Golinga. Some years ago, GIDA attempted to install metering devices but was not successful (one device was installed but it eventually was washed away). There is not even a depth meter at the Bontanga reservoir to measure the water depth. GIDA has no records of any past measurements. Furthermore, there is no institutional memory for past experiences, since most of the older staff have retired and have not been replaced. For example, the Bontanga scheme manager retired and it required several months to name his replacement. Previously, Bontanga had six technical officers but now there are none, with the exception of the scheme manager who also works as agricultural officer.

The irrigation consultant mentioned that the water bailiffs at the two sites had referred to calibration tables that existed earlier. These tables defined the relationship between the amount of water that is released from the reservoir into the main canals, based on the number of turns of the screw mechanism that raises the gate at each canal entrance. For example, with 10 turns of the screw mechanism, 0.1 cubic meter of water would be released into the canal, and so on. Without these relationship tables, or developing new tables, it would not be possible for the water bailiffs to know how much water is being released. Mr. Ayingayure said that GIDA does not have any records of calibration tables.

The current method used for water management at the two schemes is to send water into different zones of the irrigation scheme on different days. This is the main responsibility of the water bailiffs and the lateral canal leaders. However, the amount of water that flows into the different canals is not presently being measured.

A difficult problem that presently exists at the scheme is that the irrigation plan is not respected. Farmers go at night and divert the flow of water to their farm, to the detriment of those farmers who are authorized to use the water. "When farmers are in charge, that's the way they are" he explained.

The consultant asked Mr. Ayingayure if it was GIDA's policy to abdicate responsibility for water management to the scheme farmers. We remarked on the apparent timidity of the scheme managers at both Bontanga and Golinga to take charge of the scheme and to assert their authority

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over scheme operations. He said that the main problem is that GIDA is short of personnel and has only a limited budget for scheme maintenance. The farmers have to run the schemes.

Mr. Ayingayure provided possible contacts for local hydrological service companies that would be able to calibrate the entry gates that provide water to the main canals at the two schemes.

Mr. Ayingayure mentioned that he had been in discussions with Mr. Emmanuel Darkey, an agribusiness entrepreneur and marketing agent for agricultural products, to work as the Scheme Management Entity (SME) for Bontanga and Golinga schemes. He said that Mr. Darkey is presently visiting the two sites and will be meeting with the scheme managers as well as the officials of the farmer-based organizations (FBOs) whose members have their farm plots at the schemes. He said that the intent is to create a public-private partnership for scheme management, and to create the institutional structure that was originally envisioned, such as the Stakeholder Governing Board. The first step will be to sensitize the scheme farmers and to re-orient them to the required changes, particularly with regard to the required increase in the amount of the ISC.

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Date of Meeting: September 9, 2014

People met, and titles: Mr. Awal Adam  
Operations Manager and Board Member

Organization: Solar Harvest Limited

Address: Bontanga Irrigation Site, Tolon-Kumbungu District, PO Box TL 1908, Tamale, Ghana

Telephone, fax, e-mail: (M) +233 243 062 276 Adam@solarharvest.eu;  
www.solarharvest.eu

Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with the Anchor Farm Solar Harvest to review the status of its farming operations at Bontanga as well as the irrigation scheme and the institutional arrangements that are in place for irrigation services

Person drafting notes: Tom Easterling

Solar Harvest (SH) Ghana is a registered company in Ghana that is owned by two Norwegian partners, one of which is Mr. Steiner Kolnes, the Managing Director of the company in Ghana. The company originally began operating in Ghana in 2006 to produce jathropha plants as a source of bio-fuel and it made its first planting of production trials of the trees in the Volta Region in 2007. The Environmental Protection Agency approved its jathropha project in March 2008, and the company started planting soon thereafter. Investors came on board at the end of 2007, which funded the equipment purchases and during the first half of 2008 the company began producing oil from its test farms. It began exporting oil in 2008, and was severely affected by the financial crisis of 2008 - 2009. The company went bankrupt, and in 2009 Mr. Kolnes and his Norwegian partner bought the company and diversified into food production.

Mr. Steiner Kolnes was traveling during the consultant's visit, and was not available for the interview. The consultants interviewed Mr. Awal Adam, his deputy. Mr. Adam made the following comments during our interview:

The SH project has fully taken off. The 200-hectare center-pivot system was finalized in October 2013 but it could not be used due to problems with water distribution. The company is at the end of the Left Bank main canal and scheme farmers located near the canal intake from the reservoir frequently block the flow of water to farms downstream. This has occurred despite early agreements that Solar Harvest would have a continuous supply of water. The company requires a continuous flow of water for 48 hours to complete its irrigation cycle. In view of the problems the company faces with the flow of irrigation water, during the last dry season the company began constructing a collection pond into which water could flow intermittently, and where water could be stored to ensure a continuous irrigation operation for 48 hours. However, the pond could not be completed before the beginning of the rainy season, and the work had to be suspended after the rains came. SH plans to complete the pond at the beginning of the next dry season. Approximately 20 days' effort with heavy equipment will be required to complete the collecting pond.

The company is completely dissatisfied with the water management service that is provided. Although GIDA does the best job possible under difficult circumstances caused by its limited

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staff and inadequate budget, the responsibility for water management has been delegated to water bailiffs at the two main canals who are responsible for opening the main canal gates so that water can flow into the irrigation scheme. The bailiffs are scheme farmers who are completely non-cooperative with Solar Harvest. The bailiff for the Left Bank canal (where Solar Harvest is located) refuses to open the intake gates more than halfway because he is afraid that it would drain the reservoir. If the farm staff attempts to reason with the bailiff, he becomes angry. Sometimes the company must call GIDA to require that the water bailiff open the gate to provide water to the farm. SH purchased padlocks to keep the farmers upstream from opening the gates during time periods when the diversion of water was not authorized for them, but the farmers broke the padlocks. The MiDA plan was to put into place a scheme management entity (SME), but this has not been put into effect.

Mr. Adam would give GIDA a score of 7.0 (on a scale of 10.0) for its work in scheme operation. However, he would give the water bailiffs a score of only 2.0 on a scale of 10.0 for water management.

SH has been assigned a total producing area for its anchor farm of 305 hectares. The area that has been separately assigned to scheme smallholder farmers is 495 hectares. The total area that is contemplated for the scheme is 800 hectares, which is the calculated supply capacity of the reservoir for flood-irrigated agricultural production. Since Solar Harvest is using overhead sprinkler irrigation instead of flood irrigation, Mr. Adam considers that it could produce crops on 400 hectares with the same amount of water that would be used for 305 hectares of flood irrigation. Consequently, its intermediate-term plan is to bring a second center-pivot irrigation system that would enable the company to farm an additional 200 hectares.

Despite the current plan of providing SH with an available irrigated area of 305 hectares, and Solar Harvest's desire to eventually farm a total of 400 hectares, the company will be required to obtain the right to occupy the entire amount of land through a process of negotiating with the legal land owner, the Paramount Chief for the area. Thus far, SH only has authorization to farm 200 hectares. For a farm area exceeding 200 hectares, it plans to use contract farmers who are located at the Bontanga scheme. In addition, within the confines of the 200 hectares that have been awarded to SH, some 57 smallholders are occupying approximately 50 hectares. Instead of attempting to evict the smallholders, SH plans to allow them to continue occupying their farm plots, and will convert them into contract farmers. These smallholder farm plots will be irrigated by Solar Harvest's 200-hectare center pivot irrigation system.

In addition, Mr. Awal said that the company has an agreement in principle with the Paramount Chief to lease an additional area of 3,500 hectares that could be irrigated by lifting water from the White River, located only 3.1 kilometers from the farm center.

Surprisingly, Mr. Awal revealed that he does not know the precise location of the entire 305-hectare farm area that has been reserved for Solar Harvest. He has requested the land maps for the area from GIDA, but he has received no response. He assumes that the 305-hectare area is adjacent to the smallholder irrigated area. He does, however, know the location of the 200-hectare area that will be farmed during the first phase of the company's farming operation, since the company has surveyed this area. He also requires the Social and Economic Impact Assessment Report for the 305-hectare irrigated area.

In view of the current difficulties of obtaining water from the Left Bank main canal, the company may look to locate its additional farming area (the amount of area in excess of its

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present amount of 200 hectares) at an existing sump location that is served by the Right Bank main canal.

Solar Harvest started its farming operation as rainfed production at the beginning of the rainy season from April – September 2013. It is currently in its second production season, during the rainy period April – September 2014. Since it has never used its irrigation system, it has not yet paid the irrigation service charge. The amount that it will be required to pay will be GHC 100 per hectare per year.

During the company's first production season (April – September 2013) it produced 120 acres (48 hectares) of rice, along with a trial crop of five acres (two hectares) of soya. The soybean trials were successful, but the results of the rice crop were not stellar. The main problem was that the company had insufficient rice harvesting equipment on site. As a result, the harvest was extremely slow, and the quality of the grains was poor. However, despite the difficulty, the venture provided a slight profit. The current rice crop is showing good results and should be quite profitable. The company plans to store its rice at one or more of the agribusiness centers (ABCs) that were constructed by MiDA under the MCC Compact. That way, it will be able to obtain warehouse receipts financing for the rice while it is under storage. That will provide a good inflation hedge against Ghana's present high inflation rate.

During the current rainy season, Solar Harvest is farming an area of 150 acres (60 hectares) in rice, and 80 acres (32 hectares) in soybeans. Despite repeated inquiries, it was not possible for the consultants to determine why the company is not farming its fully identified area of 200 hectares during the current season. We believe that it is probably related to a limited availability of working capital financing. Mr. Awal confirmed that the expansion of its farm area from 200 hectares to an additional producing area of 200 hectares covered by an additional center-pivot irrigation system would be dependent on funds availability. Additionally, the company's long-term plan for a 3,500 hectare expansion would also depend on the availability of long-term capital.

Currently, the company's plans for the next dry season (October 2014 – April 2015) will be to plant its entire 200-hectare area in soybeans, with smallholder farmers within its farm area accounting for 50 hectares of production. It is also engaged in discussions with sweet potato exporters and chili pepper marketing companies for a second, dry-season crop mix of these two commodities. The company already has on site the equipment that it would need to produce sweet potatoes. If Solar Harvest's planned vegetable production as the second dry-season crop does not materialize, it may well consider a second crop of soybeans for the coming dry season. Ecobank is presently providing credit for the company's rice and soybean crops. However, credit for vegetable production will largely depend on the company's marketing arrangements for these crops. The USAID project FINGAP financial facility recommended the project to Ecobank.

In June 2014, the NGO, Vegetable Production Export Ghana (VPEG) arranged with Solar Harvest to provide the farmers that are located within SH's irrigated area with one week's training on production of chili peppers. After providing the training, VPEG has not returned. However, pepper production is a good business, particularly for smallholders.

While very little maintenance is being done for the irrigation scheme, the scheme is in generally good condition. Some of the canals are silted and contain trash, but there are no serious problems. Mr. Adam does not know how well preventative maintenance is being carried out.



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MiDA had planned that the government would provide “seed money” of US \$1.5 million to ensure the scheme would be operated and maintained for the first five-year period.

Solar Harvest proposed to GIDA to maintain the main canals and to recover the cost from the amount of its irrigation service charge. GIDA never responded to the offer, and the GIDA manager in charge at that time has since retired. Solar Harvest would still be willing to make this arrangement.

