Progress Report Summarising Dams for Africa's involvement in various RESIS Projects in Limpopo for the Period October through December 2004

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Summary

This document summarises the involvement that Dams for Africa (Pty) Ltd has had with various RESIS projects for the period October through December 2004. It lists a total of 17 conceptual designs that were done following site investigations. It gives the corresponding estimated cost of implementation as well as the estimated time for implementation.

It mentions those instances where a feedback meeting has taken place, and the comments and requested changes/additions to the proposals put forward by the farmers. Finally, for each project a 'recommended action' is made for RESIS's consideration.

1 Background

At the request of Mrs Marna de Lange, Dams for Africa (Pty) Ltd visited a number of irrigation schemes in Limpopo in the period October through December 2004. The brief was to assess the state of the irrigation schemes and propose a practical solution in the form of a conceptual design and cost estimate.

2 Conceptual designs for 17 Projects

Following are summaries of 17 'conceptual designs' done for the projects that DFA has been involved in. These designs were included in reports that were submitted to RESIS over a 3 month period. *The dates of the visit to site, the date on each report, the date of the feedback meeting (where one was held) as well as a cost estimate of implementation for each design, and the implementation time, are shown in table 1*.

2.1 Thabina

Summary : Solutions are proposed for ending the problem of ongoing theft and vandalism at three pump stations at Thabina (see table 1 for date of visit, date of report, cost estimate, implementation time etc).

2.2 Success

Summary : Various ways of reducing water losses in the balancing dam and the extensive downstream canal system that conveys water to the farm 'Success' are proposed. It is estimated that the farm is 150Ha. *Canal repairs take on the form of cleaning the canal and side verges, removal of troublesome trees, minor repairs, major repairs, and in some sections full reconstruction, as well as repairs of long weirs and outlets.* Some tractor bridges are also to be constructed over the canals to prevent ongoing damage. (see section 4.1 for requested additions/variations arising out of the feedback session).

2.3 Grootfontein

Summary : Ways were proposed of re-instating the water supply to the soon-to-be-supplied centre pivot at the farm 'Grootfontein'. (The report assumed that the pivot would cover 80Ha). A cost effective extraction point in Olifants river and another one from the 'grootfontein' were to supply the balancing dam, which in turn supplies the pump station and hence the pivot (see section 4.2 for requested additions/variations).

2.4 Koedoeskop

Summary : Ways are proposed of reducing water losses in the extensive canal system that conveys water from a weir in the Mphogodima river to the 116 Ha communal farm 'Koedoeskop'. Some gabions are proposed for the weir to channel the water. The scope of the repairs to the extensive canal system is the same as that described in 'Success' (see 2.2). Cleaning of the balancing dam is proposed and a silt trap is to be incorporated in the dam.

2.5 Fertillis

Summary : The diversion weir in the Mohlapitse river is to be upgraded to divert more water into the extensive canal system at Fertillis. At the same time the canals are to be repaired (the scope of repairs is the same as that listed in 2.2) to reduce the very substantial water losses to the 96 Ha communal farm. The lining of certain earth canals has also been provided for.

2.6 Canyon/Vallis

Summary : The conversion of approximately 4,3 km of earth canal to concrete canal is proposed, including the construction of 3 diversion weirs and 26 long weirs and outlets. This will significantly reduce seepage losses to the estimated 35 Ha of arable land.

Considering the two farms together makes sense as they are situated on opposite banks of the Lumawe river and also because the proposed solution for the two farms is essentially the same.

2.7 Lepellane

Summary : A conceptual design is proposed for revitalizing the irrigation scheme at Lepellane by replacing the previous 340 Ha central pivot system with a 340 Ha impact-sprinkler system.

The proposed revitalization is considered under four headings (1) *the new irrigation system* - including the sprinklers and associated surface pipe lines, the hydrants, the buried supply pipelines, and the pumps/motors at the pump stations, (2) *the balancing dams*, (3) *the main canal*, (4) *the diversion weir* and associated structures.

