GAZANKULU DEPARTMENT OF AGRICULTURE AND FORESTRY

REF. 6/8/3-2-7

HOXANE IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

PREPARATORY STUDIES PHASE I
SECOND INTERIM REPORT

JULY 1989

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GAZANKULU DEPARTMENT OF AGRICULTURE AND FORESTRY

HOXANI IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

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SUMMARY

After submission of our First Interim Report which has dealt with the evaluation of existing information (Step 1) this Interim Report has been prepared in order to complete the requirements of Phase I of this study. The following additional work is included in this Second Interim Report Phase I:

a) Farm models of 5 sample farmers at various localities within the Sabie Irrigation Scheme.
b) Incorporation of sewage effluent into the irrigation scheme from the proposed Mkhuhlu sewage works.
c) Re-evaluation of the soils data in order to determine the irrigable qualities thereof.
d) Revised layout maps of the area.

GAZANKULU DEPARTMENT OF AGRICULTURE AND FORESTRY

HOXANI IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

PREPARATORY STUDIES

SUMMARY INCLUDED IN FIRST INTERIM REPORT DATED FEBRUARY, 1989

This report has been prepared as part fulfilment of the requirements for the Phase I part of the study and covers the following aspects:

a) Data collection and arising therefrom descriptive details of the study area and surroundings.

b) An evaluation of the availability of the two most important elements of the proposed study namely soil and water.

c) Institutional framework.

The above data had been accrued through inputs by the Client (the Gazankulu Department of Agriculture and Forestry) and the Team of Consultants, backed by field inspections.

In accordance with the relevant terms of reference, summarized in Annexure 4 of this report, compliance has been reached in this report for the Steering Committee to do a first evaluation of the project before the Consulting Team is to be instructed to proceed with the following outstanding issues required for the Phase I study, namely

a) Further data collection required by the Steering Committee.

b) Data analysis (as described in par. 3.3.1e of Annexure 4).

GAZANKULU DEPARTMENT OF AGRICULTURE AND FORESTRY

HOXANI IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME
PREPARATORY STUDIES PHASE I : SECOND INTERIM REPORT

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1. TERMS OF REFERENCE

1.1 Our firm was appointed by the Gazankulu Department of Agriculture and Forestry in their letter 6/8/3-2-7 of 87-10-08 as main consultants to undertake the preparatory studies for the submission of an appraisal report for approval by DBSA's management.

1.2 The professional team of consultants for this investigation comprises of the following:

a) Eksteen, Van der Walt and Nissen per A.O. Eksteen, Pr. Eng., as project leader, B.M. Mouton Pr. Eng., as review engineer (quality assurance) and S.G. Pienaar Pr. Eng., as technical assistant.

b) Messrs. Measured Farming Pty. Ltd., locally (Tzaneen) represented by S.J. de Swardt assisted by H.S. Roodt, doing agronomical, marketing and farming studies.

1.3 The DBSA project team would comprise of the following:

Project Leader	G. Mashile	Rural and Agricultural Development
Team Members	A.J.v.Niekerk	Rural and Agricultural Economic Policy unit
	W. Pretorius	Financial Analyst
Assisted by	P. Mkalipe	People participation unit
	D.C. Midgley	Hydrology Consultant
	J. Swart	Animal husbandry consultant
	J. Meyer	Human Resource Development
	J. v.Rensburg	Consultant
In consultation with:	I. Verwey	Architectural services
	J. Oosthuizen	Agricultural Technical unit

1.4 All work shall be conducted in accordance with the project description prepared by DBSA (included in Annexure 3 herein), summarised and programmed per Annexure 4; all as agreed upon by all concerned parties at a meeting held in Pietersburg on 89-01-11.

2. GENERAL DESCRIPTION OF STUDY AREA AND IMMEDIATE SURROUNDS

2.1 Locality

The study area is located in the Hoxani tribal area in the south of the Mhala district of Gazankulu. The irrigation area is situated between the Hazyview-Skukuza main road (P33-5) and the Sabie river on the farms Calcutta and Cork; all as shown on the attached figures 1 and 2.

2.2 The Sabie river

2.2.1 General

This river is the main source of water supply for the proposed development.

The Sabie river sub-catchment conflues with the Sand river sub-catchment within the Kruger National Park. The Sabie river sub-catchment is occupied by the following regions.

State/ Region	Area (km^2)	Main Tributaries	Description
RSA	125,8	Sabie Klein Sabie Mac Mac Motitsi	Upper western catchment above 600m m.a.s.l. Characterised by undulating and at places mountainous topography.
Lebowa	33,1	Marite	Upper north-western catchment with characteristics as for RSA.
Kangwane	11,3	Noord Sand	This small area stretches from the Sabie river right bank near Hazyview southwards alongst the Kruger Park boundary. The area lies mostly below 600m m.a.s.l. with gently undulating slopes.
Gazankulu	47,7	Saringwa	The area lies on the left bank of the Sabie river and is bordered by Lebowa on the upper north and northwest sides and Kangwane and the K.N.P. on the opposite right bank of the Sabie river. The topography is gently undulating with altitude below 600m.

2.2.2 Proposed upstream impoundment

It was proposed in the Sabie Study that a dam be immediately constructed at Injaka on the Marite river in Lebowa. This dam will allow for the required non-consumptive water requirements in the Sabie river for the maintenance of the riverine ecosystems in the Kruger National Park (i.e. avoids reducing the flows in the Park below critically low levels) as well as stabilising all existing water use in the Sabie river and will further allow for a modest increase in water use by lower riparian users.

A dam site at Madras (with cost order of R150M-R250M) was identified in the recent Sabie Study. This proposed dam is sited 1,5km upstream of the Hazyview road (P33-5) and would not affect any improvements proposed or existing in the FSP study area. This dam will have to be constructed by the year 2003 to meet the increased future consumptive water requirements; i.e. well within the design life period of infrastructural development required in the FSP under review.

2.2.3 Sabie river surface water quality

Samples were taken by the RSA Dept. of Water Affairs at locality X3Q01 (see fig. 1) during the period 83.11.14 - 85.06.01 with results as follows:

Winter Season April-Sept.						Summer Season Oct.-March				
Min	Mean	Max	St Dev	90%		Min	Mean	Max	St Dev	90%
9,0	10,9	14,7	1,3	11,8	Electrical Conductivity (mS/m)	5,8	11,2	29,7	4,5	15,0
6,4	6,9	7,4	0,3	7,4	pH (pH units)	6,0	7,0	8,0	0,5	7,7
63	77	88	8	87	Total Dissolved Solids	39	76	221	33	91
25	35	43	5	42	Total hardness as $CaCO_3$	14	34	86	13	44
5	7	8	1	8	Calcium as Ca	3	7	15	2	9
3	4	6	1	5	Magnesium as Mg	2	4	12	2	5
0,3	0,8	4,7	0,9	1,2	Potassium as K	0,3	0,9	2,6	0,6	1,4
3	5	9	1	7	Sodium as Na	2	7	28	5	8
12	29	38	6	35	Total Alkalinity as $CaCO_3$	11	28	104	17	35
5	8	11	2	10	Chlorides as Cl	5	10	24	4	12
0,1	0,1	0,3	0,1	0,2	Fluorides as F	0,1	0,1	0,4	0,1	0,2
5,4	6,8	12,1	1,3	7,2	Silicon as Si	0,4	6,5	12,3	2,1	7,6
2	9	18	5	17	Sulphate as SO_4	2	7	12	3	9
0,03	0,06	0,11	0,02	0,10	Ammonia as N	0,02	0,05	0,11	0,03	0,08
0,02	0,22	0,42	0,08	0,32	NO_3 + NO_2 as N	0,03	0,22	0,61	0,12	0,31
0,005	0,010	0,036	0,009	0,021	Phosphates (inorganic) as P	0,005	0,022	0,101	0,022	0,046

2.2.4 River flow

The flow in the Sabie river where it passes the study area is without augmentation (regulation) from dams in the upper sub-catchments of the river. The less erratic components of the runoff and therefore the base flow originate in the higher rainfall western portion of the catchment.

Daily flow records are available at only a few locations (gauging stations) in the catchment, none within Gazankulu. The information obtained from these stations can, if used judiciously, give reasonable estimates at other localities in the catchment.

The daily unregulated flow characteristics of the Sabie is important for the planning of a run-of-river scheme as envisaged for the Cork-

Calcutta F.S.P. The present day low flow characteristics, extended to possible scenarios for a few years hence, prior to envisaged impounding schemes coming in operation, but allowing for short term extensions to irrigation farming in Lebowa, Kangwane and Gazankulu, have been simulated, all as described in Section 3 and contained in Annexure 9 of this report.

2.2.5 Existing water rights and allocations

The extent of irrigation in Gazankulu, Lebowa and RSA in the Sabie river sub-catchment, as well as existing water rights and allocations are described in par. 2.5.6 herefollowing.

There are no Government Water Control Areas in the Sabie river catchment and no water court awards exist.

The peak abstraction rate of the various irrigation plots presently farmed on Calcutta & Cork (i.e. the study area), is in the order of 400 l/s according to the Department Water Affairs Statement (included in Annexure 8, par. f). It can however be safely assumed that this abstraction can be marginally increased provided that such abstraction do not affect the required non-consumptive low flow of 1,0 m^3/s entering the Kruger National Park and the peak abstraction allocations of 2,49 m^3/s and 0,25 m^3/s to Lisbon and Belfast respectively.

2.2.6 Floods

The Sabie Study contains flood peak estimates based on deterministic methods which can readily be used for the purposes of this study in which some idea of floods associated with short- to medium-term recurrence intervals are required for the location of pumpstation elements and in-

frastructural development positions. The following flood peak values would apply to the Sabie river reach between Cork and Madras.

Probable Maximum Flood	$5400m^3/s$	
T = 200 yrs	$2800m^3/s$	
100 yrs	$2300m^3/s$	
50 yrs	$1800m^3/s$	
20 yrs	$1200m^3/s$	: Design
10	$850m^3/s$	
5 yrs	$550m^3/s$	

2.3 Physiography

2.3.1 General

The study area generally lies below the 450m contour and falls within the Granite Lowveld Region. The geology is of the Basement Complex and mainly consists of granite with minor intrusions of diabase.