Before the end of the Compact, MiDA worked to organize a single governing board for both the Bontanga and Golinga irrigation sites. The joint Board included Solar Harvest, GIDA, MOF, representatives of the FBO Union, the District Assembly, and farmers’ representatives from both Bontanga and Golinga. Should a maintenance contract be awarded to Solar Harvest, it should be signed by the Chairman of the governing board. When the board was formed, MOFA held the position of Chairman.

Unfortunately, the governing board is no longer active. At a meeting in 2013, the board voted to turn over to GIDA all activities related to scheme management.

Initially, the Bontanga and Golinga irrigation schemes were both located within the Tolon Kumbungu district, and relevant government officials held similar positions at both schemes. However, in 2012 the district divided into separate districts, Tolon and Kumbungu, and Bontanga is now included in the Kumbungu district whereas Golinga is now in the Tolon district. As a result there has been some turnover in the government officials who had initially worked with the Bontanga scheme during its construction phase.

Mr. Adam provided the telephone contact information for the relevant MOFA district directors:

Golinga (previously was the MOFA representative for both schemes) – 02444 20986

Bontanga (recently appointed) – 02085 68802

In response to the question “what would you do differently if you were starting anew?”

- ♦ Mr. Adam said that he has learned that local people are quite difficult to deal with, and the company should have made a greater effort for good community relations sooner than it actually did.
- ♦ Had the company had better communications with the scheme farmers, so that they better understood the company’s plans and programs, some of the conflicts with these farmers might have been avoided.
- ♦ The land issue is a much bigger challenge than initially anticipated. The entire amount of 305 hectares of land is still to be sorted out.
- ♦ He feels that Solar Harvest should have finalized the issue with regard to the scheme manager, and not have left it pending.

Mr. Awal said that Solar Harvest would be willing to collaborate with the consultants to provide a monthly report on irrigation performance from the point of view of the anchor farm. The company has named a monitoring specialist that will be willing to collaborate to provide the needed information.

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Date of Meeting: September 8 2014

People met, and titles: Mohammed Al-hassan Adama, District Coordinating Director

Organization: Kumbungu District Assembly

Address: PO Box 40, Kumbungu, Ghana

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Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with the District Coordinating Director to obtain information on the operations of the Land Allocation Committee for the Bontanga irrigation scheme

Person drafting notes: Tom Easterling

The Kumbungu District was created in 2012. The District Chief Executive also serves as the Chairman of the Land Allocation Committee for the Bontanga irrigation scheme. The consultants were informed that the Chief Executive was not available due to illness, and we were referred to the District Coordinating Director. During our meeting, Mr. Adama provided the following information:

Mr. Adama has been involved in the Bontanga scheme since the new District office was formed. He began the process of meeting with GIDA and those involved in scheme management beginning in June 2012 as a means for reactivating the Land Allocation Committee (LAC). He met with the scheme farmers, Solar Harvest, and leaders of the FBOs. His concern is that the land at the scheme is underutilized, especially during the rainy season. With irrigation, he sees the opportunity to grow two crops per year.

He said that there are three categories of farmers: 1) Farmers displaced by scheme construction, who have been assigned permanent occupancy of their scheme; 2) local farmers who are indigenous to the area, and 3) smallholders from outside the scheme area who apply for an allocation of land at the scheme. Those farmers in the first category consider they have full ownership of the land, and are not pressured to fully utilize the land. The second and third categories realize that if they do not fully utilize their land, it can be taken away.

The purpose of the scheme is to put land into use fully for agricultural production. He sees the limited use of the scheme through a limited cropping system as the result of several factors:

- ♦ GIDA does not have land preparation equipment available, and privately operated land preparation equipment is in short supply. The MOAF had a program for distributing farm tractors, and Mr. Adama requested that GIDA apply for two tractors to serve scheme smallholders, but he is not sure if the GIDA followed through.
- ♦ Farmers have limited access to credit, which limits their ability to purchase farm inputs and to engage in crop production. Generally, financial institutions run away from providing



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agricultural credit. However, in reality, irrigated farming at Bontanga is highly profitable, but the financial institutions are not aware of this credit opportunity.

- ♦ Ghana's seed system is deficient, and farmers re-use their agricultural grain as seed, which results in non-uniform varieties of rice entering the market. This makes milling difficult, and is a constraint to marketing.

In general, Bontanga farmers are not using their land appropriately to reach optimum production levels. They should be growing more vegetables. For example, the market for chile peppers has high prices. Peppers are currently selling for CDG 100 in local markets for a large sack of good quality peppers.

He complained that the anchor farm, Solar Harvest should be more outgoing to the District Assembly. The local government could help the company to establish contact with local farmers and the FBOs.

Farmers need a strong platform and a strong voice to defend their interest.

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Date of Meeting: September 12 2014

People met, and titles: Ms. Amidatu Adam, District Extensionist

Organization: Ministry of Food and Agriculture (MOFA), Tolon District

Address: Tolon, Ghana

Telephone, fax, e-mail: (M) + (233) 242 053 625; Amidatu\_a@yahoo.com

Representing NORC Tom Easterling, Collins Owusu, Nana Ama Oppong-Duah

Purpose of meeting: Meeting with the District Extensionist of Tolon District to learn her viewpoint on the operations of the Bontanga irrigation scheme, and her current relationship with the Golinga scheme management.

Person drafting notes: Tom Easterling

Ms. Amidatu Adam, the Tolon district agricultural extensionist, is assigned to work full time with the farmers at the Golinga irrigation scheme. She provided the consultants the following comments during our meeting:

She strongly believes that when the spillway at the Golinga irrigation reservoir was replaced as part of scheme renovation, the elevation of the spillway was reduced considerably which means that less water is held in the reservoir. She said that presently, after the renovation, at the height of the dry season the reservoir has insufficient water to fully irrigate the 40-hectares of dry season crops that are grown. For example, during the last dry season, farmers at the Golinga scheme cultivated 30 hectares of rice and 10 hectares of vegetables crops. Since rice is a “thirsty” crop, the combination of rice and vegetables required more water than the reservoir could provide. Another indication that the spillway is at a lower elevation than it was before the renovation is that during the dry season, after a heavy rain, the spillway releases water into the main drain to a much greater extent than it did before scheme renovation. When water flows from the spillway into the exit canal leading to the main drain, it blocks the movement of traffic and results in complaints from the local residents who are inconvenienced. Traffic interruptions are much more pronounced than before. The Irrigation Engineer, Mr. Collins Owusu finds this possibility of lower spillway elevation to be entirely plausible. Furthermore, the reservoir is undoubtedly heavily silted due to smallholder farming that has been taking place for a considerable length of time in close proximity to the reservoir.

Despite these apparent limitations, the scheme farmers are very satisfied with the performance of the scheme, and feel that MiDA helped them a lot. Crop yields have increased: before, farmers typically harvested six bags per a half-acre of rice production, whereas now, they can harvest twelve bags for a half-acre plot. In other words, rice crop yields have doubled. Farmers can produce year-round at the scheme, and many farmers can produce two sequential vegetable crops during the dry season. Furthermore, some farmers are producing new crops at the scheme, such as ground nuts and cow peas.

As the District Extensionist, Ms. Adam provides numerous services for scheme farmers. For example, she monitors the farmers’ crop production; provides farmer training on good agricultural practices (GAP); advises farmers with regard to suitable inputs and the responsible use of pesticides, and provides pesticide training. She also manages demonstration plots at the

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Golinga irrigation site. In addition, she also collaborates with donor and NGO projects at Golinga, including IFDC, World Vision, and Amsig Resources.

Scheme farmers are members of seven different FBOs that are affiliated with the Golinga Farmers' Cooperative. These FBOs include farmers at the Golinga scheme, as well as non-scheme farmers. Most scheme smallholders farm ½ acre, while there are a few one-acre plots and also a few very small ¼ acre farms.

The scheme farmers are the de-facto scheme managers. While the farmers are doing a good job of day-to-day scheme management, there is a great need for a strong institution to take charge of scheme operations. If the farmers implement something, it does not “stick”. There is a need for a governing board to exercise authority over the farmers.

The water bailiff collects the fees for the irrigation service charge (ISC) and turns the money over to the Cooperative Treasurer who then deposits the funds into a joint GIDA-Cooperative account. Many farmers are not up-to-date on their payments.

Golinga farm plots are considered to be “family property”. Many of the original owners no longer exist. Many of the plots have been passed down to family heirs, or to third parties. Most of the scheme farmers consider this to be their land “for life”.

The Golinga irrigation service charge (ISC) is the amount of GHC 60 per acre per year, or GHC 150 per hectare per year. The Golinga ISC is greater than the Bontanga ISC, which is GHC 100 per hectare per year. Before the Golinga irrigation scheme was renovated, the ISC was GHC 30 per acre per year, or GHC 75 per hectare per year.

There is no effective structure to force the Golinga scheme farmers to pay their ISC. The farmers are themselves responsible for collecting the fee, and for handling the money. An entity that has authority over the scheme farmers should oversee this process. The Land Allocation Committee operates only in theory, with no authority to remove land from farmers who are behind on their ISC payments, or who no longer farm their respective plots. There is no effective penalty for non-compliance by smallholders of their obligations.

In terms of the sustainability of scheme operations, without better management the Golinga scheme is likely to collapse within five years.

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Date of Meeting: September 10, 2014

People met, and titles: Ms. Hawa Musah, District Director

Organization: Ministry of Food and Agriculture (MOFA), Tolon District

Address: Tolon, Ghana

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Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with the District Director of the Tolon District to learn her viewpoint on the operations of the Bontanga irrigation scheme, and her current relationship with the Golinga scheme.

Person drafting notes: Tom Easterling

In 2012, the Tolon-Kumbungu District was divided into the Tolon District and a new Kumbungu District. Ms. Musah was the previous MOFA Director for the combined district. After the combined district was divided into two districts, she was appointed as the Agricultural Officer for the Tolon District. Before the single district was divided, she was Chairperson of the combined Stakeholders Governing Board (SGB) overseeing the two schemes. During our meeting, she made the following observations:

After the SGB was formed, the board members were deeply involved in Bontanga's operations, and closely followed scheme developments. It was almost as if the board members were functioning as the scheme manager. Unfortunately, MiDA was unable to hire a Scheme Management Entity (SME) that would manage the two schemes together - both Bontanga and Golinga. It appeared as if the management opportunity was not attractive to private sector managers.

The anchor farm, Solar Harvest is a weak organization, and has struggled since it began operating. It started as a jathropha production investment and later changed to food crop production. It has never shown the leadership that the small farmers at Bontanga have needed to improve their livelihood. Everything has been difficult for the company. Its first rice crop was very poor and had very low production. The SGB organized a combine harvester for the farm, but the operator refused to harvest the crop due to its poor condition.

The scheme smallholder farming operation is limited by the limited availability of agricultural equipment for land preparation. Farming operations at Bontanga are quite inefficient, since most agricultural practices are done manually. MOFA brought combine harvesters for rice harvesting, but the equipment was Chinese-made, and of poor quality, so the effort was a failure. The SGB helped to arrange for a rice buyer from the South to provide equipment services and be paid with rice produced by the smallholders. The farmers did not pay for their equipment services, and this venture also failed.

The Bontanga scheme farmers are de-facto owners of their farm plots. Despite its statements, GIDA is reluctant to remove farmers from the scheme that are not farming their plot. The Paramount Chiefs should be involved in the allocation of land for scheme farmers, since they could better control who has use of the land.