2.8 Tsatane

Summary : This report proposes two ways of increasing and improving the water supply for 30 Ha of arable lands at Tsatane; an extraction point at the river that has either (1) a relatively small pump delivering water continuously to two concrete reservoir balancing dams, or (2) a relatively large submersible that delivers water to a small reservoir used primarily as a means of switching the

submersible on and off. In both cases water is gravity fed from the reservoirs on the high ground to the hydrants in the individual plots.

2.9 Seraganeng Dam

Summary : This document considers the re-vitalization of the Seraganeng storage dam in preparation for the re-vitalization the Lepellane irrigation scheme. Its primary focus is the de-sedimentation of the reservoir over a period of 4 years, as this is essential if the dam is to cope with the demand that the irrigation scheme will place upon it. Hence a relatively cheap way of siphoning the substantial build up of sediment from the reservoir.

A concept is also proposed for dealing with the mud that goes down stream in the desedimentation process, although this cost is not reflected in table 1.

2.10 Strydkraal B

Summary : Three solutions are proposed for increasing and improving the water supply to 113 Ha of arable lands at Strydkraal B. The first solution only uses water from the canal, and thus maintains the status quo involving repairing of the canal and revitalizing existing equipment such as pumps and transformers. Included in this cost is a share of the cost (to be shared with Strydkraal A and Mooiplaats) of repairs to be made to the diversion weir about 10km upstream, as well as the cost of repairs to the 10km principal canal upstream from the farm.

The second solution amounts to supplementing the water in the canal with water pumped from the nearby Oliphant’s river.

The third solution completely ignores the water in the canal and all the required water is pumped from five extraction points at the river, to hydrants in five independent blocks. This option was unanimously adopted by the farmers at the feedback meeting on 12/11/04.

The cost of replacing all the moveable surface pipes and sprinklers is included in the budget for all three solutions.

2.11 Strydkraal A

Summary : Two solutions are proposed for increasing and improving the water supply to 125 Ha of arable lands at Strydkraal A. The first solution maintains the status quo and amounts to supplementing the water in the canal with water pumped from the nearby Oliphant’s river. Here the emphasis is on reducing the leakages in the canal by maintenance and repairs, revitalizing the pumps and transformers, making small improvements to increase efficiencies - but no new structures are built.

The second solution completely ignores the water in the canal and all the required water is pumped from four extraction points evenly spaced along the river directly to the hydrants in the lands. The lands are arranged in four independent blocks, one block for each extraction point.

The cost of replacing half the moveable surface pipes and sprinklers is included in the budget for both cases.

2.12 Success North - Tongwane Gorge Canal

Summary : This investigation was done primarily as a result of new information received and requests that came to light at the 'Success' feedback meeting (see 2.2).

Repairs and betterments required for the water supply system associated with the farm Success and a portion of the farm Grootfontein north of the Mafefe road are described. Only the canals and structures situated north of the Mafefe road are considered here as the in-field canals south of the road were discussed in an earlier report (see 2.2 Success).

The major costs relate to (1) repairs to the main canal (the scope of repairs is the same as that listed in 2.2) that starts at a diversion weir up in the gorge and terminates at a balancing dam 7 km downstream, and (2) gabion structures to protect the canal at strategic places from the river during floods.

2.13 Tswelopele – alternative water extraction method

Summary : Practical and cost effective methods of extracting water from rivers with deep sandy riverbeds are presented, for the purpose of irrigating lands near the river. This solution is presented as a generic alternative to conventional reinforced concrete structures, and may have application at certain sections of the 685 Ha Twelopele project.

2.14 Mooiplaats

Summary : This document presents two solutions for supplying irrigation water to 103 Ha of arable lands at the farm Mooiplaats. The first solution maintains the status quo in terms of pumping water to the respective lands via two existing pump stations that get their supply from a canal - that is supplied from the Olifants river about 14km away. Here the emphasis is on reducing the leakages in the canal by maintenance and repairs (the scope of repairs is the same as that listed in 2.2), making many small improvements to increase efficiency of water supply, and by revitalising the pumps.

The second solution completely ignores the water in the canal and all the required water is pumped from the Olifants river directly to the hydrants in the lands via five new extraction points. The lands are grouped into 5 independent blocks, each with its own extraction point.

