Proposal

Irrigation System

for

Vegetable Gardens

at

Rooiberg School

Dams for Africa
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Purpose

The students of Rooiberg School have started a fledging vegetable garden at the school (see figure 3) under the guidance of Emily Schneider. The aim is to teach the students new skills in agriculture, and to increase the level of nourishment in their diets. As the cultivated area increases they will be able to sell some of the vegetables to the community, and in so doing generate sufficient income to (1) purchase more seeds/fertilizer to grow even more produce, (2) operate and maintain the equipment used in the garden and, (3) eradicate poverty in the lives of all participants and their families.

Thus on 31st May 2002, the writer, representing Dams for Africa (DFA), was invited by Emily Schneider and the principal, Emily Malebye (see figure 2), to assess the current water supply, and propose ways of providing sufficient water to allow cultivation on a substantially larger scale. (Currently water is carried by buckets over long distances, severely limiting productivity).

Background

The current infrastructure consists of a borehole, which possibly still has a submerged pump, an 8m diameter reservoir, a old disused centrifugal booster pump, two tank-stands without tanks, two 5000 litre tanks on 5m high stands, and an electrical distribution board nearby. These components are shown variously in figures 1, 5 and 6. It would seem that the initial intension was that the borehole water should be pumped either to the 5000 litre tanks, or to the reservoir. Once the reservoir was full, its water was pumped via the powerful centrifugal booster pump (see figure 6) to irrigate the playing fields. Presumably this was done with sprinklers, but there is no evidence of this equipment.

On inspection, the reservoir was found to be empty, and the corrugated iron elements that make up its walls are severely corroded at the joints. The concrete base appears to be sound. The electrical switchgear for the centrifugal pump is missing, and it is not known if either the motor or pump is still working.

The location of the borehole could not be established during the visit and will require some investigation/exploration. It is therefore not known whether or not there is a pump in the borehole.

Proposed Irrigation Scheme at Rooiberg School

It is proposed that the existing unused 5m high stands be painted and that their rotten wooden platforms (see figure 5) be replaced. Thereafter two new 5000 litre tanks should be erected on these stands, and the necessary pipes should be connected.

For budget purposes it is assumed that after such a long interval the borehole pump is either stolen or is unserviceable, and hence a replacement has been budgeted for. Before this is done, the depth and yield of the borehole should be determined and a pump/motor purchased that has a slightly lower capacity than the borehole's 24 hour yield. To prevent the theft of the pump it is advisable to take certain security precautions. These should include (1) using galvanized pipes for at least 2m laterally and 6m vertically, (2) constructing a secure enclosure with a 10mm thick lockable lid, (3) concealing the borehole and security enclosure by ensuring that the lid is covered by at least 200mm of ground.

The irrigation system consists of 130m of 50mm ldpe pipe coming from the tanks and running along the highest ridge of the garden (along the fence), with 12mm dripper pipes coming off every meter (see figure 1). An example of a cabbage patch under drip irrigation is shown in figure 7,. while figure 8 shows how spinach can be similarly irrigated. (These picture are from another

project). Drip irrigation is strongly advised where limited water is available, as this is often the case with boreholes.

From this configuration, beginning with the borehole, and terminating with the dripper pipes, it is evident that the 8m reservoir, and the old centrifugal booster pump are not required at this stage, since the 2 x 5000 litre tanks will have more than sufficient storage capacity to cultivate the ¼ hectare area indicated on plan in figure 1, and shown pictorially in figure 4. However if ground further away is later developed for small scale farming, the expense of repairing and re-using the reservoir and centrifugal-pump may be feasible. There is also another ¼ hectare of land available east of the soccer field, and ½ hectare west of the soccer field. Clearly, developing these areas should only be considered once the students/community are proficient in cultivating the area shown in figure 1.