The existence of any significant exploitable mineral deposit is expected to be remote (3).

Residual soils are not as deep as that on the upper lying catchment and the collapse potential is almost negligible.

2.3.2 Soils

2.3.2.1 Original Reconnaissance soil survey

A soil survey of the study area was recently undertaken by the University of Potchefstroom followed by a monitor survey by officials of the DBSA. Their report is contained in Annexure 7, section 7.1. EVN has superimposed the results on 1:5 000 orthophoto compilation maps of the study area (8723.2 series drawings).

From the above survey it was found that the areal distribution of soils, and the suitability for irrigation farming, were as follows:

Area west of Mkhuhlu : Ten Farms, Big Bend & Mkhuhlu West

A narrow band, some 50 to 200m wide, of class A2 soils (Alluvium, Jozini Series, Legend O5) occur alongst the river. This strip forms part of the riverine environment and should only be cultivated beyond say 50m away from the river in order to maintain this important ecological feature. Most of the remaining area consist of marginal soils (Legend C4) with irrigability classification B2; suitable for controlled or limited irrigation. A small block of some 5ha of most suitable A2 classified soils (Legend H3) occur on plot no. 10 of Ten Farms. Outside of the existing development two blocks of suitable soils (Legend H3) with A2 classification occur.

In the Big Bend/Mkhuhlu area three large blocks of soils with Legend E9/E6 is found which were deemed unsuitable for prolonged irrigation. Fourteen existing farming plots are thus affected of which six plots fall fully within this regime and will probably be included in the proposed F.S.P. only for the cultivation of crops with low irrigation requirements.

Area East of Mkhuhlu : Mkhuhlu East, Seholokoane and Cork

Soils with A2 irrigability classification are found in a 35ha block at the Seholokoane hill and two further blocks (totalling 39ha) at Cork. The remaining area is covered with shallow soils mostly with irrigability classification B2 i.e. marginally suitable. There are also a number of plots (Layout legend E6/E7/S2) on soils not normally suitable for irrigation. Eleven plots are affected by the latter, in which four plots are fully covered with these soils. The remaining seven plots (including two at the existing Cork

scheme) are partially affected. There are only two small occurrences of marginal B1 soils (Legends H7 and H6) i.e. one of 4ha at the Upper Cork and one of 7ha at the Belfast border.

The aerial distribution of the various classes of soils within the borders of the existing plots just outside these plots but incorporable therein as well as details of the possible nett extent of the irrigation area are given in the following tabulation, which is a summary of the details contained in Annexure 6C of the First Interim Report; February 1989, now superseded by the tabulation contained in par. 2.3.2.2.

	Ten Farms	Big Bend	Mkhuhlu	Seholokoane	Upper Cork	Cork Scheme	Totals
1. Gross Areas within borders of existing plots.							
Soils Class A	26,4	11,3	3,1	35,4	-	38,9	115,1
B	94,5	38,5	115,4	95,0	42,5	109,2	495,1
C	-	50,0	39,1	27,2	75,2	8,0	199,5
	120,9	99,8	157,6	157,6	117,7	156,1	809,7
2. Gross areas of soils outside of existing plots but incorporable therein							
Soils Class A	56,8	14,8	-	-	-	-	71,6
B	23,2	-	1,8	4,2	2,1	16,4	47,7
C	-	-	-	-	-	-	-
	80,0	14,8	1,8	4,2	2,1	16,4	119,3
3. Possible nett areal extent of F.S.P.							
Soils Class A	65,7	20,1	2,4	28,3	-	30,6	147,1 (23%)
B	83,3	26,7	86,2	76,7	35,0	98,0	405,9 (63%)
C	-	19,2	20,4	8,0	39,0	4,4	91,0 (14%)
Total	149,0	66,0	109,0	113,0	74,0	133,0	644

From the above tabulation it can be seen that marginal soils make up 63% of the total aerial extent of the scheme and 14% consist of Class C soils. These areas have been farmed for a number of years albeit with limited irrigation.

2.3.2.2 Re-evaluation of existing soils data

During our field inspection we have found that the boundaries of the various irrigability classes described in par. 2.3.2.1 were not in all localities clear and it would therefore be necessary that further monitor studies will have to be undertaken to proof these boundaries prior to the implementation of the F.S.P. Such a further soil survey will necessarily also involve additional laboratory information at a later stage.

The client GAZDAF and the DBSA have subsequently (March 1989) agreed that a re-evaluation be undertaken of the existing soil survey data and EVN requested the firm Partridge, Robson & Associates to commence with such work.

The survey involved the inspection of 20 test pits excavated using a tractor mounted JCB backacter of the Gazankulu Department of Agriculture and Forestry and a number of field traverses through the area, as well as inspection of crops and interviews with certain of the farmers. The fieldwork was carried out by Professors T.C. Partridge and R.R. Maud. The locations of the test pits are shown on plans 8723.2.1, 2.2 and 2.3. Their findings are contained in Section 7.2 of Annexure 7 in which it is concluded that the soils of the area are certainly suitable for redevelopment for irrigation.

The revised irrigability classification indicates the following:

a) Most of the areas that were previously classified as Class C have been re-classified as Class 3 ST (marginal soils due to slope and textural limitations) and 2T and can there-

fore be included in the proposed FSP. Such soils were previously identified throughout the irrigation area.

b) There are two occurrences of non-irrigable Class 5 soils of the Mispah series within the existing scheme namely Mkhuhlu plot 5 and Seholokoane plot 5.

c) The revised classification of soils is summarised as follows:

Previous Classification	Revised Classification	Soil Series Units	Locality
Class C : Non irrigable	Class 3 : Marginal	E9	Big Bend
		E6&E7	Mkhuhlu Upper Cork
		S2	Cork scheme
Class B : Marginal	Class 2 : Moderate	H7	Upper Cork

d) The revised aerial distribution, i.e. superseding the tabulation in par. 2.3.2.1, of the various classes of soils within the borders of the existing plots just outside these plots but incorporable therein as well as details of the possible nett extent of the irrigation area are given in the following tabulation, which is a summary of the details contained in Annexure 6C.

	Ten Farms	Big Bend	Mkhuhlu	Seholokoane	Upper Cork	Cork Scheme	Totals
1. Gross Areas within borders of existing plots.							
Soils Class 1&2	26,4	11,3	3,1	36,5	1,4	45,8	124,5
2&3	94,5	88,5	134,4	118,8	116,3	110,3	662,8
5	-	-	4,6	4,4	-	-	9,0
	120,9	99,8	142,1	159,7	117,7	156,1	796,3
2. Gross areas of soils outside of existing plots but incorporable therein							
Soils Class 1&2	56,8	14,8	-	-	2,0	-	73,6
2&3	23,2	-	-	3,0	0,4	16,4	43,0
5	-	-	-	-	-	-	-
	80,0	14,8	-	3,0	2,4	16,4	116,6
3. Possible nett areal extent of F.S.P.							
Soils Class 1&2	65,7	20,1	2,4	29,3	3,0	35,7	156,2 (24%)
2&3	83,3	45,9	94,6	87,7	77,0	97,3	485,8 (76%)
5	-	-	-	-	-	-	-
Total	149,0	66,0	97,0	117,0	80,0	133,0	642

From the above tabulation it can be seen that marginal and moderate soils make up 76% of the total nett aerial extent of the scheme.

2.3.2.3 Appropriate Irrigation Systems

In a farmer support programme special care will have to be taken in the selection of crops and the system and volume of irrigation on these soils to avoid deterioration thereof in the years to come. The following generalised selection of crops could be considered at this phase of the study in order to formulate the project.

Soil Class	Typical Crops	Irrigation system	Irrigation Volume
1	Any	Q.C. sprinkler	As required for optimum production
2&3	Maize/Vegetable	Q.C. sprinkler	Limited
	Mango	Dragline hose	
3	Mango/Quava	Dragline hose	Very limited
	Pastures	Q.C. sprinkler	Very limited
	Garden plots (1ha max. per farm plot)	Dragline sprinkler	Very limited

2.3.3 Groundwater

During the planning of the Mhala South Water Scheme (4) a study of the groundwater supplies were included. Details of the consultant's findings and recommendations are contained in Annexure 8 (par. 1a).

The estimated available (recoverable) groundwater is 4,5mm/a (i.e. 0,64% of annual precipitation of 700mm) giving a safe continuous yield of 2000 l/h (or 5000 l/h pumped for 10h per day) from every 4 km^2. This supply cannot meet the irrigation demands and can only be used for stock watering and for other primary demand purposes in the study area.

2.4 Climate

2.4.1 General

The study area essentially falls within the Eastern Transvaal Lowveld climatic region generally with a warm subtropical climate. During winter the skies are clear with sunshine duration some 75% of the possible but during summer the duration reduces to about 50% of the possible sunshine.

The cloud cover varies between 60% in January to 20% in July. The humidity generally varies between 60% in January to 35% in July.

2.4.2 Rainfall and evaporation

No reliable long term rainfall or weatherstation occurs within the study area. The following design rainfall and evaporation values, applicable to the requirements for this study, have however been derived from the Weather Bureau publications:

		O	N	D	J	F	M	A	M	J	J	A	S	YR
Rainfall	%	6,6	14,0	15,7	16,6	17,4	11,6	6,7	2,4	2,0	1,5	1,4	4,1	100%
	mm	46	98	110	116	122	81	47	17	14	10	10	29	700
Evaporation	(mm)													
Symons														1510
Class A		185	185	210	220	190	185	140	120	100	110	135	165	1945

Figures 2 & 3 show rainfall isoyetals and evaporation lines for the Mhala district.

2.4.3 Wind

In general the winds are fairly light with average windspeeds less than 12 km/h for 80% of the time. Winds mainly blow from the south-southeast or the north-northeast.

2.4.4 Temperature

The average temperature at Madras is 20^{o} with 23^{o} in January and 14^{o} in July. The absolute maximum temperature is 40^{o} and the absolute minimum -5^{o}. The following generalized picture applies in respect of occurrences of:

a) Hot days (temperature $>35^{o}$) : 10 days
b) Warm days (temperature ($>30^{o}$) : 60 days
c) Cold days (temperature $<10^{o}$) : 0 days
d) Tropical nights (min. $>20^{o}$) : 10 days
e) Frosty nights (min. $<0^{o}$) : 5 days

During 50% of the years in record frost occurs.