In both solutions 58 Ha of the 103Ha lands are relocated away from an area that is affected by floods, and a new irrigation system is allowed for in the new area consisting of buried pipes and hydrants, as well as the moveable surface pipes and sprinklers.

2.15 Masetlwe

Summary : A solution is provided for improving the water supply to an estimated 8 Ha of farms near the village of Masetlwe. The scope of the work includes the construction of two relatively small diversion weirs, a 200m x 110mm transfer pipeline, a 3000m x 160 mm main pipeline, and some maintenance to the two existing balancing dams. These improvements should dramatically reduced seepage losses resulting in significantly more water to the farmers.

2.16 Lusern

Summary : A solution is presented revitalizing the irrigation system at the 48 Ha farm Lusern. It is estimated that currently 90% of the water is lost owing to leaks in the canal system before it gets to the lands, especially in the two main earth supply canals originating from the river.

The proposed solution has four elements. The first element consists of a filtration system to ensure that no debris in the stream enter into the pipelines. The second element is the hdpe pipelines that takes water from the stream and filtration system, which are situated at a relatively high elevation, and leads it to the extensive network of concrete canals that are situated in the flood plains of the Olifants river more than a kilometre away. The third element consists of repairs to the existing concrete canals, which are in a relatively good condition in most places (the scope of repairs is the same as that listed in 2.2). The fourth and final element of the solution consists of lining the existing balancing dam with a concrete slab in order to reduce seepage losses.

2.17 Mafatoabokgwale

Summary : Two solutions are proposed for revitalizing the water supply to approximately 36 Ha of arable and irrigable land adjacent to Tsimanyane village, Limpopo Province, near the Matlala Hospital, in the Greater Marble Hall District Municipality.

The first solution amounts to revitalizing the concrete canal system to channel water from the river to enable furrow irrigation. The second solution proposes revitalizing the impact sprinkler irrigation system whereby water is pumped from the dam. In both cases the bulk of the existing infrastructure is in a relatively useable condition, and with some repairs and betterments can be made fully functional at a fraction of the cost of a new installation. The third solution would be to adopt both solution 1 and 2.

3 Costs and Implementation Periods

The various costs and implementation periods are summarised in Table 1 below. The relevant dates corresponding to the DFA visits to the projects and the RESIS/LDA facilitator are also shown.

Table 1: RESIS Projects for which DFA Conceptual Designs have been done

	Name of Project	Size of Farm	DFA visit	DFA report	Pgs	Cost in Rands (excl VAT)			Implementation Time	DFA feedback	Fascilitator at visit
						Solution 1	Solution 2	Solution 3			
1	Thabina	228	2004/10/01	2004/10/07	10	251,000			3 months	No	Marna/Rex
2	Success	approx 150	2004/10/05	2004/10/07	17	342,000			2 months	2004/11/09	Gauta Masetane
3	Grootfontein	approx 120	2004/10/05	2004/10/11	8	346,000			2 months	2004/11/09	Gauta Masetane
4	Koedoeskop	116	2004/10/05	2004/10/13	25	269,675			1.5 months	No	Gauta Masetane
5	Fertillis	96	2004/10/05	2004/10/14	38	1,103,150			3 months	2004/11/09	Gauta Masetane
6	Canyon/Valles	35	2004/10/19	2004/10/22	16	1,722,125			3 months	2004/11/09	Gauta Masetane
7	Lepellane	340	2004/10/22	2004/11/02	28	7,398,000			4 months	2004/11/11	Rachel Motloutsi
8	Tsatane	30	2004/10/22	2004/11/04	17	750,000	1,100,000		1.5 months	2004/11/11	Rachel Motloutsi
9	Seraganeng Dam	see Lepellane	2004/10/22	2004/17/11	12	1,045,000			4 years	2004/11/11	Rachel Motloutsi
10	Strydkraal B	113	2004/10/21	2004/12/01	30	1,373,599	913,000	1,957,000	3 months	2004/11/12	Rachel Motloutsi
11	Strydkraal A	125	2004/10/21	2004/12/01	25	1,015,885	1,172,000		2 months	2004/11/12	Rachel Motloutsi
12	Success North	see Success	2004/12/10	2004/12/13	53	1,695,000			3 months	No	Rex Mtileni
13	Tswelopele	685	2004/12/08	2004/12/13	17	230,000			1 month	No	Marna de Lange
14	Mooiplaats	103	2004/10/21	2004/12/27	19	2,179,000	2,635,000		3 months	2004/11/12	Rachel Motloutsi
15	Masetlwe	8	2004/11/10	2005/01/03	7	501,238			1 month	No	Rex Mtileni
16	Lusern	48	2004/11/10	2005/01/05	17	812,263	1,189,530		2 months	No	Gauta Masetane
17	Mafatoabokgwale	36	2004/12/09	2005/01/18	19	312,201	417,000	729,201	3 months	No	Rob McBean
				Total		**21,346,136**	**22,329,718**	**23,685,919**			