Table 1 - Rooiberg Food Gardens

	Item	Arranged by	Cost
1	**Repairs existing 6m tank stand**		
	Paint	DFA	250.00
	Labour costs to paint the stand [(d)]	Students	
	Material for new wooden platform	DFA	400.00
	Labour for above [(d)]	Students	
2	**Borehole**		
	Locate existing Borehole [(d)]	Community	
	Yield test on Borehole [(a)]	DFA	2400.00
	Installation of Pump and Motor [(b)]	DFA	11500.00
	Electrical Connections	DFA	2000.00
3	**Borehole security**		
	Excavation of a pit to given size [(d)]	Community	
	Supply and install secure enclosure [(c)]	DFA	4000.00
	8m x 40mm galvinised steel pipe and fittings [(e)]	DFA	600.00
4	**Installation of 2 x 5000 litre tanks**		
	Supply and install 2 x 5000 ltr tank complete with connections and ancillary pipework	DFA	7550.00
	Installation of a level control switch	DFA	500.00
	Filtering system	DFA	1000.00
	Excavation of trench from borehole to tanks [(d)]	Community	
5	**Irrigation pipes**		
	130 m x 50mm LDPE main line distribution pipe	DFA	650.00
	100 off 12mm drip saddles	DFA	160.00
	2500m x 12mm od class 3 LDPE dripper with 2 litre/hr hole at 500mm	DFA	4425.00
	Installation of drip irrigation system	DFA	1500.00
	Project management fee at 15%		5540.25
	All prices excluding VAT	Total	42475.25

Notes

(a) This is required in order to determine the strength of water up to a yield of 8000 litre/hr and to a depth of up to 100m. This information is required to correctly size the submersible pump.

(b) It is assumed that the existing motor and pump is either stolen or badly corroded/unserviceable, necessitating a new pump and motor. The price is based on the assumption that the borehole is within 20m of the existing tank, the depth of the borehole is 100m, and the water yield allows a 4000 litres/hr pump. This includes the cost of the pump, motor, cable, and the electrical controls.

(c)This enclosure will adequately secure the pump/motor against theft or sabotage. Its walls are 150mm thick and are made of reinforced concrete. It has a 10mm thick lockable lid, which is positioned 200 mm below ground level. This effectively conceals the location of the borehole/pump etc.

(d) No cost is reflected here as it is assumed that the students will make a 'sweat equity' contribution.

(e) This refers to a 2m x 40mm horizontal burried galvanised steel pipe connected via a 90^{o} bend to a length of 6m x 40mm galvanised pipe which goes into the borehole. This pipe is connected to the pump by means a 40mm class 6 HDPE pipe. This arrangement makes it even more difficult for a thief to remove the pump.