Mrs. Musah believes firmly believes that the small-scale farmers are better off now than they were before the scheme was renovated. First, they benefited greatly from the MiDA training they

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received for crop production, and the support to FBO development that was provided. Their agricultural practices have definitely improved, and they have access to the drying pads and storage warehouses that MiDA provided to them.

After the SGB was formed, the members met several times at the IFDC office in Tamale, but after the IFDC office closed it was difficult to arrange meetings. After the new Kumbungu district was created, the make-up of the SGB changed as well. Finally, after it was seen to be impossible to establish a SME for Bontanga and Golinga with the result that MiDA's concept for scheme management was not put into effect, it was decided to revert to the previous method for scheme operation, whereby the scheme would be managed jointly by GIDA and the scheme farmers. However, the main problem is that at present, the Government of Ghana (GOG) has no budget for operating the irrigation schemes. MOFA is undergoing a financial crisis with no operating funds. For example, the plant protection office has a staff of four officers, and zero budget for fuel this year. Ms. Musah has a single, twelve-year-old pickup for her office, with no budget for maintenance.

The operations of the Bontanga scheme are not sustainable. There are no funds available for maintenance.

A complicating factor for the Bontanga scheme is the poor payment history of the irrigation service charge (ISC) by Bontanga scheme farmers. This reflects GIDA's weak management capability. The situation at Golinga is much different. If farmers do not pay their ISC, they are removed.

When asked to rate the performance of the Bontanga scheme on a scale of 1.0 – 10.0, Ms. Musah rated the operation at 6.0.

The three major failures at the Bontanga scheme were 1) MiDA's inability to hire a scheme manager; 2) the limited involvement of the local Chiefs in scheme operations, particularly for the assignment of farms at the irrigation schemes, and 3) the poor performance of the anchor farm, Solar Harvest.

At the Golinga irrigation site, Ms. Musah has an agricultural extension officer at the service of the scheme farmers. The officer's contact information is the following:

Extensionist Amida, Tel. 024 205 3625

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Date of Meeting: September 11, 2014

People met, and titles: Iddrisu Musah, District Director

Organization: Ministry of Food and Agriculture (MOFA), Kimbungu District

Address: Kimbungu, Ghana

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Representing NORC Tom Easterling, Collins Owusu, Nana Ama Oppong-Duah

Purpose of meeting: Meeting with the MOFA District Director to review the agriculture program in Kimbungu District and the relationship between the MOFA office and the Bonganga irrigation scheme.

Person drafting notes: Tom Easterling

In 2012, the Tolon-Kumbungu district was divided into two separate districts, aptly named the Tolon district and the Kimbungu district. The previous Agricultural Director of the combined district, Ms. Hawa Musah became the new head of the Tolon district, and Mr. Iddrisu Musah was appointed Director as the new director of the Kumbungu district. He previously worked as Deputy Director in the combined district office under the direction of Ms. Hawa Musah.

Since Mr. Musah was appointed to his current position in late 2012, he did not have an opportunity to participate as a member of the Stakeholder Governing Board for the Bontanga irrigation scheme, and was not very knowledgeable of scheme operations. By the time that Mr. Musah was appointed MOFA District Director, the management of both the Bontanga and Golinga schemes had reverted to GIDA.

He expressed his opinion that the Bontanga irrigation scheme is working well, in that irrigation water is flowing to the smallholders and they are able to irrigate their crops as required. The FBOs that were formed with MiDA's assistance continue to operate at the service of their members, although the groups are not as cohesive as they originally were. He sees the scheme management as being totally ineffective. He believes that the scheme is a "white elephant" because of weak management. Farmers do what they want at the scheme. There is no control.

MOFA has now been decentralized. The district offices are now part of local government. The local political leader is the District Chairman, who is head of the Assembly.

He lamented the high rate of inflation that is affecting the farmers in the Kumbungu district. For example, during the previous (2012-2013) crop year, the (subsidized) price of compound fertilizer was GHC 51 per bag, whereas this year the price ranges from CDG 95 – 100 per bag. Similarly, the price of sulfate of ammonia has increased to a range of CDG 85 - 90 from an average (subsidized) price the previous season of GHC 39 per bag. Beginning this crop year, the government fertilizer subsidy has been eliminated, which has resulted in a doubling of the price.

Furthermore, MOFA's program of "block farming" whereby agricultural inputs are provided on credit during the production season to groups of contiguous farmers at zero interest with the loan repayment being made in-kind, has been suspended by MOFA headquarters for Kumbungu district due to the high default rate by small farmers for credit repayment.

At the same time, MOFA offices are undergoing extreme budget limitations. The district office has a staff of four people, but there is no available funding for fuel. Mr. Musah uses a motorcycle

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for transport that he received from a USAID project. Since there is no fuel allowance, he must provide fuel for the motorcycle from his salary, for official transport.

The government developed the irrigation schemes for increased agricultural production. If farmers are unable or unwilling to farm at the scheme, the plots should be released to others. Some Bontanga farmers do not farm their fields, as a result of their feeling of “entitlement” to the land; consequently, there is little outside pressure on the landholders to farm their plots. As a result, many Bontanga farmers rent their land to third parties. As head of the Land Allocation Committee at Bontanga, the District Chairman will work closely with the local chiefs to re-allocate the land away from those farmers who are make insufficient use of their farm plots. The District Chairman, as political leader, has the authority to enforce the land use requirement. Unfortunately, the District Chairman has been ill for some time, and unable to carry out his required functions. The local chiefs must be involved in land allocation decisions, since they are the traditional land owners. Furthermore, since government never paid the required compensation to the local chiefs when the land was originally taken for the irrigation scheme, then the chiefs remain the rightful owners of the land.

Mr. Musah assigned a score of GIDA’s operation and management of the Bontanga irrigation scheme at 7.0 on a scale of 10.0: Farmers are getting the water, and they can cultivate their fields; and agriculture is taking place. The major problems are the land allocation and the limited payment for the ISC.

As to the reason why only limited vegetable farming is done at Bontanga during the rainy season, many of the Bontanga farmers cultivate upland areas as well. They can have access to larger plots in uplands areas, whereas in Bontanga they are limited to plot sizes of only 1-2 acres.

In terms of the overall impact of the Bontanga irrigation scheme on Ghana’s agriculture, the SARI research institute has introduced new, productive rice varieties. For example, Jasmine rice seed is doing particularly well. With good management, farmers can obtain 20 bags per acre. Furthermore, there are lots of vegetables going to Tamale during the dry season that are produced at the Bontanga irrigation site.



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Date of Meeting: September 18, 2014

People met, and titles: Sammy Akagbor, Manager, Scheme Management Entity  
Mr. Lawrence Kuwarnu, Irrigation Engineer

Organization: Post Agric Associates, Scheme Management Entity, Torgorme (SME)

Address: Torgorme, Ghana

Telephone, fax, e-mail: Mr. Akagbor (M) + (233) 208 132 484; postagric@yahoo.com  
Mr. Kuwarnu (M) + (233) 262 365 725

Representing NORC Tom Easterling, Collins Owusu

Purpose of meeting: Meeting with the Post Agric executives to obtain information on the situation and outlook of the Torgorme irrigation scheme, and to be informed on scheme management and maintenance by the SME.

Person drafting notes: Tom Easterling

Messrs. Akagbor and Kuwarnu provided the following comments during the interview:

Mr. Akagbor was previously the GIDA operations manager, and assumed the position of scheme management entity for Torgorme after he had retired from GIDA. During his tenure at GIDA, he saw numerous donor-funded irrigation schemes that failed, primarily due to poor scheme management.

The management contract between Post Agric Associates (PAA) and the Stakeholder Governing Board (SGB) at Torgorme was signed in February 2012. Both MiDA and GIDA were witnesses. The management contract is presently in place. MiDA took the Torgorme scheme over, effective December 19, 2014. The SME was supposed to take over the management role and “be on the ground”. However, due to a lack of funding, this was not possible.

The scheme management concept is that of public-private partnership (PCC) with PAA as the private partner.

Under MiDA’s contract with the scheme construction contractor, Erdmark, the responsibility of the contractor ends with the tertiary canals. No irrigation infrastructure was constructed within the smallholder farm plots. The smallholders will be hard-pressed to take the water from the tertiary canals onto their farm. There are no furrows or ditches to control the flow of water – only the bare ground.

Earlier this year, the SME did land allocation for the entire lot of 887 scheme farmers. Mr. Akagbor’s operating strategy is to ensure the farmers feel as if they “own” the scheme. The land demarcation was difficult. For example, two different survey companies quoted a price of GHC 50,000 to survey the scheme to know where to locate the farmers, but this price was well beyond the SMEs ability to pay. The SME asked the 15 FBOs that operate at the scheme to each provide 10 people to help with the scheme demarcation, but none were forthcoming. The FBOs are not sufficiently well organized with the necessary internal discipline to provide the requested people



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to help with the demarcation. Consequently, it took several months to complete the land allocation.

The SME convened a meeting with the 14 mid-size farmers at the scheme and reached an agreement with them for a special assessment of GHC 1,000 per farmer along with the pre-payment of their ISC in the amount of GHC 1,000 that together generated sufficient funds (GHC 32,900) to cover the cost of the demarcation.

The SME is assisting the mid-size farmers to apply to EDAIF for credit to purchase either sprinkler or drip irrigation equipment to be used on their anchor farms under a long term financing arrangement with a commercial bank that is the beneficiary of an EDIAF grant for on-lending in support of contract farming. PAA would like to organize the mid-size farmers in time to begin production during the coming dry season, beginning in October or November 2014. For example, Viva City Farms has been assigned an 11-hectare plot within the irrigated area, and currently has an outgrower program composed of 314 farmers who are members of five FBOs at the scheme. Vita City has also been selected as the recipient of 500 hectares of land within the scheme expansion area that is being developed under the Ghana Commercial Agriculture Project (GCAP). Another anchor farm, Queen Organics, is an exporter of organic vegetables. This company has been assigned 6 hectares within the irrigation scheme, and plans to develop a contract farming program with 38 outgrowers. Yet another mid-size farmer, 3-A's Agribusiness, has been assigned an area of 10 hectares within the scheme area, and will establish an outgrower program with three FBOs. A female mid-size farmer, whose company is known as Jokopan, was assigned 5 hectares at the scheme and has been assigned two FBOs as contract farmers. The owner of Jokopan was named "best chile pepper exporter" during 2013. Vegpro, the original anchor farm, has not yet started its outgrower program involving scheme farmers. However, it has been assigned 5 FBOs as contract farmers. Vegpro is the recipient of a matching grant from GCAP and with grant funding support is developing a 64-hectare anchor farm (corresponding to one center-pivot irrigation system) on the Vegpro farm property. A total of 75 smallholders will farm the center pivot irrigation area that will comprise a net area in production of 60 hectares. Vegpro has been supported by the development consulting NGO, ACDI-VOCA, to help arrange the matching grant financing. This NGO also trained the Torgorme scheme farmers for approximately one year under the training program funded by EDAIF to produce Vegpro crops.

Mr. Akagbor was highly critical of the work of the construction contractor, Erdmark. When the scheme was turned over to MiDA in December 2013, the engineering contractor, SNC Lavalin, presented a lengthy document of construction deficiencies. Mr. Akagbor enumerated many deficiencies that he has observed, including 1) no scheme operations manual has been provided; 2) the canal gates have not been calibrated, to determine the amount of water that flows into the canal at different openings; 3) the scheme has not yet been tested by running water throughout the entire scheme; 4) there is no maintenance equipment at the scheme.