It may be seen that the total sum for the seventeen projects varies between 21,3 million to 23,3 million depending on which of the three solutions are chosen for the projects where there is a choice.

4 Feedback Meetings

Feedback meetings were held at several of the projects, and the dates are indicated in the 'DFA feedback' column of table 1.

At these meetings the conceptual designs were explained and use was made of a digital overhead projector to (1) show the current state of affairs by way of projecting photographs and (2) illustrate the proposed solutions by showing the conceptual drawings and layouts.

There was generally a healthy level of discussion and in several cases modifications/additions to the proposed designs were requested and taken note of.

The meetings were generally well attended by the farmers or their representatives. The extension officers were also in attendance at most of these meetings, and were generally also present at the site visits where they played an important role as guides. In some instances representatives from the Municipal Authorities attended.

Apart from the visits and feedback meetings indicated in table 1, two meetings were also held on 8th November. The first presentation was made to the district engineers and extension officers of Capricorn, and the second to a similar body from Sekhukhuneland, with Rob, Rachael and Gauta in attendance from RESIS. The recommendations that arose out of these meetings were in many instances incorporated into the presentations made later in the week to the farmers.

4.1 Matters arising at Feedback Meetings

The special requests and proposed variations arising out of the various feedback meetings will now be considered for the 10 projects that were reviewed:

4.1.1 Success

There was general acceptance and agreement for the aspects covered in the presentation (see 2.2), but a number of issues not covered by the report were raised.

Matters Arising, Recommended Action

1. The farmers pointed out that there is a second balancing dam (referred to as the 'sand dam') in the system which is meant to supplement the main balancing dam. It has fallen into disuse and requires lining with concrete.

   Recommended action: This dam was subsequently fully investigated by the writer and the author's finding is that the dam has been made redundant by the much larger main balancing dam, and furthermore its supply canal comes from the river about 1km away that hardly ever has water in it. It would therefore be a complete waste of money to spend any money on this dam. This is fully discussed in the document 'Success North' (see 2.12).

2. It was also pointed out that there is an exposed 250mm pvc pipeline (about 100m long) higher up in the Tongwane river (the writer knows this pipeline, made from pvc pipes that were used to repair the flood damaged canal) that is broken and this results in the water flowing in the river for a distance of some 400m rather than in the canal, resulting in losses. This was subsequently investigated by the writer on 10th December. The pipeline is not leaking at all and is in perfect working condition. However recent storm waters flowing down the river have eroded some of the soil around the supports, and this may eventually expose their foundations.

   Recommended action: Two solutions are proposed in the document 'Success North' (see 2.12), both are of a very permanent nature and should fully satisfy the farmers. The consultant should investigate which of these is preferable and make his recommendations to the community at a further feedback meeting.

3. There are also two or three places where the water goes through a pipe under the road/river on its way down the gorge to the balancing dam. At these places the pipe leaks resulting in spillage and runoff down the road.

   Recommended action: These problems should be addressed and permanent soundly engineered solutions to these problems are described in the document 'Success North'(see 2.12).

4. The drawings of the canal system at Success (and all other projects where there are canals) should be obtained from Mr Martiens Gouws or Mr Peter Smith, and a copy made for the consultants to assist them in establishing the extent of the canal systems.

   Recommended action: Canal layout drawings to be obtained by the consulting engineer. The length and condition of all canals should also be carefully measured on site.