2.5 Present Land use and Infrastructure

2.5.1 Towns, Villages and Population data

The following Gazankulu residential areas (with 1985 survey data) are located in close proximity to the study area within the Hoxani tribal precinct:

Residential area (or cluster)	Popula-tion (1985)	No. of houses		Shops	Schools*		Churches	Clinics*
		Prominent	Traditional and related		Primary (Pupil no)	Secondary (Pupil no)		
Madras : A	3034							
: B	1991							
: C	1091							
Total	6116	15	279	7	4 (2300)	1 (331)	1	1
Calcutta : A	3640							
: B	6676							
: Mkhuhlu	50							
Total	10366	52	1316	17	6no (3630)	1 (654)	-	1
Cork	2915	17	166	2		1 (273)	1	
Belfast	1378	6	91	2	1 (501)		1	

***Notes:** 1) The nearest hospital is Tintswalo (260 bed) near Acornhoek in the north.

2) A teachers' training college is located at Mkhuhlu with 1985 enrolment of 651 students.

Only Mkhuhlu is a proclaimed town (one of seven in Gazankulu) with waterborne sewage and full reticulated water supply. An area of 25ha has been provided with industrial infrastructural

town services. All the other are rural villages with traditional layout and rudimentary standpipe system of water supply. An improved water supply scheme is now being implemented as described in Annexure 8.

Within 10km away from the study area a further eight residential areas occur in Gazankulu (1985 population 14 980) as well as five in Lebowa (1985 population 39200), three in Kangwane (1985 population 6170) and the Hazyview Cluster in the RSA (population 500) all having a further population (1985) of some 61 000 people.

Population growth rates of some 5% over the period 1985-1990 & 2,5% further, are normally used for planning purposes such as for this study (3).

Practically all the light (mostly service) industries in the Mhala district of Gazankulu are concentrated at Mkhuhlu and Tulamahashe; at Bosbokrand in Lebowa and Sabie and Graskop in the RSA.

2.5.2 Communications

Tarred road P33-5 between Skukuza and Hazyview traverses the area. Details of internal access roads are contained in the descriptions of Annexure 6 and shown on the 8723.2 series orthophoto maps. Ready access is further enhanced by the railway line going through the area with a station at Mkhuhlu.

Telephone lines are well established throughout the area.

2.5.3 Electric Power Supplies

From the description of existing power lines contained in Annexure 6 (par. 6.2.3), it is evident that the Ten Farms and Big Bend areas cannot readily be provided with electricity supplies whereas those irrigation areas in the Mkhuhlu surrounds and eastwards towards the Saringwa river, can more readily be serviced with electricity for pumping and otherwise.

2.5.4 Water Abstraction points

A number of suitable river abstraction sites were identified alongst the Sabie river. There is presently only one permanent pumping installation for irrigation purposes in the study area, namely at Cork. Direct abstraction through an earth canal at Upper Cork was used in the past but due to a lack of proper maintenance, this system has become desuetude. All other farmers use temporary diesel or petrol driven pump installations with direct suction lines to the water edge for the provision of irrigation water to the lands. Surface pump mains are used which are in various states of adequacy; none being properly installed or designed. All of the above are further described in Annexure 6 and shown on the 8723.2 series drawings.

The border fence of the Kruger National Park (from Big Bend to Belfast i.e. excluding Ten Farms) is on the left river bank i.e. on the Gazankulu side. All pump stations and other abstraction installations will therefore have to be suitably fenced in corridors.

2.5.5 Livestock

Most irrigation plot holders in the study area do not keep livestock. Only one farmer in a sample of 12 (ref. Annexure 6 par. 6.5) kept

livestock to a total of 14 cattle. The estimated total number of livestock kept by all irrigation farmers in the study area should not normally exceed 80 L.S.U.

2.5.6 Irrigation farming

Irrigation farming on the rated 400ha nett (810ha gross) of the Cork/Calcutta irrigation scheme comprise (1986 per ref. 3) of 200ha maize and 40ha each of groundnuts, cotton, sown onions, cucurbits and beans in summer and 30ha each of maize, potatoes, tomatoes, onions (replanted), cucurbits and brassicas in winter. Details of this scheme, which forms the subject of this study, is given in Annexure 6, summarised as follows:

Block Name	No. of Farmers	Total Gross Area (ha)	General
Ten Farms	10	121	Mostly flood irrigation. Individual temporary pump installations
Big Bend	12	100	- Do -
Mkhuhlu	10	158	- Do -
Seholokoane	6	157	- Do -
Cork : Upper	6	118	- Do -
Cork Scheme	18	156	Pumped water supply from permanent river pumpstation to a leidam. Area served with canal from which flood irrigation is principally practised.
	61	810	

A table is contained in par. 6.5 of Annexure 6 in which general data on a sample of 12 farmers on 130ha spread throughout the study area, is given.

Annexure 6C (which forms part of Annexure 6) contains details of each plot in the Cork/Calcutta irrigation scheme which includes the plotholders name, the gross aerial extent of his plot, the area of the different soil classes and the possible extent of his plot in respect of the farmers support programme under review. Further details on the irrigability of soils are contained in par. 2.3.2.2.

Immediately downstream of Cork, further irrigation farming in the Gazankulu region is practised at Lisbon/Saringwa on the farms Lisbon and Belfast where a rated area of 765ha is farmed with 500ha citrus, 250ha mangos, 10ha litchis and 5ha summer and 5ha winter tomatoes. Water is abstracted at each farm from the Sabie river by direct pumping.

Details of Sabie river abstraction permits for the above Gazankulu projects are given in Annexure 8 (par. 1f).

The estimated field edge water requirements in the Sabie river sub-catchment are presently as follows(3):

State	Rated area (ha)	Unit water requirement (mm/a)	Mean Annual water requirement (Mcu.m/a)
R.S.A.	6550	782	51,2 (76%)
Lebowa	730	548	4,0 (6%)
Kangwane	-	-	-
Gazankulu			
a) Cork/ Calcutta	400	1020	4,1 (6%)
b) Saringwa/ Lisbon	765	1100	8,4 (12%)
	1165	**1073**	**12,5 (18%)**
TOTAL	**8445ha**	**802** (weighted)	**67,7 (100%)**

It was estimated in the Sabie Study (3) that the potential irrigable extent (class 1 & class 2 soils) in Gazankulu within the Sabie sub-catchment (i.e. Sabie and Saringwa) can be increased to 2330ha).

Outside of Gazankulu within 25km distant the following areas (ha) were farmed (ref. 3) in the Sabie river basin.

	Lebowa	R.S.A.
Perennials		
Tea		100
Pecans	20	
Mangoes		60
Macadamias		50
Litchis	5	
Coffee		15
Bananas	50	3380
Avocados	45	680
Citrus	140	640
Deciduous fruit	15	120

Summer Crops		
Ginger	30	200
Tobacco	420	1160
Tomatoes and other vegetables		25
Winter vegetables	5	60
	730ha	**6550ha**

Further away (30 km north of the study area some 230ha mangoes, 130ha coffee, 550ha citrus, 1300ha maize, 140ha groundnuts and varying areas of vegetables; in all some 3000ha are farmed under irrigation in the upper Sand river basin in Lebowa and Gazankulu.

No afforested areas occur within the study area or elsewhere in Hoxani.

The following new irrigation schemes are planned outside Gazankulu within the Sabie sub-catchment, according to the latest programmes available to EVN:

Lebowa : Bushbuck Ridge Trust Farms : 1270ha

Kangwane (Ref.3) Noordsand 50ha

Sabie 400ha

(opposite Calcutta) : 450ha

The above development can be considered as the short to medium term development potential under unregulated river conditions i.e. for run-of-the river irrigation.

In the Sabie study a full irrigation potential was estimated using available class 1 and class 2 soils, indicating the following possible future development.

	Present	Short Term extension	Additional Long term extension	Total
R.S.A.	6 550	-	-	6 550ha
Lebowa	730	1 270	1 560	3 560ha
KaNgwane	-	450	920	1 370ha
Gazankulu	1 165	500	665	2 330ha
	8 445ha	**2 220ha**	**3 145ha**	**13 810ha**

Local knowledge (EVN) of the area indicates however that it is unlikely that these additional areas (column 4) would be developed to its full potential due to limiting factors such as topography, rural settlement and suitability of the soils.

The above tabulation also includes an estimated short term potential increase of some 500ha to the present irrigation development at Cork/Calcutta, Saringwa and Lisbon in Gazankulu; all as further described in Section 3 of this report.

It is further unlikely that the short term extensions of 2220ha could be exceeded without the river impoundment at Inyaka, as further described in Section 3.

2.6 **Environmental Aspects** (3)

The riverine vegetation in the study area is generally dense and a total of nine species of trees have been noted. Islands in the river have dense stands of vegetation. Exotic plants, dense in places occur.

A large variety of fish species is encountered of which one species (serranochromis meridianus) is rare and endemic to the Sabie river. The conservation importance of the river is considered to be high.

None of the envisaged river abstraction structures for the proposed FSP will threaten the endemic plant and animal life alongst the river. River barriers should however nonetheless be so constructed to allow for movement of migratory fish species.

No geological features or archaeological sites of particular interest or significance in need of preservation are known to occur.

2.7 Primary Water Supply

Annexure 8 contains a description of the envisaged regional water supply scheme to the various settlements in the southern Mhala district. The effects of this scheme on the proposed Hoxani FSP, reported herein, are given in par. 2 of this Annexure.

2.8 Sewage Treatment Works for Calcutta/Mkhuhlu

2.8.1 General

In their letter ref. 924/4C dated 88-03-13 to the Gazankulu Department of Works (Ref. 6), the consulting engineers presented a resumé of the extent and details of the proposed Calcutta/Mkhuhlu sewage treatment installation. This information is summarised herefollowing and the layout of the proposed works is shown on the attached 1:5000 orthophoto map ref. 8723.2.2.