The working relations between the SME and the anchor farm, Vegpro are strained because Vegpro has "stolen" its 75 contract farmers that will grow baby corn on Vegpro property using the center-pivot irrigation system, from the scheme farmers that have been permanently assigned farm plots. Mr. Akagbor sees this as hampering his management activity since it is doubtful that the 75 farmers can manage their farming operation at Vegpro, as well as their assigned plots within the scheme. The umbrella organization for scheme farmers, the Torgorme Area

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Cooperative Farmers' Union (TAC) has aligned with Vegpro during the conflict, and relations are strained between the SME and TAC as well.

Under its contract with MiDA, Erdmark (the scheme construction contractor) was required to plow the fields within the scheme in preparation for turning the scheme over to the smallholders. The SME arranged for the smallholders to use their farm plots at the scheme to grow rainfed crops during the rainy season, once the fields had been plowed. Unfortunately, due to contractor delays and extremely slow progress, only about half the assigned area was plowed in time for the smallholders to plant their crops for the current rainy season. However, just about all the scheme smallholders who were able to plant their crops during the current rainy season, chose to plant maize.

The irrigation service charge (ISC) for the Torgorme scheme has not yet been fully settled. Post Agric Associates (PAA) will deal with this "in due course" after the irrigation scheme has been handed over to GIDA. At that point, the company can begin operating fully as scheme manager, and the farmers can begin growing their crops. Mr. Akagbor believes that the amount of the ISC will be a function of the farmers' incomes and the type of crops that they grow. The amount of smallholder income will depend considerably on marketing considerations, in addition to how well the need for a certain amount of ISC is communicated to the farmers. This will essentially be a training exercise. GIDA has experienced difficulty in establishing the ISC at Bontanga because, first, Bontanga is an old project and poor habits have become engrained. Also, Bontanga is a "difficult area", socially. Torgorme is entirely different, and Mr. Akagbor does not expect any problems in establishing the ISC.

PAA will be required to install a management information system that can be used to monitor scheme operations including parameters such as the amount of water released, smallholder crop production in terms of area planted and amounts harvested, and farmers' incomes. He is presently using the services of a Dutch consultant who is linking PAA to management information system development experts in Holland. These experts will help PAA to develop a platform for creating its database.

In Mr. Akagbor's opinion, the furrow (flood) irrigation system that was designed by MiDA's irrigation consultants will not give good results. The fields are not level, and in some cases the water must be pumped from the irrigation canals onto the smallholder plots, since the plots are at a higher elevation than is the water in the tertiary canals. He plans to work with the scheme medium-scale farmers to help them apply for EDAIF-financed credit from participating banks, such as UT. Under this program, EDAIF deposits loan funds free of cost with the financial institution (FI) and the FI on-lends the funds to the designated borrower. The cost of the credit to the borrower is 12.5 percent per annum, with a term of several years for equipment loans. The medium-scale farmers would use these loans to purchase irrigation equipment, as required for drip or sprinkler irrigation. Mr. Akagbor wants to begin the process with equipment loans, which would be followed by seasonal production loans to the medium-scale farmers to purchase inputs required for their outgrower programs with smallholders. For example, the anchor farm for chili pepper production would provide hybrid pepper seed to her outgrowers. The farmers would jointly produce their contracted products for the anchor farm, which would withhold payment from crop purchases to service the bank loan.

When the Torgorme irrigation system is delivered to GIDA in December, Mr. Akagbor believes that the mid-sized anchor farmers at the scheme will play a key role in scheme operations, and

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will assume a leadership position in organizing the smallholders that are assigned to them as contract farmers. They will have to purchase and install pumping equipment for their farms to ensure effective irrigation. This will take time to put into effect. Mr. Akagbor's objective is to have a minimum amount of disruption to scheme operations as a result of the GCAP. Most likely, the furrow irrigation system for smallholders will have to be changed to drip or sprinkler irrigation systems. It is anticipated that EDAIF will finance the irrigation equipment that would be required for smallholders, as well as that for medium-scale farmers. He believes that by the end of the third year after the scheme has been turned over to GIDA, production output will be normal. However, a key issue will be the institutional strength of the FBOs.

Since the scheme has not been placed in operation, there is presently no maintenance issue. The current issues are the contract deficiencies, and the non-completion of the work that was contracted. After the scheme has been turned over to GIDA, it may require from six months to a year to sort out the contract deficiency problems. For example, one task that will need to be done is to seal the earthen canals with clay material.

During the consultant's visit, Mr. Akagbor received good news that the Minister of Trade and Industry has requested that EDAIF, a funding agency within the Ministry, to approve grant funding in an amount equivalent to three years' ISC to the 887 scheme smallholders that would be provided to PAA as start-up working capital to initiate scheme management operations. The following is a copy of the letter signed by the Minister of Trade and Industry.

To Comply with the  
Number and date of this  
Letter should be quoted

Our Ref: SC/1000/12216

Your ref/No. \_\_\_\_\_



Ministry of Trade & Industry  
P.O. Box 105 91  
Maseru, Africa

Tel: 00262 202 685000 / 547100  
Fax: 00262 202 685400 / 542410

10<sup>th</sup> SEPT 2014

**REQUEST FOR FUNDING SUPPORT FOR PAYMENT OF IRRIGATION SERVICE CHARGES  
ON SPONGEFT BANK IRRIGATION PROJECT BY SMALL HOLDER FARMERS**

The Ministry of Food and Agriculture (MOFA) has requested for grant funding support of Osh 690,800 from the Export Trade Agriculture and Industrial Development Fund (ETAIF) to be utilized as an irrigation Service Charge (ISC) already payment on behalf of 880 smallholder farmers lined up to undertake vegetable farming in the Tongoch Area using water from the Kpong Left Bank Irrigation Project. The farmers are expected to pay the approved Scheme Management Party (SMP) predetermined fees for the use of the water and related services. The SMP is tasked to take full care for the management and maintenance of the irrigation infrastructure.

The subsidy has become necessary because of the fact that the anticipated revenue to be generated from farmers' operations and crop harvests to pay for the irrigation water is not expected to reach the required critical mass until after the end of third and year. To ensure that adequate funding is available to the SMP for its operation during the first three years the Ministry of Food and Agriculture is requesting for funding support from ETAIF.

It would be recalled that at the onset of the previous stages of the project the Ministry of Food and Agriculture acted as a catalyst of farmers' interest, committing to the provision of additional resources from Ghana Government to ensure the successful completion and sustainable management of the irrigation facility after the close of the Millennium Development Authority (MDA) project which provided the bulk of funding for the infrastructure works.

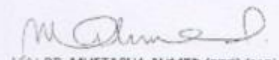
At the close of the MDA funded project, a request was made by MOFA to ETAIF through the Ministry of Trade and Industry for an amount of US\$650 million which was approved and released in 2012 for the completion of the irrigation infrastructure.

The current request for funding from ETAIF constitutes a complementary request aimed at supporting the farmers to meet their obligation to the SMP to enable the latter undertake the operation and management of the facility.

In view to the Export Trade Agriculture and Industrial Development Fund the proposal and application of the Ministry of Food and Agriculture and I recommend for the favourable consideration of the Board, the approval of an amount of Osh 690,800 as a grant for supporting the payment of irrigation Service Charge by the 880 smallholder farmers registered to participate in the irrigation project.

The funds are to be applied for the operation and maintenance of the Kpong Left Bank Irrigation Scheme over a three year period as per the disbursement schedule provided by MOFA.

Counting on your cooperation in this matter.

  
MAJ. DR. MUSTAPHA AHMED (RTD) (MP)  
ACTING MINISTER

THE CHIEF EXECUTIVE  
EDAIF  
ACCRA

CC

THE HON MINISTER  
MINISTRY OF FOOD AND AGRICULTURE  
ACCRA

THE HON. DEP. MINISTER (CROPS)  
MINISTRY OF FOOD AND AGRICULTURE  
ACCRA

THE CHIEF DIRECTOR  
MINISTRY OF FOOD AND AGRICULTURE  
ACCRA

THE CHIEF EXECUTIVE  
GHANA IRRIGATION DEVELOPMENT  
AUTHORITY  
ACCRA

*15/9/14*

Date of Meeting: September 17, 2014

People met, and titles: Christopher Sitsole Amelio, Officer

Organization: Post Agric Associates, Scheme Management Entity, Torgorme (SME)

Address: Torgorme, Ghana

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Representing NORC Tom Easterling, Nana Ama Oppong Duah

Purpose of meeting: Meeting with the TAC chairman to learn his opinion and that of the cooperative members on the Torgorme scheme operations.

Person drafting notes: Tom Easterling

Mr. Amelio is the field manager for Post Agric Associates (PAA), the company that was selected through public tender to manage the Torgorme scheme. The SME was selected on April 3, 2012. Since the system is technically under construction, the SME has not yet begun to actively manage the irrigation scheme. However, the company says that it will not be able to manage the Torgorme scheme without startup funding from government. Considerable financing will be required for a period of at least two years to cover the costs of administering the irrigation system before sufficient revenue is realized from water sales to cover the SME operating costs.

Mr. Amelio made a surprising revelation that instead of the 450 hectares that has been reported as the total area of the Torgorme irrigation scheme, the irrigated area is actually only 386 hectares. When the consultants asked “how is this possible?” his response was “ask the Engineers”. Of this total amount available, approximately 50 hectares will be assigned to around 14 medium-scale farmers. The remaining area of around 335 hectares will be assigned to 887 smallholders, who have already been selected as scheme farmers. Those farmers who previously farmed at the scheme location and were displaced as a result of scheme construction have been assigned one acre each, whereas other “migrant” farmers who were not displaced by scheme construction but have been assigned plots at the scheme will be assigned ½ hectare each. That way, the entire number of 887 smallholders will be accommodated.

One of the medium-scale farmers at the scheme will be Viva City Farms, an anchor farm that will contract with scheme smallholders as outgrowers. Viva City Farms will also be assigned a farm area of around 200 hectares within the Torgorme expansion area once the extension of the Torgorme irrigation scheme has been completed by the Ghana Agricultural Commercialization Project (GCAP) that will be funded by the World Bank and USAID.

In view of the delays in operating the irrigation scheme, PAA pressed GIDA to allow the scheme smallholders to operate their farm plots at the scheme during the current rainy season (May-October), under rainfed conditions. The scheme construction contractor, Erdmark, was required to plow and condition the land before turning the scheme over to GIDA, and the land preparation was scheduled to be completed and the land ready for planting before the rainy season began. However, the contractor was delayed and only around 200 hectares were prepared in time to use the land during the current rainy season. Most farmers whose plots are located near the second main canal (MC2) benefitted from early plowing and with abundant rainfall during the rainy season, their maize crop yields are high. However, those farmers adjacent to the first main canal



(MC1) whose planting was delayed as a result of delayed land preparation are having poor maize crop yields.

Of the total number of scheme farmers, approximately 250 farmers received inputs as outgrowers to Viva City Farms. It is planned that all the medium-size farmers at the scheme will use contract farmers as outgrowers.

Both Viva City Farms and Vegpro applied to the GCAP for matching grants to develop their outgrower programs.

PAA has assessed the sixteen medium-size farms at the site an amount of GHC 2,000 each as advance payment for their irrigation service charges. This generated a total amount of GHC 32,000 that the company used to survey the smallholder plots as required to locate and lay out the smallholder plots that were assigned. The company has received no other source of funding since it was assigned the contract to operate as SME.