5. Fish farming should be considered in the large balancing dam and Mr Phose should be contacted on this aspect as he is reported to be an expert.

   Recommended action: No action recommended as a balancing dam is meant to fill up at night and empty in the day – which is clearly not possible if fish are to be kept there.

6. The RESIS team is to keep the district engineers informed of all progress.

   Recommended action: RESIS to action on an ongoing basis (this applies to all projects).

7. Training is required on the correct usage of a balancing dam – it does not appear that the farmers understood that it is there to increase the rate of supply by day, and be re-plenished by night, rather than remain as full as possible as a reserve.

   RESIS to action as part of their training/motivation budget.

8. The mine takes water from the canal, and clearly this reduces the available water to the farmers.

   Recommended action: The mine should be made to refrain from tapping water from the canal as the canal was built for the use of the farmers. Instead, the mine should build their own weir in the river (it is possible to do so very cost effectively and the writer has already investigated this problem), and use this as their extraction point.

A water user association should be established and the mine should be included in this. The writer was involved in such an initiative in 2003, but the application seems to have been lost by DWAF. Refer also to similar recommendations in document 'Success North' (see 2.12).

The department of environment should also be included in the WUA, as they have in the past objected to much water being abstracted from the river. (This position in the view of the writer has limited logic as the water that is not diverted into the canal soon disappears into vast underground dolomitic caverns, unless a lot of water comes down the river).

Note: The comments and recommendations made in the report 'Success' regarding the main balancing dam should be ignored in favour of those recommended in 'Success North' – as subsequent investigations have revealed that the dam does not leak, and therefore does not required resealing.

4.1.2 Grootfontein

The concept of pumping water from the Olifants river into the balancing dam by means of a submersible pump situated in a buried 'gabion reservoir' in the riverbed was accepted – however see the document mentioned in 2.13 for the latest thinking on cost effective methods of extracting water from a sand filled river.

Matters Arising, Recommended Action

1. It was stated that the municipality intends to replace the original '80Ha' pivot with a '10 Ha' pivot. The farmers asked what could be done with the balance of the land, which is approximately 100 Ha. In response to this request the concept of 1 Ha plots under sprinklers (see Lepellane presentation, point 2.7) was shown them, and they seemed to be in favour of this but needed time to discuss this with the other farmers.

   Recommended action: The irrigation system to be used should be re-evaluated in the light of the small pivot now installed, and the preferences of the farmers should be obtained by Gauta Mosetane.

2. The concept of increasing the capacity of the dam at the spring and then pumping this water to the balancing dam (see document mentioned in 2.3) met with disapproval from some individuals at the meeting. Apparently any tampering with the spring would offend the 'snake' that lives in the spring, resulting in a curse coming upon the farmers.

   Recommended action: The leaders of the Zionest church (virtually all the farmers are members of this church) should be consulted as to their stand on cultural beliefs that contradict the teachings of Christ in regard to His power over spirits and 'snakes'. If that church adopts the biblical position, then the church leaders should address the farmers and allay their fears. On the other hand if the church believes that cultural beliefs that contradict the authority of Christ should not be challenged, and providing that the majority of the farmers hold to this belief, then the spring should be left alone.

   This however means that more water will be required from the Olifants river. Marne de Lange should investigate the legal position with regard to taking water from this source (for 100Ha approximately 7000m^3 is required daily)

4.1.3 Fertillis

There was general agreement on the main thrust of the presentation (see 2.5), which was (1) to correct the deficiencies in the diversion weir so that it would divert a sufficient quantity into the main canal and (2) to make the necessary repairs and betterments to the main canal system to ensure that it has sufficient capacity.

Notwithstanding the general agreement, four request/criticisms were made and are discussed below.

Matters Arising, Recommended Action

1. The concept of the 'plot canals' was not accepted. This has the effect of reducing the cost from R2,255,150 to R1,152,000 – with the lower figure being indicated in table 1.

   Recommended action: Do not continue with the concept of plot canals.

2. It was requested that their should be an increase in depth to the main canal as there is insufficient water arriving at the plots.