2.8.2 Sewage effluent volume (m^3/day)

The initial sewage effluent volume (1990) is estimated to be $350m^3$/day gross and $170m^3$/day nett (evaporation $120m^3$/day and seepage $60m^3$/day). In seven years' time the nett daily average flow would increase to about $1000m^3$ inflow; $800m^3$ outflow with an annual range of $500m^3$/day minimum to say $1300m^3$/day maximum during rainy periods.

The discharged effluent would have a COD of below 150 and after discharging over grass beds (to remove algae) prior to discharging into irrigation furrows; would be of a quality suitable for the production of stored fodder.

The annual subsequent increase of effluent (after 1997) would be in relation to the population growth of say 2,5% p.a. (See par. 2.5.1); giving a design nett average daily effluent volume after 20 years (yr. 2010) of 1200 m^3/day; 438 000m^3/a.

This volume of water could irrigate the following areas over the design period if the annual irrigation depth is kept within an envelope of between 500 & 1500mm.

Year	1990	1997	2010
Annual available effluent volume : m^3	61 000	292 000	438 000
Areal extent (with irrigation depth)	12ha (500mm/a)	30ha (970mm/a)	30ha (1460mm/a)

2.7.3 Possible utilization

It is proposed that an area of 30ha be set aside for irrigation with sewage effluent. This area will have to be extended after 20 years to 40ha say. The water for irrigation may have to be augmented during the initial years.

The class 2/3 soils on the Mkhuhlu plots 8 & 9 and the Seholokoane plot 1 can readily be commanded under a gravity supply system from the sewage works.

3. UTILIZATION OF RUN OF THE RIVER FLOW FROM THE SABIE RIVER AT THE STUDY AREA

3.1 General

The Sabie river study (ref. 3) contains information on the Sabie river virgin flow; the estimated growth in primary water consumption; possible extensions to irrigation farming (as described in par. 2.5.6); evaporation and other river losses and gains; as well as hydrologic parameters that can be used to simulate the present day river low flow. This information is necessary in order to evaluate the potential extent of present and short term future irrigation development that can be provided with water from direct run-of-the river abstracton.

The descriptions in paragraph 2.2 of this Report are relevant to the evaluations described herefollowing:

3.2 Principle assumptions

The following main parameters are relevant to the evaluation of the availability of direct river runoff:

a) Irrigable extent and irrigation requirements for the present and short term future (ref. also par. 2.5.6):

Annual water use of unregulated river flow (without immediate impoundment)

	Present 1985	Additional short term irrigation development potential		
	Area (ha)	Area (ha)	Irr.Depth (mm)	Mm^3/a
Lebowa	730	Sc.1 : 770ha	900	13,5
		2 : 1270ha		18,0
R.S.A.	6550	-	780	51,2
Kangwane	-	450ha	1000	4,5
Gazankulu:				
a) Cork/ Calcutta	400	200ha	1000	6,0
b) Saringwa/ Lisbon	765	300ha	1100	11,7

b) Primary water demand growth based on the following accepted growth rates (ref. 3):

R.S.A.	: 2% p.a.
National States: 1985-1990	: 5,0% p.a.
-2000	: 2,6%
-2010	: 2,4%

Of importance here is that regional water supply schemes (such as the Mhala south scheme with abstraction point at Madras all as described in Annexure 8), fall within the framework of the above water supply demand growth scenario.

c) A minimum low flow of 1,0 m^3/s (2,68 Mcu.m for October) should be allowed to pass through to the KNP.

d) Flow data and afforestation extent as envisaged in the Sabie Study.

3.3 Sabie river run-of-the-river abstraction flow scenarios

Four scenarios have provisionally been evaluated as detailed in Annexure 9, using the parameters described herebefore. From the summary matrix on p.9/1 of the Annexure it can be concluded that:

a) The status quo can be retained in respect of the present irrigation extent in the RSA, Lebowa and Gazankulu.

b) The envisaged short term extension to the above irrigation development can readily be accommodated within the following limits:

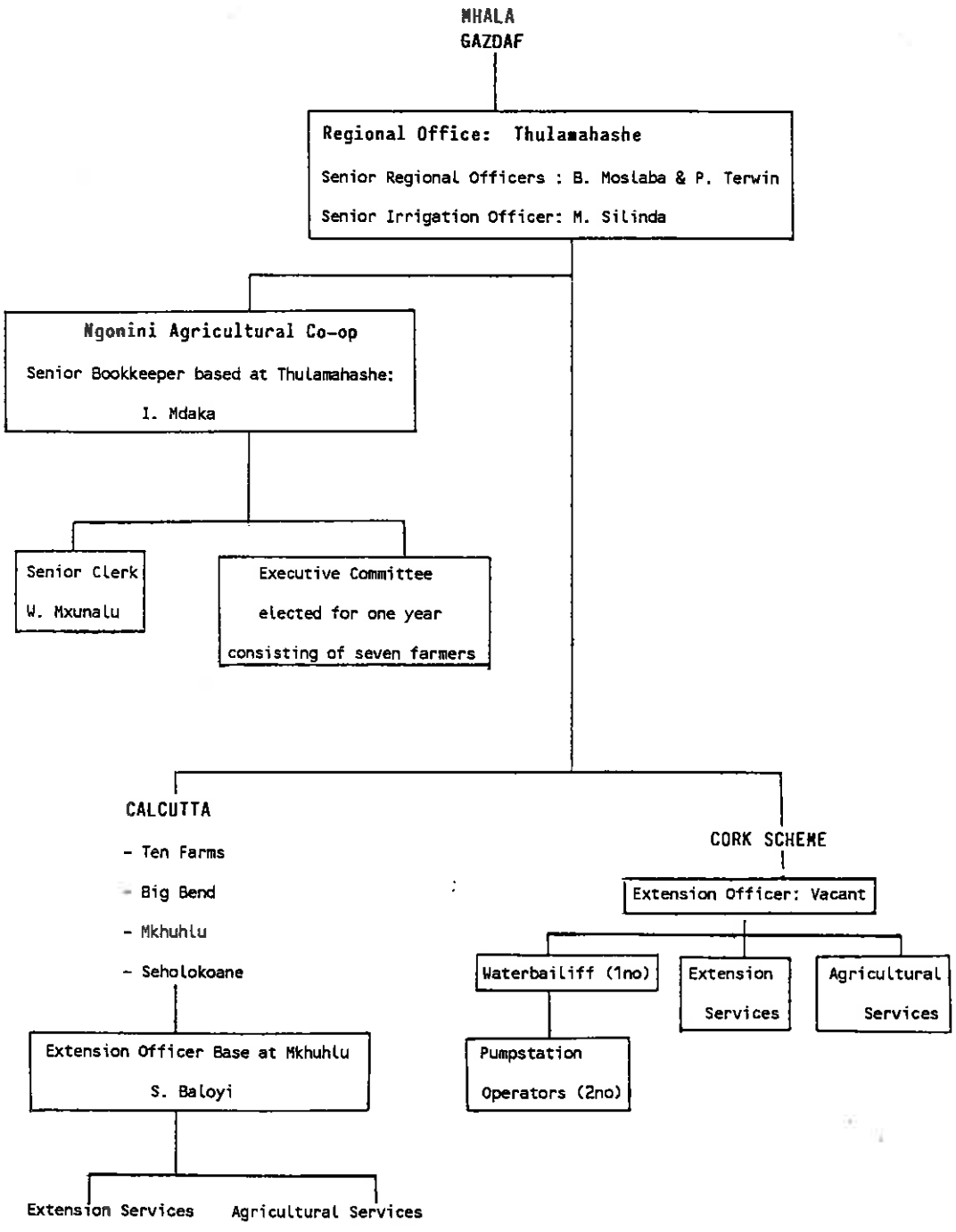
R.S.A.	: Nil (as proposed in the Sabie report)
Kangwane	: 450 ha
Lebowa	: 1200ha
Gazankulu	: 500ha (of which provisionally 200ha is at this stage earmarked for Cork/Calcutta and 300ha for Saringwa/Lisbon)

4. INSTITUTIONAL FRAMEWORK

4.1 General

The information provided in this section was collected and prepared by GAZDAF as part of their input requirements to this study prescribed in the terms of reference, further to the information contained in Annexure 6. The department had also prepared a proposed institutional system which although included in the first interim draft of February 1989, was on request, pending further inputs by DBSA, being withdrawn from this report on Phase 1 of the study.

4.2 Present Institutional Composition



5. MODELS OF EXISTING FARMERS

5.1 General

Messrs. Measured Farming made a study of a sample of five farmers at different localities within the Sabie irrigation scheme during April 1989. The conditions at each of these sample farmers differ and it can be concluded that the sample is representative. The results of this survey is contained in Annexure 10 which information can be considered as a scientific presentation of the *de facto* situation, other than the generalised data contained in Annexure 6.

5.2 Summary of findings

From the summary tabulation in Annexure 10 the following can be seen:

a) The farming income ranges from very high profit to a loss.

b) Some farmers have other income others not.

c) The most porfitable crop is tomatoes with vegetables and maize (cobs) fairly profitable.

d) The prices received by the farmers can be much higher than normal market prices.

e) The suitability of soils in respect of irrigation did not bear a direct relationship to the success of the farmers in the sample.

f) There exists a definite potential for agricultural development in the area.

6. DEVELOPMENT NEEDS

6.1 General

In the project description (par. 3.3.1 of Annexure 3) it is a stated requirement that at the conclusion of Phase I of this study the development needs of the farmers in the project area should be identified. Within the limits of the extent of information collected during this study phase it is well possible to give an indication of the availability of resources and market opportunities so that the project concept can be developed during the following study phase. These issues are described herefollowing:

6.2 Infrastructure

Farmers are already settled on the Sabie Irrigation Scheme and the general infrastructure comprising major and minor access, settlement, rudimentary *ad hoc* irrigation to individual plots by direct river abstraction in general, more improved irrigation water supply for a basic flood irrigation system at the Cork Scheme and electricity supply, have all been established.

The main constraints in this regard are as follows:

a) Suitable river abstraction and supply to plotholders and for improvement to the existing installations.
b) Improvement to infield irrigation systems.
c) Extension of irrigation layout towards adjacent suitable irrigable areas. (Refer to paragraph 5 of Annexure 11.)
d) Utilisation of sewage effluent produced by the proposed Mkhuhlu sewage works (refer to par. 2.8 of this text).