PAA applied to EDAIF for a grant to provide startup capital that it needs to operate the scheme. However, the grant was not approved by the EDAIF Board because PAA is a private company and should have its own source of capital.

The construction contractor is presently in the “defects liability period” of the construction contract for the Torgorme irrigation scheme. During this period, the contractor will be required to complete all outstanding works, as well as the defective works that were identified during the construction phase of the contract. The report of contract deficiencies was completed by MiDA and SNC Lavalin and provided to the contractor on December 19, 2013. Defective work includes a) canal siltation, b) cracks in the canal lining, and c) failure to construct some of the required drains. Non-completed work includes i) some tertiary canals were completed only half the required length; and ii) some canals banks were not graveled. However, the contractor is non-responsive and little of this work has been completed. The SME recently wrote a technical report on the status of the irrigation scheme. Mr. Amelio believes that the construction contract should be terminated and another contractor hired to complete the work.

Once the defects liability period of the contract has ended, it is doubtful that the scheme farmers will be able to irrigate their crops. The main problem is that several farmers who are assigned to a single large field will be required to layout and construct a field ditch to carry water to their individual plots that is parallel to the tertiary canal, and will also be required to provide drainage for the entire field. Crops must be laid out in rows, with furrows to carry irrigation water to the crops. These tasks will likely be beyond the capabilities of most small-scale farmers. The smallholders will not likely be able to begin farmers when the irrigation scheme is turned over to GIDA.

Mr. Amelio said that the amount of ISC proposed by PAA is GHC 577 per acre per year. This amount has not yet been negotiated with the scheme farmers. PAA needs a grant in the amount of three years’ of irrigation service fees to fully operate the system. Otherwise it does not have sufficient working capital to operate the scheme. The company has been operating the scheme since April 3, 2014 with no income from irrigation services, since the scheme is technically under construction. Its contract for SME services is for a seven-year period.

Mr. Amelio believes that the scheme farmers will be required to install pumped, sprinkler irrigation at their scheme to overcome the problem of irrigating crops on undulating, non-level land. Furthermore, he said that some of the farm plots are at a higher elevation than the irrigation

canals, which means that in these cases, it will be required to pump water to irrigate the crops. He further believes that export vegetables cannot be suitably produced with flood irrigation; instead, sprinkler irrigation will be required for exports.



Date of Meeting: September 17, 2014

People met, and titles: Emmanuel W. Ezzo, Chairman

Organization: Torgorme Area Cooperative Farmers Union (TAC)

Address: Torgorme, Ghana

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Representing NORC Tom Easterling, Nana Ama Oppong Duah

Purpose of meeting: Meeting with the TAC chairman to learn his opinion and that of the cooperative members on the Torgorme scheme operations.

Person drafting notes: Tom Easterling

The consultants were introduced to the TAC Chairman by the ACDI-VOCA country manager while visiting the Vegpro office at the Torgorme irrigation scheme. The consultants interviewed the Chairman during our return travel to Accra from a visit to the Torgorme scheme.

The Torgorme Area Cooperative Farmers Union (TAC) represents all 887 farmers who have been assigned plots at the Torgorme irrigation scheme. TAC was formed in 2011, and includes 15 farmer-based organizations (FBOs). The scheme farmers live in seven local communities in the Torgorme area.

The land where the Torgorme scheme is now located was taken by government for the irrigation project around four years ago. The people who were farming land in the area at that time were dislocated, and have not had access to their farm areas since they were taken from them. The land they previously farmed went into the project and as of now there have been no results. All the farmers from three communities lost their entire land holdings, whereas some of the farmers living in the remaining four communities lost only small farm plots. Those who were dislocated were expecting to be re-settled on irrigated farmland in 2012, then 2013; and now 2014 is almost over and the land is still not available. The scheme farmers are complaining about the delay in scheme operations.

Things are not working as they should at the irrigation project. Mr. Ezzo gave the following examples:

Water does not flow from many of the tertiary canals into the fields. Some of the fields are at a higher elevation than the canals carrying the water.

Only the primary canals are cement-lined. Some of the earthen canal walls at the secondary canals have washed away due to the rush of water entering the canals. In some locations the cement wall of the primary canal is cracked. In many places the soil from the exposed shoulder of the primary canal (the area above the canal lining) has eroded and is silting the main canals. Weeds are growing inside the canals in these locations.

During a long rain that occurred this past May, many farm plots were flooded because the drainage system could not quickly remove the water. It appears the drainage system was clogged.

Around 20 farmers who were doing rain-fed farming at the scheme lost their crops due to flooding.

Post-Agric Associates, the scheme management entity (SME) tested the scheme around 3-4 months ago and wrote a report on the results. The consultants should request a copy of the report.

The scheme engineers say that any work required within the farm plots is the responsibility of the farmers themselves. However, many farm plots contain 5 acres (2 hectares) or more, which could be farmed by as many as 10 farmers. The farmers will be required to plan and construct their drainage network within each block to remove excess water from their fields within the larger blocks. This will require land survey work, drainage design, and in some cases the excavation of fairly large drains. Much of this work will be relatively costly and will be beyond the technical capabilities of the smallholders. Furthermore, for effective flood irrigation the fields should be levelled. Presently, the land is undulating, with some areas under water and some areas above water when it rains. Flood irrigation will be quite difficult.

Also, according to Mr. Esso, the gates controlling the flow of water into the different canals must be calibrated to determine the amount of water flowing into the canal.

The maintenance of the entire canal network (primary, secondary, and tertiary canals) will be carried out by the SME. The irrigation service charge will fund the cost of maintenance.

Scheme farmers have been fully trained for irrigated farming, and are fully prepared to operate their farm plots under irrigated conditions. EDIAF (through ACDI-VOCA) is training scheme farmers on the production of baby corn to be contracted by the anchor farm, Vegpro. Earlier, scheme farmers were trained on the production of birds' eye chile peppers and butter-nut squash. They have been trained on the requirements for exporting to European markets under GlobalGap standards. When MiDA was operating, this agency trained the farmers on topics such as farming as a business, contracting, value chain advantages, and technical production methods. The scheme farmers are ready for irrigated farming, but the scheme is not.

Mr. Esso lamented that since the Stakeholder Governing Board was formed, there has been no support provided to the Board, for travel expenses related to board meetings. This is a government project, and board members should receive a stipend.

Another problem that will affect the scheme operations is that smallholders will require startup capital to begin farming at the scheme. Mr. Esso, on behalf of TAC, approached EDAIF with a request to provide needed capitalization for smallholders. His concept was acceptable to EDAIF, and he now is in the process of developing a business plan. He said that the startup capitalization would include the cost of the irrigation service charge.

Date of Meeting: September 17, 2014

People met, and titles: Jagdish Patel, General Manager

Organization: Vegpro Ghana Limited

Address: After Kpong Powerhouse, Torgorme-Fodzoku-Juapong Road, PO Box PMB MD 201, Madina, Accra, Ghana

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Representing NORC Tom Easterling, Nana Ama Oppong Duah, Collins Owusu

Purpose of meeting: Meeting with the Vegpro Ghana to learn the anchor farm's situation and outlook, the status of its farming operation, and the progress made on its contract farming program.

Person drafting notes: Tom Easterling

Mr. Patel said that Vegpro recently suffered a labor strike but now the situation has returned to normal. The company is presently producing baby corn at the Vegpro farm, which is labor intensive and requires lots of manpower. The labor situation is difficult – for example, absenteeism is high, and he said that today around 15 workers are absent from a labor force of around 320 people. The company's work force is approximately 350 people, including professional staff. The company is in the process of negotiating a collective bargaining agreement with the union. However, the workers tend to bypass the union and come to Mr. Patel directly with their problems. There is no union hierarchy that can be followed.

The company is producing baby corn for export to the UK, a few hectares on onion for local markets on a trial basis, and also has a test plot of export chili peppers. Baby corn is quick growing – its production cycle is only about ten weeks.

Vegpro's area for farm production includes four center-pivot irrigation systems, each covering 64 hectares. This year, the company is farming a different 64-hectare center pivot area every three-month period so that by the end of the year, it will have farmed 256 hectares, which is 25% of its production capacity. Mr. Patel said that he wants to "sort out the production issues of baby corn first", before expanding into other crops. He is proceeding cautiously. He is not presently interested in producing grain and legume crops such as maize and soybeans because the cost of the equipment that would be required for their production is very high. He does not wish to engage in intensive labor activity such as producing maize for manual harvest because it is difficult to obtain labor (and quite likely, as a result of Vegpro's labor problems). Furthermore, the company has "free zone" status and can import its packaging material and other inputs duty-free, which is a benefit to the company. However, to qualify for free zone status, the company must export a minimum of 70 percent of its production. Therefore, its production of crops for local markets is limited to a relatively small amount of 30 percent.

Mr. Patel lamented that many farm chemicals for short-cycle vegetable crops are not available in Ghana. Most available pesticides are of longer duration than is the life of the baby corn that he grows, and therefore cannot be applied to his export products.

The farm is presently exporting approximately 5 tons of baby corn to the UK every day, and will soon expand its output to 7 tons per day during the peak consumption season. Vegpro makes

only limited use of the Perishable Cargo Center (PCC) at the KIA airport, even though Vegpro's parent company is the minority owner of the PCC. The reason is because Vegpro must use British Airways (BA) to reach its customers in the UK, and the PCC does not have a service contract with BA. Should Vegpro export its products through the PCC, it would have to use another carrier such as Lufthansa, which has a contract with the PCC, which would require the trans-shipment of its baby corn through Frankfurt. However, when BA has limited cargo capacity for Vegpro due to other shippers booking the available space, the ability to trans-ship through Germany is a good option. Previously, BA had 10 flights per week to the UK, but at the end of August 2014, it reduced the number of its flights to only 7. Air cargo space on BA is now more difficult to obtain.

Vegpro is in the process of being awarded an 80% – 20% matching grant from the Ghana Agriculture Commercialization Project (GCAP) for a US \$500K investment in a contract farming venture with Torgorme scheme farmers. GCAP will provide US \$400K and Vegpro must invest US \$100K to fund a contract farming program with 75 smallholders that will farm approximately 0.9 hectare plots within the Vegpro farm, with irrigation services and farm inputs provided by Vegpro. The matching grant will cover the cost of a 64-hectare center pivot overhead sprinkler irrigation system, land clearing, farmer training, and the extension of an electric power line for 6.6 kilometers to provide electricity to the irrigation pump. The company has already brought equipment for land clearing, and the electric company is now extending the electric power line. ACDI-VOCA will provide training to the smallholders for crop production. The 75 smallholders for the Vegpro outgrower scheme were selected from the 887 smallholder farmers who have been assigned land at the Torgorme irrigation scheme.

The piped system that provides water to the Vegpro farm is working well, with no problems. Mr. Patel would give a score of 8.0 (on a scale of 10.0) to MiDA for the installation of the piped water system. However, the smallholder scheme is yet another story. Mr. Patel was highly critical of the work that has been done on the Torgorme irrigation scheme. Some of his observations were the following:

- ♦ The scheme has not started operating.
- ♦ The main access road to the scheme is non-compacted earth, and becomes nearly impassible during the rainy season.
- ♦ Two siphons that permit the water in the main irrigation canal to pass beneath two small rivers are poorly installed. There are no protective gates at each end of the siphon to prevent people or animals from falling into the siphon. The adjacent roadways where the siphons are constructed tend to flood when it rains.
- ♦ Some of the irrigation pipes that are used to convey water from the intake to the Vegpro farm are exposed, and must be covered to prevent damage to them.
- ♦ A large quarry of approximately 3-1/2 hectares was left by the contractor as an open pit at the end of the main canal when the construction work ended.