   Recommended action: It should not be necessary to increase the capacity of the main canal once the leaks in the canals have been repaired, and especially once the deficiencies in the diversion weir are corrected. Then there will be more than enough water in the canal to irrigate the 96 Ha at Fertillis. However, check the cross sectional area of the main canal and its slope to determine its flow capacity (use can be made of Manning's formula). Ensure that it has sufficient capacity to irrigate 96 Ha in 10 hours. The length and condition of all canals should be carefully measured.

3. Previous to the feedback meeting the district engineer, Mr Phasha, stated that making the diversion weir more effective would not be acceptable to the department of environmental affairs, who do not want to see all the water in the river being diverted into the canal.

   Recommended action: A sluice gate has been budgeted for at the weir to allow the flow in the canal to be closed off after the day's irrigation, and to regulate the amount of water that goes into the canal by day during the irrigation process.

   The concern of not enough water for the river is not a major problem as there is enough water in the river to satisfy both the farmers and the environmentalists. The flow in the river was estimated as 250 litres per second – but this should be confirmed. To irrigate 96 Ha in 10 hours 184litres/second would have to be diverted during the 10 hours of irrigation. This would still leave about 66 litres per second in the river for 10 hours, and the full 250 litres per second for the remaining 14 hours. It should also be stated that according to Damien Chiron, the French MSc student, most of the irrigation water that is diverted into the furrows will in any case seep into the very porous ground and make its way back to the river.

   A meeting should be arranged with the department of environmental affairs to explain the situation and alleviate their fears.

4. The request was made that an earth balancing dam should be lined with concrete, as the ground is very porous.

Recommended action: Investigate the practicalities and cost of lining this reservoir.

4.1.4 Canyon/Valles

The concept of replacing the earth canals with concrete canals to reduce seepage losses, and building diversion weirs with sluice gates, and building 26 long weirs and outlets to divert water out of the canals into the earth canals (see 2.6) was well received.

Matters Arising, Recommended Action

1. It was noted that the diagram for Valles excluded two secondary canals.

   Recommended action: Proceed with the final design and costing based on the conceptual design, but increase the length of the secondary canals at Valles to correct the omission. The length and condition of all canals should be carefully measured. Suitable sites for the weirs and the outlets should be determined with the input of the farmers.

4.1.5 Lepellane

The concept design (see 2.7) was accepted favourably without any criticism.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: Proceed with the final design and costing based on the conceptual design. Measurements such a canal length, canal slope, dimensions of balancing dams etc. will be required.

   However before this is done, two aspects should be debated with the farmers:

   Firstly, an irrigation system of with moveable surface pipes is far more manpower intensive than a central pivot. Some of the farmers have expressed concern for this and it appears that they would like to have all the pipes buried with risers to the sprinklers so that no moving of pipes is required. This clearly will add to the cost, and it appears that the LDA are not prepared to go to such expense.

   In the view of the writer the central pivot system would work well at Lepellane – as the farmers are old and constant moving of surface pipes may be too much for them.

   Secondly the farmers should be made aware that the proposed solution is the third solution that is be employed at Lepellane. The first was a canal system for furrow irrigation, the second the central pivot system. With the correct management systems in place these systems would have worked, and unless this is done for the new proposed system, it too will fail. RESIS should give much attention to this aspect.

   On the other hand there are also several advantages to the proposed solution (see 2.7) which are fully discussed in that document.

4.1.6 Seraganeng Dam

The concepts put forward (see 2.9) were received favourably, as the community is well aware of the importance of a dam with adequate storage capacity.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: The concepts put forward should be discussed at a forum including experts from DWAF. If found acceptable and workable then implementation should be put into effect as soon as possible.

4.1.7 Tsatane

The concepts put forward (see 2.8) were well received, with the second option being preferred (i.e. the option of have two concrete reservoirs to act as balancing dams).There were no criticisms.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: Proceed with the final design and costing based on the conceptual design – option 2. The flow capacity of the river should be confirmed for all months of the year to ensure that there is sufficient capacity for 30 Ha, i.e. at least 24 litres per second.

4.1.8 Strydkraal A

There was considerable debate and discussion around solution 1 vs 2, but when put to the vote, solution 2 was adopted unanimously, chiefly because it is independent of the canal. There were no other criticisms.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: Although solution 2 is the preferred option, it is also the most expensive, both from a capital investment aspect as well as an operational and maintenance aspect. Therefore before deciding on this option over solution 1, there are two aspects that should be carefully weighed.