6.3 Soil & Water

A nett irrigable area of 642ha can readily be included in the proposed FSP of this area. 24% of the soils are most suitable for irrigation and the remainder have moderate to marginal qualities. Special care will have to be taken with the irrigation on the latter soils and a well-planned overhead irrigation system is required to assure long term suitability of the soils.

All of the available area could be irrigated by direct abstraction from the Sabie river within the abstraction rights of Gazankulu. If the aerial extent or irrigation volume is increased a careful analyses would have to be made if such is possible within the existing balanced situation of supply and demand alongst this important river system.

6.4 Institutional

The present institutional composition may need to be revised in order to accommodate the proposed upgrading of the irrigation scheme. The existing agricultural co-op (Ngonini) needs financial upliftment.

6.5 Farmers Support

There are many farming plots on which practically no production take place whilst other farmers show average to well above average production and income (refer par. 5 of this text). It seems that a very high potential exists for improved farming and crop production on this irrigation scheme and that every effort should be made to realize this.

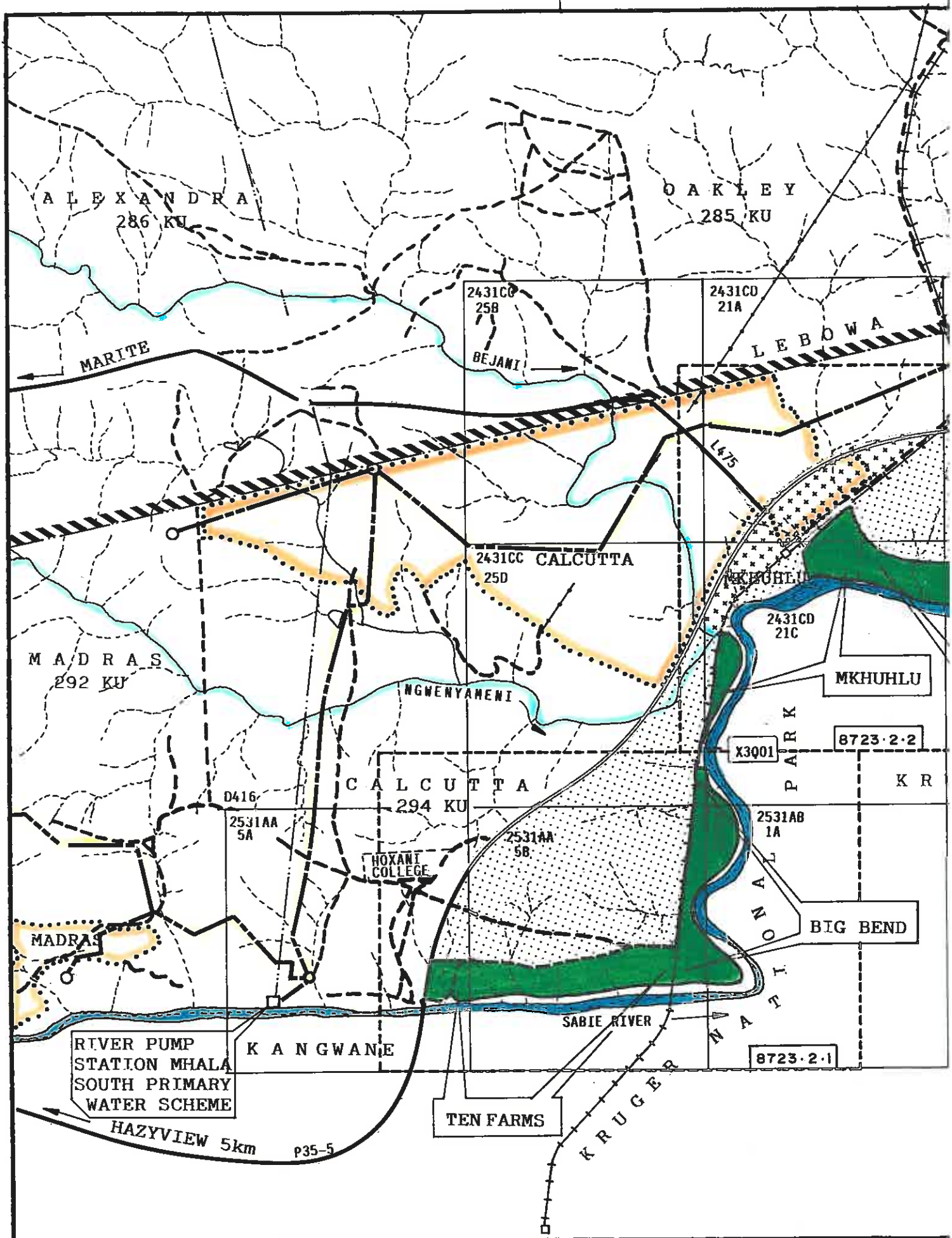
ANNEXURES

1.	References	White
2.	Maps and Drawings	
	Fig. 1 : Locality Map (1:50 000)	
	Fig. 2 : District Map (1:250 000) showing rainfall isoyetals	
	Fig. 3 : District Map (1:250 000) showing evaporation	
	Orthophoto compilation maps (1:5000) : issued separately EVN Ref. 8723.2.1 .2.2 .2.3	
3.	Project Description by DBSA	Blue
4.	Preparatory studies : Project Resumé and program prepared by EVN	Yellow
5.	Survey (by GAZDAF) of existing farmers - October 1988 Summary of findings	Green
6.	Data Survey by GDAF - January 1989	Ocre
7.	Soil survey : Data	Pink
8.	Mhala South Primary Water supply Scheme : Resumé by EVN	White
9.	Sabie river run-of-the-river abstraction flow scenarios	Blue
10.	Farmer Models : Sample of present situation (Measured Farming)	Yellow
11.	Review of matters that were discussed during a meeting on 89-03-15 at Saringwa, Mhala District	Green

Annexure 1

REFERENCES

Abbreviation		Title	Author
	1.	Gazankulu Development Information (1986)	DBSA/Gazankulu Govt.
	2.	Die Landboupotensiaal van Gazankulu t.o.v. die Nasionale Ontwikkeling Streek 'G' : Addendum t.o.v. Mhala-distrik (Jan. 1986)	GAZDAF/EVN
Sabie Study	3.	Sabie River Catchment Development Study : Draft Report Vol. 1 & 2 (April 1988) and Interim Reports Vol. 1 to 34 (July 1986-June 1988)	Chunnett, Fourie & Partners
Mhala South Water Scheme	4.	Mhala South Regional Water Supply Scheme. Addendum to Report 0958-86-04. Supplementary information. Madras-Calcutta-Mhala South (Dec. 1986)	Hawkins, Hawkins and Osborn
SWR 12/83	5.	Addendum to Surface Water Resources of South Africa, December 1983.	Water Research Commission.
	6.	Data Relevant to the Sewage Treatment Works at Mkhuhlu, March 1988 (Letter to Gazankulu Dept. of Works)	Hawkins, Hawkins & Osborn



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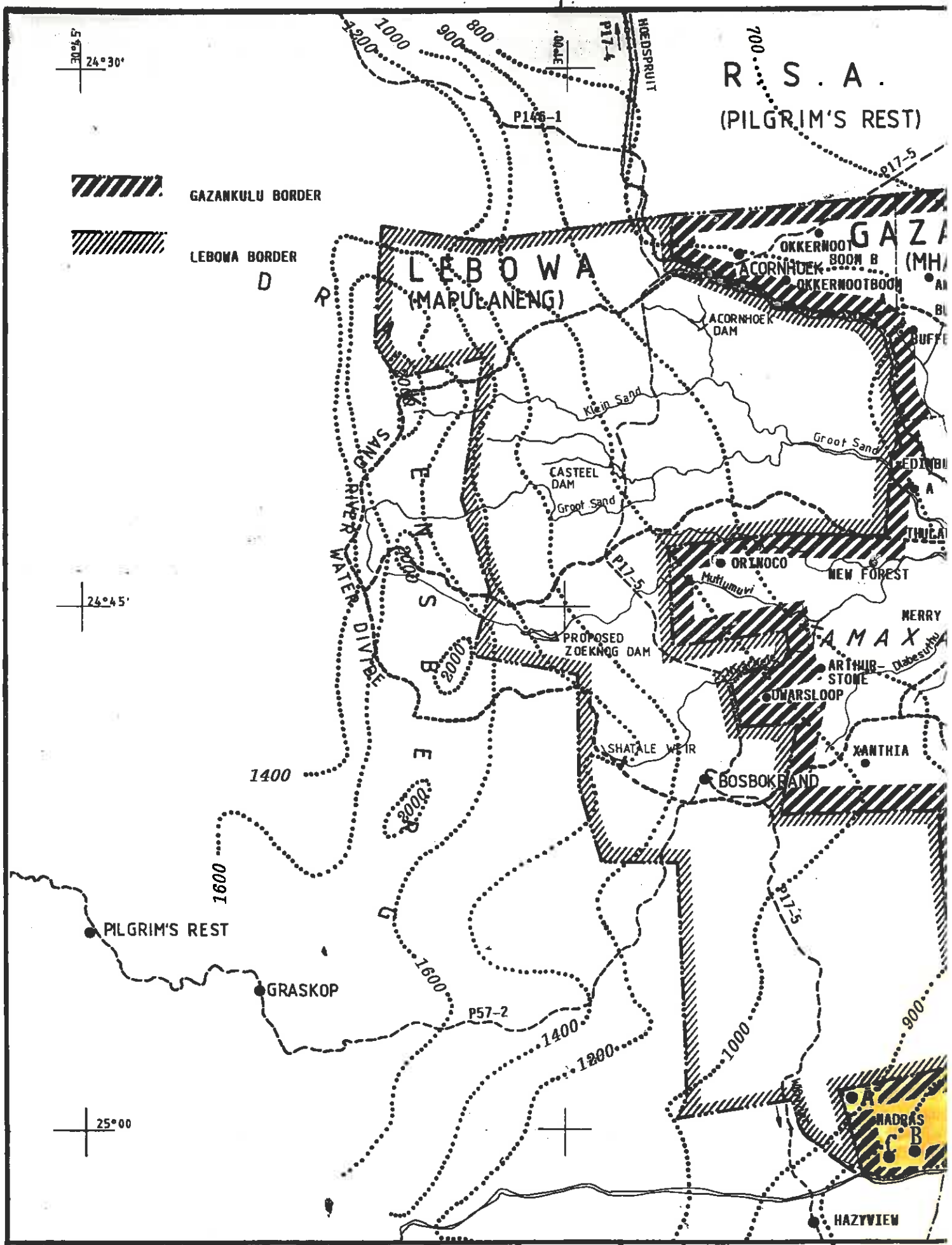