Mr. Patel believes that the following steps will be required to complete the Torgorme irrigation scheme:

- a) The scheme must be tested to make sure that it functions: that all scheme farmers have access to water when water is flowing through the scheme. Thus far, only the main canal has been

tested. No one knows if irrigation water would reach all the scheme smallholders, nor how long would be required for the water to completely fill the scheme.

- b) The blocks of land within the scheme cover 5-7 acres, with one block serving as many as 12 farmers. There is only one inlet for each block. It is not clear if the group of smallholders at each block will be able to divide the water between themselves. Internal water distribution within the blocks must be verified, as well as the smallholders' ability to effectively drain the excess water from their plots.
- c) The cement lining in the main canals does not reach the top of the canal, so silting will be likely. None of the secondary or tertiary canals are lined, and erosion as well as silting will likely occur at these canals.

Mr. Patel is unsure of the capabilities and competency of the scheme management entity (SME) at the Torgorme scheme.

The anchor farm is now paying a small sum to the Water Resources Commission for the amount of water that it pumps from the Kpong Hydroelectric reservoir. Once the irrigation scheme begins operating, Vegpro will be required to pay the established irrigation service charge (ISC).

Mr. Patel estimates that Vegpro will achieve financial breakeven during 2015. Recently, Vegpro's exports have been limited as a result of the low summer demand in the UK for imported vegetables, since local production is abundant. However, exports should increase strongly beginning next month. The production schedule calls for an increase from the current level of six hectares to a total of nine hectares per week.

Vegpro is now planning its production schedule for its contract farmers. Vegpro has drawn 75 farmers from the 877 farmers at the Torgorme scheme to work on Vegpro's land, with a net irrigated area of 60 hectares. Vegpro also plans to work with 255 farmers as outgrowers within the main irrigation scheme area.

Vegpro is planning to utilize its entire 256 hectares of irrigated area during the next dry season. If crop production is successful on the 256 hectares, then Vegpro will consider increasing its producing area at some time in the future.

Vegpro started its farming operation in September 2012, and began producing in November 2012. The major problems and issues that the company has been required to face include labor problems, land quality (heavy soils), drainage problems, in-farm road conditions, and production scheduling. He said that he needs additional road equipment, and in hindsight, should have arranged to have access to sufficient equipment from the beginning of his farming venture.

At this point, the ACDI-VOCA Country Director joined the meeting in Mr. Patel's office and made the following contribution:

The defects period of the construction contract for the Torgorme irrigation scheme will be finished in December 2014. There is concern that the scheme will not be able to function as required, due to the deficiencies that exist. An important meeting is scheduled next week for all the scheme stakeholders, including MiDA, GIDA, Vegpro, the Ministry of Trade and Industry, and EDAIF, to discuss next steps and to determine when the scheme will be turned over to GIDA. As the current funding organization, EDAIF should be the entity to take charge. MiDA has not yet transferred the scheme to GIDA, and the contractor is still reporting to MiDA. All those involved should discuss these issues and resolve the problems.

Date of Meeting: September 5, 2014

People met, and titles: Mr. Oliver Taylor, Project Manager - Senior Engineer, Environment & Water

Organization: SNC-Lavalin UK Limited

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Representing NORC Tom Easterling

Purpose of meeting: Skype conversation with Mr. Oliver Taylor, head of the SNC Lavalin engineering consulting team for the Bontanga and Golinga irrigation schemes under the Ghana compact, and post-compact engineering supervisor for the Torgorme scheme

Person drafting notes: Tom Easterling

Mr. Bloomfield C. Attipoe, the Senior Rural Infrastructure Engineer at the Ghana Agriculture Commercialization Project (GCAP) referred the consultant to Mr. Oliver Taylor. Mr. Taylor has worked with SNC Lavalin, MiDA's irrigation engineering consulting firm at Torgorme, since the MCC Ghana Compact ended. Mr. Taylor has made periodic inspection visits to Ghana since the Torgorme irrigation contractor has entered the defects liability period. The next visit was planned to be at mid-September 2014, with the final visit scheduled for December 2014. However, on September 5, 2014 Mr. Taylor advised the consultant that he was supposed to visit Ghana this month for an inspection of the Kpong Left Bank Irrigation Project (KLBIP) works, but due to MiDA's cash flow problems and non-payment of SNC-Lavalin's invoices for the past 10 months, he had postponed his visit until further notice. He added "that is just one unfortunate outcome of the many delays and change in funding of the irrigation program".

Other observations made by Mr. Taylor during our conversation were the following:

#### Bontanga and Golinga

The northern schemes were rehabilitated, and it was therefore possible that some amount of smallholder irrigated farming activity could continue during the rehabilitation period. However, scheme management is now in the hands of GIDA, which has led to a hopeless situation where there is no scheme maintenance and no overall management of irrigation water at the scheme. In Mr. Taylor's opinion, in a very short period the scheme will be in a similar condition as it was before the renovation took place.

The Northern schemes have been rehabilitated a number of times in the past, and it is very likely that they will have to be rehabilitated again, unless there is better maintenance and water management. The schemes are simply not commercially viable under the existing method of operations. Before the schemes were renovated, the ISC was GHC 20 per hectare per year. After the Golinga renovation, GIDA announced that the ISC would be assessed at GHC 50 per hectare per year. However, an ISC of GHC 500 per hectare per year would be required for the schemes

to be fully viable, including a reserve for asset replacement and the provision of smallholder services such as marketing.

We discussed the problem that had been described earlier to the consultant, whereby Solar Harvest, the anchor farm that now operates at Bontanga had responded to MiDA's tender for the SME but its offer had been rejected as "non-responsive". Afterwards, MiDA invited Solar Harvest to make a scaled-down offer for scheme maintenance only, but the proposed amount of the ISC offered by Solar Harvest exceeded MiDA's upper limit of 20% of smallholder's income for irrigation charges. Consequently, the offer by Solar Harvest was rejected.

Subsequently, there was an agreement between MiDA and GIDA that GIDA would assume the responsibility for scheme management.

#### Torgorme

The Torgorme scheme is an entirely new scheme that has not yet begun operating. Work on the scheme is expected to be completed in December 2014. Smallholder farmers at the scheme are now producing rainfed crops, without benefit of irrigation, during the current rainy season.

The ability of Post Agric Associates, the Torgorme Scheme Management Entity (SME) to effectively manage the scheme is doubtful. The main problem is that the company has insufficient working capital to hire staff and purchase equipment needed to manage the scheme until the irrigation service charge (ISC) assessed on scheme producers reaches a sufficient amount to finance the operations of the SME.

Mr. Taylor said that there was an agreement between MiDA and the Ministry of Food and Agriculture (MOFA) that the ministry would subsidize the amount of the ISC for three years. Mr. Taylor is not sure if the MOFA subsidy would be turned over to Post Agric Associates for scheme operations.

Mr. Taylor offered to provide the consultant with copies of the SNC Lavalin completion reports for the three schemes.

Mr. Taylor will also provide contact details of Mr. David Casanova at the World Bank, who is knowledgeable of the bank's plans for the Kpong West Bank scheme.

In addition, he will provide contact information for Mr. Mwali Kuma, the SNC Laval Deputy Resident Engineer at the Torgorme irrigation scheme.

Date of Meeting: August 6, 2014

People met, and titles: Mr. Gary Merkley, Project Engineer

Organization: Millennium Challenge Corporation

Address: Chisinau, Moldova

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Representing NORC Tom Easterling

Purpose of meeting: Skype conversation with Mr. Gary Merkley, Consulting Engineer with MCC Moldova to discuss possible methods that could be devised in order that MCC could remotely monitor the performance of the irrigation schemes at Bontanga, Golinga, and Torgorme

Person drafting notes: Tom Easterling

Gary Merkley was one of the contacts provided by MCC as a possible consulting irrigation engineer for the post-Compact assessment of MCC's irrigation investments. The following is a summary of the Skype conversation between Tom Easterling and Mr. Merkley on August 6, 2014.

Gary Merkley is presently employed as an irrigation engineer with MCC in Chisinau, Moldova, where is working on a five-year project to rehabilitate smallholder irrigation schemes.

The consultant explained to Mr. Merkley that the Ghana requirement is to devise a recommended method for MCC to monitor the performance of the three irrigation schemes, in order to determine the appropriate time to schedule the planned impact evaluation of the schemes. The consultant mentioned that the method being considered might include taking measurements of water flow at critical points throughout the irrigation schemes, along with a periodic, written operating summary of scheme operations, possibly supported by a simple weather station.

He advised if a farmer survey is conducted, the questions should be carefully crafted to avoid bias. He said that "every farmer in the world complains that the cost of water is too expensive, and the water delivery service is deficient".

He also advised that in his experience, weather stations are not very effective, since checking the amount of evapo-transformation is "a long shot". Furthermore, unless they are under the control of a highly reliable organization, they tend to deteriorate and components frequently disappear.

The basis for any measurement should be to determine the amount of water that specific crops need. Quite frequently, farmers will over-water their crops, particularly when water availability is erratic. He suggested that a practical method to monitor water application is to use soil sensors (tensiometers) that can be placed at different depths within the soil and kept there for the growing season. These measure the soil water content and can determine the water deficit in the soil. These would be suitable for monitoring irrigation over a period of time. These can be purchased with a data logger, where data could be downloaded onto a USB-connected device. These would be installed at mid-field, marked by a stake, containing a battery.

To measure how well water is being delivered would require the use of a flume that is placed in the delivery canal. By measuring the velocity of water flowing through a known cubic area such



as a flume, the flow rate can be calculated. However, these require daily monitoring to determine the amount of water that is flowing. Also, the best location is in at key transfer points, such as at the intake where secondary canals receive water from the primary canal. Sometimes measurements taken in the main canals may not be totally accurate due to the rise in water level upstream from the flume.

In terms of farmer surveys, it would be good to start with a simple baseline survey to determine how satisfied the farmers are with irrigation service. These could be repeated at periodic intervals to determine changes in farmers' perceptions, in particular if improvements are taking place in water delivery methods.

He inquired if the farmers at the schemes are paying for water. The consultant told him that in theory, they are required to pay, but in practice, it is not likely that they are paying for irrigation water at Bontanga and Golinga. He emphasized that if farmers are not required to pay for water, they will not likely conserve water required for irrigation.

He recommended that we explore the possibility of combining farmer surveys with the use of canal structures (flumes in flat areas or weirs at inclines) to measure water flow at critical points. These structures can be constructed from metal or fiberglass and installed at a cost that is not excessive. (Care must be taken to ensure they are level).

The consultant mentioned that Collins Owusu had reported that the Kpong scheme had calibrated gates at check structures along the canals. He said that in his opinion, these devices located in the main canal are not sufficiently sensitive for precise measurement, due to their tendency to cause a rise in the water level in the canal that distorts the measurement. Their use is better in secondary canals.

He said that he could advise the NORC team on a part-time basis from home, when he is not working with the project. However, he will require maps of the irrigation schemes, and technical data.