   Firstly, there is nothing wrong from an engineering point of view with the canal system (solution 1) – the problem has been with the *management* of the system. This solution has the advantage of requiring the least amount of high-capital-high-skill maintenance (e.g. replacement of pumps and motors which must be paid for in hard cash). On the other hand the canals will require ‘low-capital-low-skill’ maintenance such as periodic cleaning and possibly some patching of the concrete. This is best done in the rainy season when no irrigation is required, which allows the sluice gate at the weir to be closed so that the canal can be dry. One

week is all that it will take – one week in the year when every farmer has his stretch of canal to clean out including the side verges. This kind of maintenance should be seen as a duty and no costs need be involved. It should be stressed that if this type of program cannot be managed, then no system will work, as all irrigations systems require a degree of *management*.

Secondly, the electricity costs of the canal option will be significantly less, as water in the canal is above the lands and therefore only has to be pressurised for the sprinklers, not lifted from the river as is the case for solution 2. This also means that the buried pipes generally run down gradient at a slope of 1% to 2%, and this compensates significantly for loss of head owing to friction in the pipelines.

On the other hand the cost of the additional power and high-skill maintenance should be seen in context with the value of the crop. It may be that the additional costs are relatively insignificant in relation to the value of the crop, and that having a more reliable source of water is well worth the additional cost. The concept of dividing the land into more manageable blocks, a feature of solution 2, also has significant merit.

It is therefore recommended that both the electricity costs and maintenance costs of solution 1 and 2 be quantified and put in front of the community before a final decision is made between solution 1 and 2.

Following this exercise, the final design and costing should be done based on the conceptual design decided on.

4.1.9 Strydkraal B

After some debating with questions and answers, solution 3 was adopted as the preferred option, as it is independent of the canal. There were no other criticisms.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: As for Strydkraal A, the farmers should be enlightened regarding the additional electricity and maintenance costs associated with solution 3. But again, this should be seen relative to the value of the crop, and also the value of having individual blocks may offset the higher electricity costs.

   Following this exercise, the final design and costing should be done based on the conceptual design decided on.

4.1.10 Mooiplaats

Once again there was a healthy level of discussion and debate around solution 1 vs 2. Eventually solution 2 emerged as the preferred option, again because it is seen to be independent of the canal. There were no other criticisms or requests.

Matters Arising, Recommended Action

1. No Matters Arising

   Recommended action: Once again, as for Strydkraal A, the farmers should be enlightened regarding the additional electricity and maintenance costs associated with solution 2. Once again this should be seen relative to the value of the crop, and also the value of having individual blocks may offset the higher electricity costs.

4.2 Photographs

Photographs were taken of some of the feedback sessions (see below), which gives an indication of the simple yet comfortable setting of the meetings, conducive to discussion. Note that the dates on the photos are not correct – refer to table 1 for the correct dates.

At these meetings the conceptual designs were explained and use was made of a digital overhead projector to (1) show the current state of affairs by way of projecting photographs and (2) illustrate the proposed solutions by showing the conceptual drawings and layouts.

In all cases either Gauta or Rachael acted as interpreters.

Feedback meeting at the Tsatane community centre – a question is being asked by the person at the back

Feedback meeting for Lepellane Project and Seraganeng dam – notice the projector

Feedback meeting at the Strydkraal B venue – Rachael take a question – notice the projector and laptop which were a feature at all the venues

Feedback venue for the Strydkraal A and Mooiplaats projects – Rachael is taking questions

5. Conclusion

It is hoped that this summary of the site conditions, conceptual designs and cost estimates will assist the consulting engineer appointed by RESIS/LDA to accelerate delivery to the recipient communities.

Depending on which option is eventually adopted (for those projects where choices are possible, see table 1), the total cost estimate is 21,3 to 23,7 million rand, excluding VAT. This however does not include the additions requested/required that have come to light from some of the feedback meetings, which could be a few million rands in the case of Grootfontein and considerable in the case Fertillis.