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			R. F.		OCT '85

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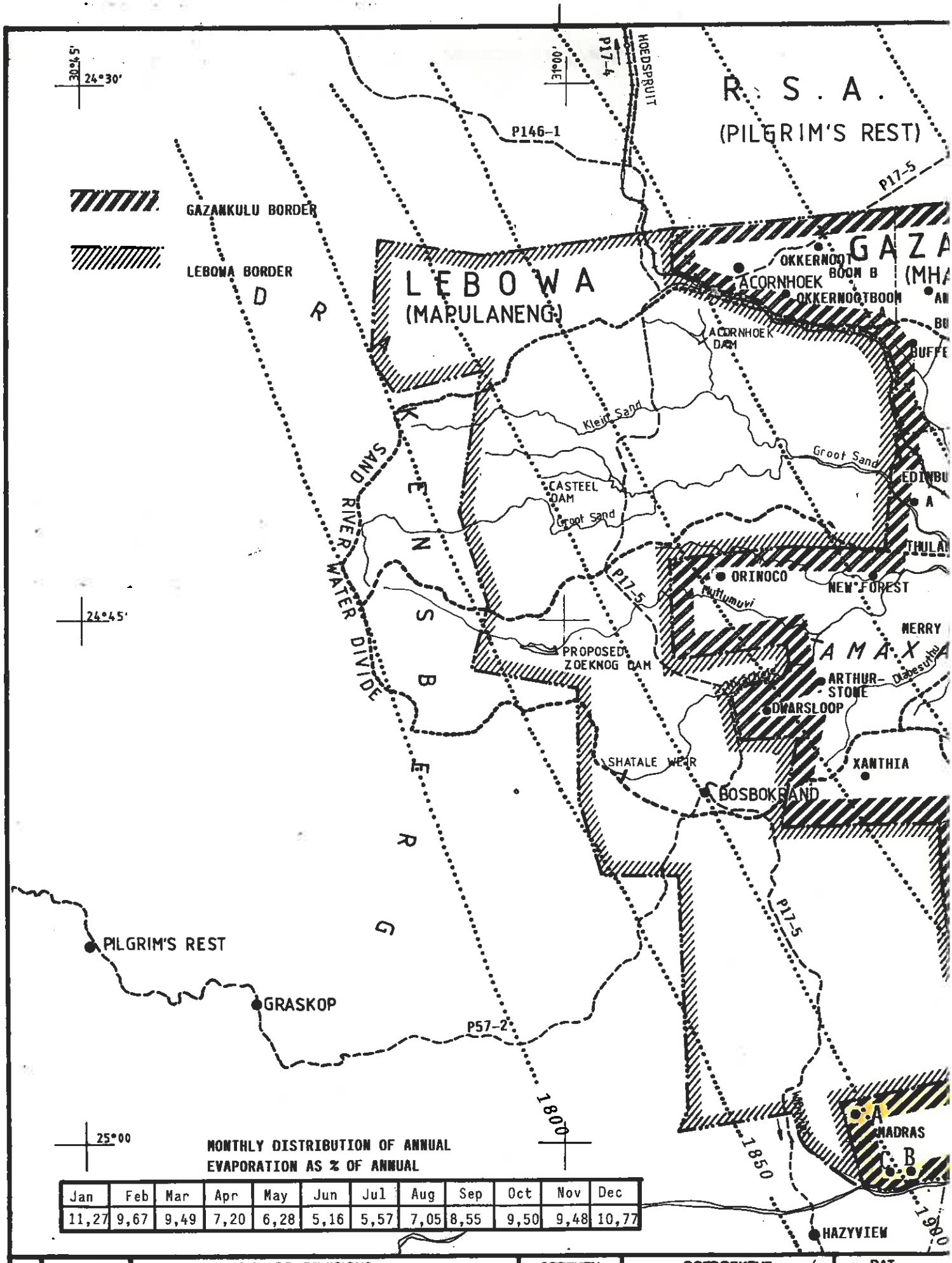

MONTHLY DISTRIBUTION OF ANNUAL EVAPORATION AS % OF ANNUAL

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
11,27	9,67	9,49	7,20	6,28	5,16	5,57	7,05	8,55	9,50	9,48	10,77

NO.	DAT.	WYSIGINGS / REVISIONS	GETEKEN DRAWN	GOEDGEKEUR APPROVED	DAT.
			R.F.		OCT '85

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PROJECT DESCRIPTION: HOXANE IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

1. DEVELOPMENT OBJECTIVE:

The overall development objective is:

The promotion of structural change away from subsistence farming towards commercialised farming by upgrading, providing and strengthening comprehensive agricultural support services and incentives to emerging farmers in order to increase efficiency of agricultural resource utilisation, food security and to foster entrepreneurial ability over a broad front.

The development objective of the preparation studies is to appoint consultants to undertake some of the necessary project preparation.

2. OVERVIEW:

The proposed irrigation upgrading and farmer support services will be implemented in the Hoxane Tribal area along the Sabie river in Gazankulu. The project area is located in the south of the Mhala District. To the south and east of the District is the Kruger National Park while Lebowa is in the west and South Africa in the north.

Upgrading the present irrigation network system and the provision of support services for the 61 farmers occupying ± 500ha irrigable land along the Sabie River requires preparatory work.

Preparation studies will concentrate on the constraints experienced by the farmers, the planning of an appropriate water distribution system and farmer support system. The financial effect of the proposed project on the farmers as well as on the Government will also be analysed. Any other information that could indicate demand for other inputs which will encourage agricultural production, will also be investigated.

To ensure that the improved agricultural activities provide a basis for rural development with maximum linkages to other economic sectors, all planning activities will emphasise an Integrated Rural Development approach.

In order to meet the stated development objectives and to provide the necessary development plans for the Hoxane farmers along the Sabie River, certain investigations will be conducted by GAZDAF and their consultant.

3. THE PROJECT:

3.1 CRITERIA:

It was agreed that the following criteria be adhered to by the borrower and the consultants in determining appropriate development proposals.

3.1.1 Economic Criteria:

- Maximum opportunity should be given to all levels of the private sector, especially small farmers and contractors to participate in agricultural activities in an effort to reduce regional economic imbalances.
- Maximising local involvement and participation requires that all activities should involve local initiative that is based on their needs.
- The application of inputs and resources should be cost-effective and affordable and within the stated development objectives.
- Farmers in Hoxane should have equitable access to opportunities to compete in the market, based on the principle of comparative cost advantage.
- Market processes should not be replaced nor interfered with by planned intervention but rather strengthened.
- The economic benefits should exceed the economic costs of the project.
- An assessment of the economic potential of the resource base and of the people involved should underline all the activities.
- The functional and sectoral components presently in operation within the rural economy should be integrated to the greatest possible extent e.g. small business development, corporative farming activities, etc.

3.1.2 Institutional Criteria:

- Maximum devolution of decision making through farmer and community participation should be attained at all levels of activity, i.e. during identification, planning, management and implementation of the project.

- In order for the FSP to be sustainable, specific attention must be paid to the training needs of Co-operative staff and farmers in management skills.

- In order to maximise the spin-offs from the intended developments, an Integrated Rural Development approach must be followed and therefore a high level of interaction between all interested institutions involved in the project area is required. The same applies to interaction between interested institutions and the Hoxane residents.

- The greatest feasible degree of **privatisation** should be favoured in the production processes and also in institutional structures.

- Intervention should be encouraged only when formal / organised collective action is more advantageous than **individual action** and when individuals seek to act collectively.

3.1.3 Technical Criteria:

- Technical design should accommodate the given properties of the natural resources.

- Irrigation water should be made available to farmers on an economic viable, reliable and cost-effective basis.

- All proposed technologies, managerial structures and practices must be appropriate and affordable in terms of the educational level, abilities, experience, needs and preferences of the local population. A phasing-in approach to new practices, taking cognisance of these aspects should be considered.

- Technical design should be flexible, accommodating the improvement in the farming and managerial abilities of the farmers.

- The following design criteria should apply for physical facilities during detail planning in the implementation phase:

  - Planning of building sites should consider correct orientation in relation to site contours and position of access roads;

  - Appropriate utilisation of available infrastructure to be ensured and appropriate cost efficient infrastructure to be created where needed;

- Provision of facilities to be based on proven and realistic expected demand to prevent duplication;

- Rational space allocation, affordability, energy efficiency and appropriate low maintenance design standards will be considered;

- Appropriate construction technology will where practical, be applied to ensure the use of local resources such as labour, material and support services; and

- Small building industry should be stimulated by involving emerging local contractors on a competitive sub-contractor basis.

- The planning and implementation of the project should be based upon sound conservation principles.

3.1.4 Financial Criteria:

- Development activities should be based upon sound financial management and administrative control procedures.

- The approach to be followed towards participation by beneficiary communities in the costs of the project (whether in cost or in kind) need to be established.

- The farmer financial benefits should exceed their financial costs in terms of their objectives.

- Proposals should be affordable and cost effective in respect of fiscal impact on the Government contribution.

3.2 INSTITUTIONAL RESPONSIBILITIES:

3.2.1 The Steering Committee:

On commissioning the study, a Steering Committee (SC) will be formed to evaluate and monitor progress of the work. This Committee will have representatives of:

- Gazankulu Department of Agriculture and Forestry (GAZDAF) - Project Agent;

- Gazankulu Development Corporation (GDC);

- The Hoxane Tribal Authority (2);
- Farmers' Representatives (2); and
- The Development Bank of Southern Africa (DBSA) - observer status.