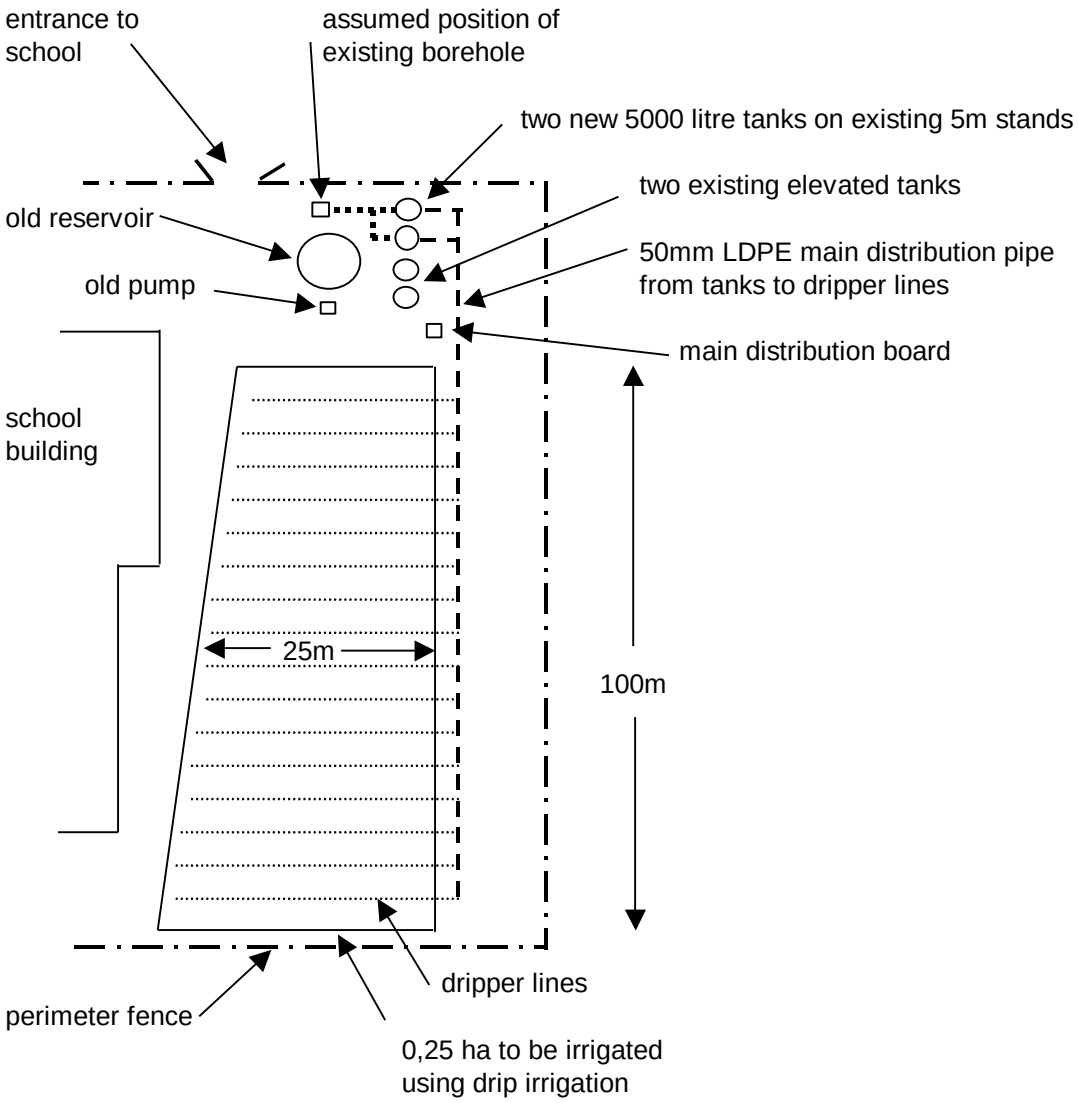

Figure 1 – Plan of proposed garden showing the assumed position of the borehole, the proposed new tanks, and proposed drip irrigation covering an area of 0,25 hectares

Figure 2 - The principle of Rooiberg school – Mrs Emily Malebye

Figure 3 – Existing gardens as seen on 31/05/2002 – Emily Schneider is in the background

Figure 4 – Area set aside for the gardens as seen from the higher narrower end (the photographer has his back to the tanks)

Figure 5 – view of existing 5000 litre tanks and vacant tank stands

Figure 6 – view of old centrifugal pump with reservoir on the left and electrical distribution board in the background

Figure 7 – Example of a cabbage that has benefited from drip irrigation. The project where this picture was taken was once very small, but today serves as a model of how emerging black farmers can produce superior crops.

Figure 8 – Drip irrigation, with spinach sprouting on either side of the pipes

About Dams for Africa

Dams for Africa are turnkey project engineers committed to the **sustainable empowerment of communities** in remote rural areas by means of dam-construction/water-supply, for irrigation/agriculture as well as purification/reticulation.

The firm recognises the need to be **flexible** and will tailor its involvement according to need, from minor consultations to relatively large turnkey construction projects.

The firm's contribution to a **typical project** would ideally be an initial feasibility study, followed by the design and supervision of the dam construction and related canals/pipes for irrigation to farms. The scope of the work may also extend to the construction of a water purification facility and related reticulation to houses.

Ideally **labour intensive** methods (that are at the same time cost effective) will be used in the construction process.

The firm is also in a position to provide the necessary hydrological, topographical, geological, ecological and social impact **studies**, and attend to the technicalities and legalities associated with a dam.

Dams for Africa fully appreciates the need to **network** and co-operate with partners such as:

1. *Community based organizations* that are in touch with the needs of the resident population.

The firm is aware of the importance of *community involvement* and is, if required, prepared to participate in all stages of this process. This would include a response-to-need request as the first step, assistance with visualization, participation in negotiations, recruitment and training of local residents for the construction stage, facilitation of training in subsequent agriculture and irrigation, and ongoing mentoring as may be required.

2. *Donors/funders* and /financial institutions.

The company is prepared to participate in *fundraising* for worthwhile projects, and in the production of 'bankable' documentation.

3. *Training organizations* who teach on farming-methods/produce-marketing, and who have a heart for ongoing mentoring if required.

The firm would like to know that its engineering contribution is placed in the hands of a motivated community that has been *equipped* with the necessary skills to put the dam and related works to good use for many years to come.

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