Date of Meeting: August 12, 2014

People met, and titles: Mr. Herve Plusquellec, Irrigation Specialist

Organization: World Bank (Retired)

Address: Washington, DC, USA

Telephone, fax, e-mail: Tel.: +1 202 966 5956; plusquel@earthlink.net

Representing NORC Tom Easterling

Purpose of meeting: Skype conversation with Mr. Herve Plusquellec, private engineering consultant, to discuss possible methods that could be devised for MCC to remotely monitor the performance of the irrigation schemes at Bontanga, Golinga, and Torgorme

Person drafting notes: Tom Easterling

Herve Plusquellec was one of the contact persons provided by MCC as a possible consulting irrigation engineer for the post-Compact assessment of MCC's irrigation investments. The following is a summary of the Skype conversation between Tom Easterling and Mr. Plusquellec on August 12, 2014.

Mr. Plusquellec is a previous employee of the World Bank, where he worked for more than 20 years. As was the case with the earlier telephone interviews with other international irrigation engineers, the consultant explained to him that the Ghana requirement is to devise a recommended method for MCC to monitor the performance of the three irrigation schemes, in order to determine the appropriate time to schedule the planned impact evaluation of the schemes. The consultant mentioned that the method being considered might include taking measurements of water flow at critical points throughout the irrigation schemes, along with a periodic, written operating summary of scheme operations.

He wanted to know when the impact evaluation would take place. The consultant told him that it would likely be at least one year from now. He responded that it is the World Bank's policy to schedule impact evaluations no less than 5 years from the time when scheme construction has been completed.

He had downloaded and reviewed information that he had found on the Internet related to the three schemes, and had a basic familiarity with them.

He said that the setup for a monitoring system is based on many factors. The irrigation scheme should be divided into sectors and sub-sectors, and water measurement should be measured at the beginning of each canal by week and by month. If calibrated gates are available, the amount of flow can be determined by measuring the velocity per unit of time.

Another method is to use measuring weirs. Depending on the geometry of the weir, the flow rate can be calculated using a mathematical formula. The weirs are normally placed a short distance downstream from the entrance gate to a canal, and the flow can be measured when the gate is opened. The water depth must be measured 3-4 feet upstream from the weir. Staff time is required to take the measurements. Measuring weirs are normally placed downstream from each gate.

He suggested that when the consultant visit the Ghana irrigation schemes, he should plan to take digital pictures of 2-3 canal gates to send him as an e-mail attachment to give him an idea of the physical infrastructure that is available there.

He said that a typical evaluation of an irrigation scheme would monitor three factors: 1) agronomical factors, 2) financial factors, and the cost recovery of water delivery. First, a method must be devised to monitor the cropping intensity practiced by the farmers at the scheme, by determining which crops are being grown, and how many crops are produced annually. Second, the volume of water required per crop must be determined. That, combined with the irrigation efficiency will determine the required amount of water delivered at the intake to the irrigation sub-sector. The third factor is the collection rate for water service fees assessed on the water users. The best, of course, is 100%, but in some locations less than 50% payment is the norm.

He said that beginning this coming weekend, he and his wife would be traveling for six weeks, to visit his home country (France), and also the country where his wife was born. However, he will be available by e-mail during that time.

Mr. Herve Plusquellec's contact information: Telephone - +1 202 966 5956;  
plusquel@earthlink.net

Tom Easterling

**ANNEX 7**  
**RESPONSE TO STAKEHOLDER COMMENTS**

Comments	NORC Response
<b>GCAP</b>	
The report is good and presents a true and balanced picture of the state of affairs.	Thank you
<b>Corrections:</b> <ul style="list-style-type: none"> <li>a. GACP has been used in some places instead of GCAP</li> <li>b. Guinea has been used in some places instead of Ghana</li> </ul>	Noted and corrected
<b>General Comments:</b> A newly constructed irrigation scheme is hardly ever perfect. Some alterations and modifications are usually necessary to make it fully operational. This activity gradually improves the scheme so that it will operate as designed. As rightly noted in the report, sufficient length of time is required for the system to reach a normal steady state operating condition. This will require that the scheme is operated as it is and planned maintenance activities are carried out as scheduled. This is the only way for the irrigation system to reach optimum operating conditions.	The evaluation team is in agreement with this general comment. However, no change is required in the draft report.
<b>Comments on Kpong Left Bank (Torgorme) Irrigation Project</b> <p>The scheme is still under the control of the contractor ERDMAC as long as all the defects have not been corrected. Some of the defects can only be seen when the scheme is used even in its limited state. If we don't start using the scheme at this stage it will be difficult for the new consultant to identify all the defects that need to be remedied.</p> <p>The scope of works on each individual plot can only be determined when water has been put on each plot. It is important that this is done with the farmers as part of training them to be able to operate and maintain the system</p> <p>The scope of ERDMAC's work ends at the edge of the farm where the off-take is located. Land smoothing was done as part of the land development when the trees and stumps were removed. Leveling and on-farm drainage will be required on some plots depending on the location and topography. This can only be done in an "operational mode"</p>	<p>This additional information is useful and is available in this annex for readers of the report. However, no changes are required in the main body of the report.</p> <p>Note also, the evaluation team observed that land smoothing did not include land leveling at Torgorme; and that much work remains to be completed in order that smallholders are able to properly irrigate their individual plots.</p>
As indicated during the interview for this report, GCAP is engaged with Vegpro and some of the mid-size farmers. The process for the selection of a consultant to carry out the studies for the completion of the KLBIP is almost completed. The need to correct the deterioration and complete the existing scheme was taken into account in developing the scope of works for the GCAP intervention. The GCAP intervention includes modernization of the scheme to improve scheduling and overall water use efficiency. GCAP has completed evaluations for design and rehabilitation of the KLBIP, and contract will soon be awarded to begin rehabilitation.	The intervention by GCAP is considered to be a highly positive development for the three irrigation schemes that were constructed under the Compact. GCAP's intervention should help to ensure the long-term success of the schemes.

The main canal has been tested and it is able to supply water to the “Vegpro sump”. It is important for Vegpro to complete the installation of its own pumps as soon as possible. This is being supported by GCAP by funding the extension of electricity supply to the site. This development is important because Vegpro will spend less money on paying the electricity bills which it is currently doing because it has to pump water over a distance of more than 6 km to run the Center Pivot System;	Noted. However, no change is required in the draft report.
<b>Comments on Other MiDA Irrigation Schemes</b>  The remedy recommended for the Golinga and Bontanga Schemes are in order. GCAP is planning to improve the management capacity of the Water User Associations (WUA) to be able to better manage the schemes. Hopefully collection of ISC will improve. GCAP guiding the preparation of the WUA legislation, and the draft legislation will be discussed with stakeholders to finalize. Training will also be provided to farmers to improve their participation in the management of irrigation schemes.	Thank you for these comments. GCAP’s plans certainly have the potential to improve the returns on MCC’s investments.
The schemes will also be modernized to improve scheduling and improve water use efficiency  During discussions with the World Bank it has become clear that ISC can only be increased so much. Depending on only a single income stream from ISC is not sufficient to provide enough funds for scheme operation and maintenance no matter who is in charge.	Increased productivity and moving to higher-value crops by scheme smallholders would generate more revenue and better enable the farmers to pay the amount of the irrigation charges that are assessed.
What are the options for multiple income streams? This is an issue which needs to be addressed head on. An anchor farmer at Bontanga and a Scheme Management Entity (SME) will be a great help	The evaluation team is fully in agreement with this comment.
<b>Conclusion</b>  GCAP looks forward to working with MCC and MiDA to ensure that the objectives of the projects are met to the benefit of the farmers and to Ghana as a whole	Noted as a comment directed to MCC and MiDA. Continued support by GCAP will be very important to the success of the Torgorme Scheme.
<b>GIDA</b>	
Acronyms  1. EDAIF: Export Trade Agricultural and Industrial Development Fund 2. KIA: Kotoka International Airport also found on page 1 3. MoTI and not MITI on this page and page 11: Ministry of Trade and Industry	Noted and corrected
Page i on this page and throughout the report  1. “Bontanga” not “Botanga”	Noted and addressed

2. Be consistent with unit of area. Either express all areas in hectares or acres or use both simultaneously; putting one in brackets e.g. 800 ha (2000 acres).	
<p>Page ii. On paragraph 5 of this page, page 27 and throughout the report, farmers do not play leading role in scheme management as asserted by the author of the report. As far as scheme management is concerned, GIDA's policy is to ensure farmer participation as much as possible. Management is neither in the hands of farmers alone nor scheme management alone. Scheme management including water management and ISC collection, is a reserve for Scheme Management Unit (SMU) of each scheme. Farmers do not play leading role in the management of GIDA schemes but participate in their management.</p> <p>NB: Ultimately, GIDA intends to withdraw from management of all schemes which include Golinga and leave them in the hands of Scheme Management Entities or farmers while GIDA plays oversight role</p>	<p>While we acknowledge that a policy is in place for scheme management, as described by MOFA, our discussions with farmers revealed that the policy is not being implemented because of resource constraints and logistics issues.</p> <p>As such, we have not changed the content of the report.</p>
<p>Page ii. Last paragraph of this page: Farmers were trained and contrary to the statement in this report that farmers were not trained. All farmers on public irrigation schemes were trained with funds from Japanese Government between 2000 and 2004 and 2004 to 2006 under Small Scale Irrigated Agricultural Promotion Project (SSIAPP) and Farmers' Participation in Irrigation Management (FAPIM) respectively. It must however, be acknowledged that training is a continuous process. This is because, new farmers become part of the scheme year-in-year-out and new technologies are introduced. Under FAPIM, training needs assessment was initially done and used to development curriculum for the training</p>	<p>While this may be the case, interviews with framers indicated that the farmers who were originally allocated plots are not necessarily the current users of the plots. . Many of the plots have been passed down to family heirs or to third parties; as a result, farmers originally trained under SSIAPP and FAPIM no longer own the plots. We have added text to the report to clarify this point.</p>
<p>Page iii. Paragraph 2 of this page and throughout the report: when it comes to sanctions of farmers for not using their plots within a particular cropping season, the Land Allocation Committee is responsible. The committee is chaired by the District Chief Executive (DCE) and is established by law.</p>	<p>The report has been revised to acknowledge the established law. However, the reality, according to farmers, is that the sanctions are not enforced even when farmers do not cultivate their plots and payment of user fees is low. Farmers who don't comply, thus continue to have user rights to the land.</p>
<p>Page iii. Paragraph 3 of this page, page 15 paragraph 3 and throughout this document: Water management is not in the hands of farmers as reported here. It is in the hands of SMU. Opening of water from the reservoir to the secondary canals is done by farmers who are employed, trained and paid by SMU on behalf of Ghana Irrigation Development Authority (GIDA). Additionally, opening of water is strictly under GIDA irrigation Schedule. However, on-farm water distribution is done by farmers with farmers' leadership at the sectional, block and lateral level playing supervisory role.</p>	<p>Report revised to indicate that farmers manage the water on behalf of GIDA and receive a payment of GHC2.0/month.</p>
<p>Page iv, page 29, 23. Paragraph one and throughout the report: it was recommended that irrigation engineer carry out monitoring of the schemes.</p>	<p>The references on pages iv, 23, and 29 in the report pertain to MCC's request to NORC for a recommended approach for third party monitoring of intermediate outcomes related to the irrigation</p>