The tasks of the SC will be to:

- Select and appoint consultants;
- Organise an orientation workshop at the commencement of the study. The consultants and other relevant groups / institutions / persons will be requested / invited to attend this workshop. DBSA will support the SC in conducting this workshop.
- Control, monitor and guide consultants and jointly review the activities at the end of each phase in consultation with DBSA and jointly decide on what further action should be undertaken to ensure that the preparatory work is still directed towards obtaining the stated development objectives and design criteria. The SC may convene at any stage during the study when necessary;
- Authorise payments to consultants;
- Communicate with the participating farmers and other local interest groups; and
- Appraise and present the final project proposal to DBSA and to the Gazankulu Government for decision-making.

3.2.2 The Consultants:

The Consultants will execute the necessary studies, analyses and project proposal as detailed in paragraph 3.3. It will also be the responsibility of the consultant to keep minutes of the SC meetings. Financial analyses and all related calculations should be made available to DBSA, if so required.

3.2.3 DBSA:

DBSA will:

- Support and guide the SC and consultants;
- Through the Departmental Manager, Rural and Agricultural Development, grant approval for progress to further phases as per the project description;

- Authorise disbursement to the Borrower for the studies; and

- Appraise the final project proposal.

3.3 PROJECT PREPARATION:

In order to establish certain milestones in the investigation and project description, the study to be done is divided into three phases.

3.3.1 Phase I: Data Analysis and Problem Statement:

In order to determine an accurate perspective on problems experienced by the Hoxane farmers, this phase will entail the analyses of data and the identification of relevant problems. This analysis will be conducted within two steps viz. the collation of existing available information and the collection of additional data (if so required). This data will then be analised to formulate an accurate statement of the problem.

Step 1: Evaluation of Existing Information:

GAZDAF, will provide the consultants with information on the following:

- Demographic information:

  Number of farmers, number of persons per farmer's household, sex, age, level of education, etc.

- Institutional description:

  Structure and role of GAZDAF, Hoxane Tribal Authority, Mhala Agricultural Action Group, GDC, the existing co-operative and small groups operating informally.

- Existing farming activities:

  Crops grown; cropping programmes; yields; market opportunities; marketing arrangements; land tenure arrangement as it relates to land use; and irrigation systems.

- Status of existing agricultural infrastructure (both on and off the project):

  Roads, telecommunication; water storage; water reticulation; electricity supply; service centres; etc.

- Financial position of the farmers and the co-operative and cursory assess other economic activities which could be linked to this project.

The consultants will familiarise themselves with the target area, scrutinize the available information and then recommend to the SC what additional information will be required in order to do a complete analysis of the constraints and problems presently facing the farmers.

This step will culminate in a decision on what additional data is required to draft a valid problem statement.

Step 2: Collection and Analysis of Additional Data:

It is anticipated that some additional information will be required for example, the agricultural potential of the project area, information regarding the hydrology and that maps will have to be prepared to indicate existing landrights and soil types. The activities and costs during this phase will, however, depend on the decisions reached by the SC.

When all the required information is in hand, the consultants will do a comprehensive economic, technical, institutional and financial analysis of the current situation under which the farmers operate, as well as noting the present and potential linkages of the farming activities to other economic activities in the surrounding areas.

This phase will culminate in a problem statement regarding the development needs of the farmers in the project area vis a vis the availability of resources and market opportunities.

3.3.2 Phase II: Developing a Project Concept:

Based on the problems and opportunities identified during Phase I of the study, the consultants will, in consultation with the SC, conceptualise various development proposals. It is perceived that the single biggest problem encountered by the farmers is the irregular and unreliable supply of affordable irrigation water, therefore these proposals will most probably be in the line of solving the technical problem of water provision within an appropriately designed Farmer Support Programme.

Preliminary capital and operational cost estimates will be undertaken to each alternative proposal, in order to enable a preliminary economic cost benefit analysis to indicate the more desirable project proposal.

Once such a proposal has been selected, the SC will consult with the participating farmers as to the acceptability of the proposed developments and obtain their agreement to proceed with the preparation of the project.

At this stage, and depending on the proposal, it might be necessary to pay attention to further technicalities such as the availability of water and water rights to irrigate the potentially irrigable area. The determination of sites for pumpstations and/or weirs, from which the water is to be pumped should be attended to.

The consultants will then present the SC with a conceptual proposal which will indicate preliminary representative farming systems, the distribution of water, preliminary costings and how the provision of irrigation water will influence the financial position of the participating farmers.

If at this stage, it proves that the farmers will benefit financially, should such a scheme be developed, the SC will have to again obtain the agreement of the participating farmers to proceed with the more detailed preparation of the project.

This phase therefore culminates in a concept, provisionally accepted by the participants and presented to the SC that can be further developed to determine its full financial and economic implications as well as the institutional arrangements required to implement the proposal.

3.3.3 Phase III: Project Proposal:

The emphasis during this phase will be on the further planning and appraisal of the development proposal selected during Phase II and particular attention will have to be paid to the following during this phase:

- Support services to be provided, e.g. mechanisation, production inputs, credit, marketing, extension and training and financing arrangements;
- Infrastructure such as roads, electricity supply, buildings, soil conservation works, etc.;
- Medium term assets which are necessary for the support services such as mechanisation, transport, etc.;
- Institutional arrangements at all levels for the proposed support services and managerial support

required for the successful implementation of the project; and

- Activating possible linkages with other economic activities and sectors in the environment (e.g. food and vegetables supply to the urban market in Mkhuhlu) should be considered.

Particular attention will have to be paid in specifying the role and function of farmers, co-operatives, contractors, private sector, Tribal Authority, GDC, GAZDAF and any other informal organisation as well as the funding and other support arrangement required to ensure an effective and efficient implementation action. Appropriate mobilisation, institution building and development and training activities should also be proposed.

A view will have to be taken on the time period required to fully implement this project, as well as the sequence, as this will influence the cashflow budget that will have to be drawn up.

Once the SC is satisfied that all institutional and technical aspects have been adequately addressed, it will then be necessary for the consultants to proceed to pay attention to the financial aspects related to the project.

Budget estimates will be required for:

- Proposed capital investment in basic infrastructure, buildings, etc.;

- Proposed capital investment in movable assets equipment, etc.;

- Working capital consisting of direct and overhead costs (including the training costs for the different participants) for:

  - Farmers;
  - Co-operatives (service centre - at cost price);
  - Mechanisation contractors; and
  - Other institutions involved.

The following cashflows (at constant prices) should be investigated for all participants of the project. (Appropriate financial terms and conditions should be taken into consideration.)

- The cashflow of the co-operative or service centre after financing (at cost prices).

- Cashflow situation of mechanisation contractors (after financing); and

- Cashflow situation and return on investment of an individual farmer after financing (at retail prices).

To complete the evaluation, the following should be addressed:

- The fiscal impact of the programme for Gazankulu Government (after financing); and

- Assessment of the development impact of the project:

  - Farming opportunities;
  - Job opportunities;
  - Linkages with other economic activities;
  - Possible spin-offs from this project e.g. community development actions, cross-border co-operation, etc.;
  - Rural development perspective; and
  - Regional development perspective (Region G).

Economic Cost Benefit Analysis:

A cost benefit analysis will be undertaken to determine the economic viability of the proposed project.

Final Report:

This phase will culminate with a presentation to the SC of the proposed project.

At the conclusion of the study, all plans designed so far will then be presented to the farmers in the form of a Project Description for their final consideration. The acceptance of the project ledger by the SC, the farmers and the Borrower will terminate the study.

The complete project ledger will then be presented to DBSA and the borrower for appraisal.

4. GENERAL ARRANGEMENTS AGREED UPON:

4.1 Permission to enter the study area should be obtained from the local district Head of GAZDAF.

4.2 PROJECT BUDGET:

PREPARATION COST	BASIC COST AS AT DATE		ESCALATION		TOTAL COST	DBSA FINANCING	
	PRE IMPLEMENTATION COST	DURING IMPLEMENTATION COST	R('000)	(%)		MAX AMOUNT CLAIM	% OF EACH CLAIM
1 PHASE 1 DATA ANALYSIS & PROBLEM STATEMENT							
1 1 GAZDAF	10000	9000	0	0	19000	0	0 00%
1 2 CONSULTANTS		27900	0	0	27900	27900	100 00%
2 PHASE II DEVELOPING A PROJECT CONCEPT(CONSULTANT)		32400	0	0	32400	32400	100 00%
3 PHASE III PROJECT PROPOSAL (CONSULTANT)		40500	0	0	40500	40500	100 00%
4 CONTINGENCIES		11200	0	0	11200	11200	100 00%
TOTAL PROJECT RELATED COST	10000	121000	0	0	131000	112000	85 50%

CONTINGENCIES AMOUNT TO 10 00%

5. APPRAISAL AND IMPLEMENTATION:

This will be followed by submission of an appraisal report for approval by DBSA's management.

If an investment project should result from the abovementioned, planning detailed design and planning of all aspects for implementation by the project agent assisted by consultant (if necessary) and the DBSA project team will take place only after the investment decision by Gazankulu.

Annexure 4

HOXANE IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

PREPARATORY STUDIES : PROJECT RESUMé

(Based on description faxed from DBSA to EVN on 88/11/30)

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Annexure 4

HOXANE IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

PREPARATORY STUDIES : PROJECT RESUMé

1. DEVELOPMENT OBJECTIVE

The upgrading of existing subsistence farming. Agricultural engineering consultant (Eksteen, Van der Walt & Nissen, EVN) and economical consultants (Measured Farming, MF) will assist in the preparatory studies.

2. OVERVIEW

- The locality of the study area is shown on the attached map.
- The proposed scheme must result in an integrated rural development.

3. THE PROJECT

3.1 Criteria

3.1.1 Economic

- Maximum opportunity to small farmers and contractors.
- Local initiative to be encouraged.
- Cost effective and affordable inputs.
- Assessment of economical potential of human and natural resources.
- Incorporation of other local economic activities.

3.1.2 Institutional

- Devolution of decision making by farmer and community participation during this preparatory study phase and so that it can be attained during subsequent implementation phases.
- Training needs of cooperative staff and farmers.
- Involvement of any other interested institutions.