<p>It must be placed on record that one of the core mandates of GIDA is to monitor and evaluate irrigation schemes nationwide. It is therefore, recommended that GIDA which has multidisciplinary staff made up of irrigation experts (engineers, agronomists, agro-economists etc.) should be tasked with the responsibility of monitoring the schemes based on MiDA's indicators. After sometime, MiDA should evaluate performance of these schemes by employing a 3<sup>rd</sup> party to do so.</p>	<p>scheme. The 3<sup>rd</sup> party monitoring could use GIDA monitoring data; however, our understanding is that GIDA has been unable to systematically collect monitoring data for the 3 irrigation schemes due to financial constraints.</p>
<p>Page iv, page 29, 23. The project was implemented with minimum involvement of GIDA during project implementation. In spite of challenges the Authority faces, MiDA could have benefited from rich source of information and guidance</p>	<p>This comments contradicts official records indicating GIDA was part of the evaluating panel for the construction designs; selection of technical consultants (SNC Lavalin &amp; Royal Haskoning) for the feasibility studies; review of Final Feasibility of the projects prior to commencement of design phase; and review of final design reports. GIDA was also part of the monthly site meetings through-out the construction and rehabilitation of the irrigation schemes.</p> <p>As such, we have opted not to revise the document to indicate that GiDA had minimum involvement.</p>
<p>Page iv, page 29, 23. Bullet 10 on this page and bullet 11 on page 30 and throughout the report: The assertion that Torgorme appears to be in a situation of bureaucratic gridlock is not true. GIDA has played leadership role in Torgorme as a result of which EDAIF and Ghana Commercial Agriculture Project (GCAP) have come in to address outstanding issues on Torgorme Irrigation Scheme and so there is no leadership vacuum.</p>	<p>Based on our interviews and group discussions with farmers, anchor farmers, and other stakeholders listed in the annex of this report, there was no indication or evidence of GIDA's leadership that resulted in the EDAIF and GCAP support. As such, we have opted not to revise this portion of the document.</p>
<p>Page 2: Starting dates for construction supervision and feasibility studies were not provided on the table</p>	<p>SNC Lavalin contract execution date: Sep 10, 2009 for Lot 1 &amp; 3. Phase A Feasibility Studies commenced on Sep 24, 2009 and ended in Apr 2010. Dates for Phase B Design Stage: Jun 18 – Aug 20, 2010. MCC Approval for award of Works Contracts: Dec 6, 2010.</p> <p>Royal Haskoning contract execution date: Oct 5, 2009 for Lot 2. Phase A Feasibility Studies, Nov 5, 2009 – Jun 17, 2010. Phase B Design Stage Jun 19- Aug 20, 2010. MCC Approval for award of Works Contracts: Dec 6, 2010.</p>



	<p>Lot 1 works: Contract signed Mar 4, 2011. Commenced Mar 15, 2011 and completed 31st Jan 2012.</p> <p>Lot 3 KLBIP Works: Contract signed Jan 7, 2011. Commenced Jan 21, 2011, and completed Nov 2013.</p>
Page 3: Paragraph one of Pre-investment situation: what crops, yields of crops, number of farmers on the scheme and ISC recovery rate were used to arrive at average income for both dry and rainy season?	<p>Main crops were rice and maize, as stated in the report; other crops included onions and okra. We have added this information to report.</p> <p>All details on pre-investment situation are drawn from SNC Lavalin report (2010), which is on pg. 3 of our report.</p>
Page 3: On this page and page 7: Provide evidence of draw down analysis to arrive at possible irrigable area of 800 ha Bontanga Irrigation Scheme	Please refer to SNC Lavalin reports and feasibility studies, all of which were forwarded to GIDA through-out the implementation of the compact.
Page 3: Construction year of Golinga Irrigation Scheme is 1971 to 1974	Noted and corrected
Page 3: What were the yield and number of farmers that undertook lowland rice production under rain-fed conditions	Added to report
Page 5: Subheading should read: Kpong Left Bank or Torgorme Irrigation Scheme	Noted and corrected
Page 9: Subsection on Golinga: check to spell "farmers" correctly	Noted and corrected
Page 12: "Viva City Farms" instead of "Vita City Farms"	Noted and corrected
Page 13: Paragraph 5: should not be \$500K and \$400K but \$500,000 and \$400,000 respectively	Noted and corrected
Page 15 & 18: The assertion that "GIDA is passive in dealing with management issues is in contention. Under FAPIM and Joint Irrigation System Management (JISM) both sponsored by Japanese Government, scheme operation, maintenance and management (OM&M) are done by SMU comprising GIDA and farmers. Additionally, farmers who open water from the reservoir to the secondary canals are employed, trained, paid and worked under strict irrigation schedule. This cannot amount to passive approach to management. Farmers are only in control of on-farm water distribution under the supervision of sectional, block and lateral leaders. Collection of Irrigation Service Charge is done by farmers under the guidance and supervision of GIDA staff on the schemes.	<p>We note GIDA's assertion of an active supervisory role; however, KIIs indicated that farmers were in charge of opening water, maintaining tertiary canals and collecting fees. At the time of NORC's field visits in September 2014, GIDA had not played any major role in the scheme maintenance due to logistic and resource constraints.</p> <p>However, we have slightly modified the language on pgs. 15 and 18 in deference to GIDA's concerns.</p>

Page 16: Change TAC to TACFU	Noted and changed.
Page 20, 28: In addition to maintaining main canals GIDA also maintains secondary/lateral canals which require technical expertise that farmers are unable to provide. As a result of this maintenance is categorised into major and minor work. Apart from slashing of secondary canals, and tertiary canal maintenance, all other maintenance works fall in the ambit of major works which are carried out by technical staff of GIDA.	Noted. At the time of the visit, GIDA had not carried out any of this maintenance work according to key informants.
Page 28: Farmers do not lack knowledge in vegetable production but have inadequate knowledge in vegetable production	Noted; report language has been adjusted.
Page 30 and 31: Delete “either” in bullet 8 on page 30 and change “or” to “and”	Noted and corrected
Page 32: Paragraph 4: add more phrase to the last sentence to read“... it is recommended that the responsibility for scheme construction completion be in the hands of GIDA supported by MiDA.	MiDA is not working on Agriculture anymore and it would not be useful to make this recommendation in the proposed format from GIDA. Text modified to read 'It is recommended that the responsibility for scheme construction completion and subsequent operation be turned over to GIDA supported by EDAIF and other partners'.
Page 32: Separate the rest of the sentence from the beginning part.	Done
Page 32: Second paragraph of Subsection 5.0 Lessons Learned, last line: insert “by MiDA and GIDA” between “instituted” and “to.”  NB: This is because, in spite of the financial challenges, GIDA has invaluable experience in scheme development and OM&M	Inserted.
Page 33: Insert “all” and “three” into last line of the sentence to read: ... all the three irrigation schemes.	Noted and corrected
General comments: Amend <b>Major Findings</b> to reflect comments passed by GIDA on page 29 to 31	Given that this is a 3 <sup>rd</sup> party evaluation/review, we have opted not to change our findings and recommendations to reflect the comments of key stakeholders that were not corroborated by key informants. However, all stakeholder comments are listed in this Annex and are available to readers of this review report.
General comments: MCC should draw on extensive experience of GIDA and involve GIDA in irrigation development	Noted as a direct recommendation from GIDA to MCC

General comments: Irrigation sub-component of the Compact was started very late. As a result, much was not done in irrigation development. It is therefore, recommended that future irrigation components start as soon as the Compact begins.	Noted.
<b>MOFA</b>	
<b>General Comment:</b> The report is well written and the recommendations are consistent with the findings. It also provided sufficient information on the status of the three irrigation schemes. The recommendations will help improve the schemes' operations and design of future schemes going forward.	Noted with thanks.
<b>Specific comments:</b>	
Page 1 of the document indicated after that involvement of the Ghanaian irrigation engineer and a Ghanaian focus group leader in field work it was found inappropriate for them to participate in writing the report. The report should explain further why it was inappropriate, after the two had been part of the study team and participated in the field work. The two could have been used as key informants in the study.	Both consultant worked with MiDA or one of its key partners during the implementation of the irrigation projects. Hence, they did not participate in the analysis of the data collected during field visits, the writing of the report, nor developing key conclusions and recommendations. The report has been revised to clarify this point.
Page 2 of the report indicated that GoG has authorized additional amount of \$6.6 million to complete the remaining work at Torgorme irrigation scheme. It is however not clear from the report whether such amount was released or not.	Yes, the funds were disbursed. We have added this information to the report.
Page 10, paragraph 6 of the report also indicated the contractor experienced severe cash flow problems and so made limited progress. It will be important for the report to provide further information on the reasons accounting for the limited cash flows.	The team was not privileged to the financial position of the contractor so is unfortunately unable to provide details of this limited cash flow.
On page 11, 1 <sup>st</sup> paragraph, the report referred to a state of gridlock with different government agencies standing by as observers with no leadership or decision making being provided by any of them. The report is however silent on the roles that were assigned to these institutions regarding the construction of the schemes and whether MiDA had officially drawn the attention of problem to the GIDA, MoFA and MoTI.	The evaluation team is not aware of correspondence between MiDA and other stakeholders related to the assignment of tasks required to complete the work at the Torgorme Irrigation Project. However, it is the team's opinion that even if MiDA did not assign tasks to the other stakeholders, or request their assistance, in light of their general responsibilities under the Torgorme irrigation construction project, one of the stakeholders should have stepped forward to provide the leadership needed to finalize scheme construction.

	GIDA also played a role in the irrigation schemes at all three sites. GIDA staff were part of the monthly site meetings through-out the construction and rehabilitation of the irrigation schemes and, as such, were in a position to be aware of any problems that surfaced.
Page 20, paragraph 1 reports of dismal repayment of irrigation service charges by scheme farmers. The report was silent on the reasons for the low repayment.	There appears to be a long-standing culture of non-payment of irrigation charges by smallholders, particularly at Bontanga and Golinga. This culture of non-payment is exacerbated by the lax discipline by GIDA for the application of penalties on smallholders for non-payment of irrigation charges.  Changes made to report.
<b>Concluding Comments</b>	
Irrigation sub-component of the Compact was started very late. As a result, much was not done in irrigation development. It is therefore, recommended that future irrigation components start as soon as the Compact begins.	Noted.
GIDA provided detailed studies undertaken in the 1980s, including designs and as-built drawings, to MiDA consultants who undertook studies for the project that MiDA implemented. However, these documents cannot be traced due to the decision by MiDA to ignore all state stakeholders in the implementation of the irrigation component of the Project. The Project could therefore not benefit from the rich and extensive experience of GIDA/MoFA in irrigation development in the country.	Noted. However, this comment is at odds with information indicating that GIDA was part of the review of designs during the irrigation scheme design phase, as well as a participant in monthly site meetings during the construction stage.
There is no documentation on the FBOs that MiDA claims to have set up.	FBOs were identified by the various MOFA districts. The data base for all the FBOs and farmers were handed over to MOFA SIRD in February 2012.
<b>MCC EMC</b>	
I agree with the lessons but suggest that the unfinished irrigation scheme at Kpong should also be highlighted as an example of failing government commitment to results, whether enduring or not.	On page 10-11 of the report, we lay out how different parties contributed to the failure to finish construction and begin operations at Kpong. We believe it would be better to leave the discussion as is, rather than single the GoG out, particularly since the review by various government institutions (GIDA, MOFA, GCAP) has already taken place.