3.1.3 Technical

- Appropriate to the education, ability experience, needs and preferences of the local population.
- Phasing in approach.
- Flexible to allow for improvement and changes in abovementioned criteria.
- Low maintenance.
- Utilization of local labour, material and support (small contractors) resources.
- Good engineering.

3.1.4 Financial

- Sound financial management and administrative control procedures.
- Beneficiary schemes to be determined.
- Financial benefits of a farmer should exceed the costs.
- Fiscal contribution by the Government to be affordable and cost effective.

3.2 Participant Bodies

3.2.1 Steering Committee (SC)

a) **Composition**

GAZDAF : Project Agent
GDC
Hoxane Tribal Authority (2)
Farmer Representative (2)
DBSA (Observer)

b) **Duties**

- (Select and appoint consultants) : Concluded
- (Organise orientation workshop which all relevant parties, including consultants, should attend.) : Concluded
- Control, monitor and guide consultants.
- Review preparatory studies in consultation with DBSA, at any stage but particularly at end of each defined phase.
- Authorise payments to consultants.

- Communicate with participating farmers and others interested.
- Appraise and present final project proposals to Gazankulu Government.

3.2.2 Consultants

a) **Composition**

EVN : Leader of professional team

MF : Subconsultant

b) **Duties**

- Execute necessary (defined) studies
- Keep minutes of meetings relevant to their studies
- Make all related technical and financial calculations available to DBSA, if required.

3.2.3 DBSA

a) **Composition**

Project Leader (Mr G. Mashile) and Project team members

b) **Duties**

- Assist SC and consultants
- Grant approval to commence with different study phases
- Authorize payments for study disbursements.
- Final project appraisal.

3.3 Project Study Phases, Time and Costs

	Time Program	Disbursement to Consultants

3.3.1 Phase I : Data

a) Information provided by GAZDAF to EVN

- Demographic data
- Institutional description
- Existing farming activities
- Status of existing agricultural infrastructure

	Time Program	Disbursement to Consultants
. Financial position of the farmers and cooperative	- 7/2/89	
b) Follow up studies by EVN/MF		
. Site visit and field work	9/2/89	
. Scrutinize data presented by GAZDAF (par. 3.3.1a) and recommend to SC on further required information	- 15/2/89	
c) Data collection by EVN		
: Cadastral		
: Hydrology		
: General		
and presentation of first interim report	- 15/2/89	
d) Meeting and decision by SC	15/3/89	
e) Further data collection re		
: Soils		
: Sewage effluent		
: Existing farm models	30/5/89	
f) Data analysis and presentation of second interim report	9/6/89	
g) Evaluation by DBSA/SC	- 30/6/89	
		R34 000
: Original estimates		
Additional for study of sewage effluent and re-evaluation of soils data (approved by DBSA)		R16 000
Total cost Phase I		**R50 000**

3.3.2 Phase II : Concept

a) Development proposals including capital and operational cost estimates	- 14/7/89	R 14 000
b) Consultation by SC with farmers	- 9/8/89	R 3 000

	Time Program	Disbursement to Consultants
c) Preparation of preliminary representative farming systems and ascertaining if farmers could afford and benefit through the scheme	- 23/8/89	R 12 000
d) Consultation by SC with farmers	- 6/9/89	R 3 000
. Contingencies		R 5 000
		R 37 000

3.3.3 Phase III : Proposal

a) **Planning Proposals**

- Support services (mechanisation, production inputs, credit, marketing, extension, training, financing)
- Infrastructure (roads, electricity supply, buildings, soil conservation, etc.
- Institutional arrangements
- Linkage systems with other local economic activities
- Implementation program - 22/9/89 R 12 000

b) **Deliberations by SC** - 18/10/89 R 3 000

c) **Financial etc. proposals**

- Capital investment in
  : Basin infrastructure
  : Movable assets and equipment
- Working capital requirements (direct and overhead including training) for farmers, cooperatives, contractors et al.
- Cashflow requirements of
  : cooperative or service centre (at cost prices)
  : mechanisation contractors (after financing)

	Time Program	Disbursement to Consultants
: individual (sample) farmer (after financing at retail prices) and return on investment		
. Fiscal impact evaluation on Gazankulu (after financing)		
. Development impact of the project (farming opportunities, job opportunities, linkage with other economic activities, spin-offs, rural and regional development perspective)		
. Economic cost benefit analysis	- 30/10/89	R 12 020
d) **Presentation of draft report**	- 7/11/898	R 3 000
e) **Deliberations SC with farmers**	- 22/11/89	R 3 000
f) **Submission of Report**	1/12/89	R 3 800
. Contingencies		R 4 200
		R 41 000
TOTAL STUDY COSTS **Original**		**R112 000**
Additions		R 16 000
		R128 000

4. GENERAL

4.1 Permission to enter the study area must be obtained from the local GAZDAF officials.

4.2 The project costs in respect of consulting services are as follows:

	EVN	MF	TOTAL
Phase I	R 42 000	R 8 000	R 50 000
II	R 26 000	R 11 000	R 37 000
III	R 13 700	R 27 300	R 41 000
	R 81 700	**R 46 300**	**R128 000**

4.3 Interim payments to consultants during each phase shall be effected to 80% of the approved invoiced sums with the 20% retention paid after completion of each phase. The total project costs shall not exceed R112 000 plus approved additions of R16 000 but the costs during each phase shall be based on actual expenses incurred by EVN/MF.

Annexure 5

HOXANE IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME
SURVEY OF EXISTING FARMERS CONDUCTED BY GAZDAF - OCTOBER 1988

SUMMARY OF FINDINGS (EVN)

1. CHARACTERISTICS

1.1 Most farmers (66%) had more than ten years farming experience.

1.2 Average family size is seven people.

1.3 Some 50% of the farmers keep limited numbers of livestock on the commonage and which activity does not compete with irrigation.

1.4 **Education levels**

a) Most farmers could not read or write Afrikaans (60%), English (60%) or Tsonga (55%). Only some 17% of all farmers could be considered fairly literate.

b) About half (48,5%) of the farmers cannot do arithmetic.

2. CONSTRAINTS

2.1 Physical

. Irrigation and potable water supply to the farms are in a poor state. Most farmers (85%) use a pumped supply (diesel) and the remaining 9% receive water from a canal and 6% do not irrigate at all.

. Farm roads are in a poor state.

. No electricity supply exists.

2.2 Institutional

. No credit facilities exist from the farmers cooperative Ngodini and a need exists for the acquiring of primarily the following:

Irrigation equipment	: All respondents
Tractor	: 74%
Production inputs	: 63%
Paying for labour	: 54%

. The farmers do not think that seed or fertilizers are limiting production factors.

- The majority of farmers are in need of ploughing, planting, marketing and transport services. Half of the farmers hire transport.
- The following primary facilities are required to be provided by the Ngonini cooperative: Diesel and oil, seeds, fertilizer, pesticides and fungicides, tractors, credit and marketing facilities, cement and knapsack sprays.
- Most farmers (63%) prefer that GAZDAF and a farmer committee should manage the cooperative.
- Many farmers (34%) required advice on soil preparation (ploughing, planting, fertilizing, pest control) and general extension education (26%).

2.3 Human resources

- The availability of farm labour is not considered a problem.
- Most farmers have a serious to very serious need for training in crop production and appurtenant, on a weekly basis.
- Most farmers (80%) are prepared to contract tractor and transport services.

2.4 System outputs

- Half of the farmers preferred movable sprinkler irrigation and the other half furrow flood irrigation.
- Most farmers are prepared to irrigate all available land. Presently (due to poor water supply and high pumping costs) the following available land are cultivated:

  All (100%) : 29% of farmers
  Most (75%) : 46% of farmers

- Both summer (maize) and winter crops (cabbage, onion, spinach, beet, beans and tomatoes) are cultivated. The occurrences of banana and mangoe trees are limited.

Annexure 6

CORK/CALCUTTA IRRIGATION
DATA SURVEY OF EXISTING INFRASTRUCTURAL DEVELOPMENT

Undertaken by B.C. Lundie, principal Agricultural Engineering Technician on behalf of GAZDAF, January 1989.

"6.1 ALGEMEEN

Hierna volg 'n beskrywing van die fisiese uitlegte en ontwikkeling wat huidig binne die gedefinieerde studiegebied voorkom. Die verskillende items word getoon op die meegaande ortofotokompilasieplanne met EVN verwysingsreeks 8723.2

6.2 FISIESE BESKRYWING

6.2.1 Toegangspaaie

Die skema is geleë suid van die teerpad wat Hazyview en Skukuza verbind en is derhalwe maklik bereikbaar.

Op die skema self is daar verskeie toegangspaaie wat gebruik word. Die belangrikste pad wat in ag geneem moet word is die grondpad wat gebruik word vir onderhoudswerk op die Nasionale Kruger Wildtuin se heining wat aan die linkeroewer van die Sabierivier loop. Die pad loop deur die volle lengte van die skema.

Daar is in 1988 geen onderhoud op die pad gedoen nie en die begaanbaarheid wissel van 'n goed geskraapte pad tot 'n swak tweespoorpad.

6.2.2 Toekomstige paaie

Daar word tans 'n teerpad langs roete L472 beplan wat die gebied waarin die skema geleë is met die Mhala streekskantoor op Thulumhase sal verbind.

6.2.3 **Elektrisiteit**

RSA Kraglyn (275 kV)

Die RSA kraglyn volg 'n roete wat deur die "Ten Farms' gedeelte van die skema gaan. Die kraglyn is die hoof-toevoerlyn na die noordelike gebiede soos Phalaborwa.

GAZ kraglyne

Daar is tans 'n 22kV kraglyn wat die roete volg suid van die teerpad vanaf Belfast tot waar die Sabierivier en Hazyview-Skukuza teerpad bymekaarkom.

Ongeveer een kilometer suid van die industriële gebied "Mkhuhlu" is daar 'n area geidentifiseer vir die aanbou van 'n rioolsuiweringswerke. Die area is reeds voorsien van 'n 11kVA kraglyn.

Elektrisiteit uitbreidings

Daar is tydens die ondersoek samepsrekings met Mnr Richard Richotso van die elektrisiteitsafdeling by die streekskantoor op Thulumashe gevoer, waartydens aan-gedui is dat bogenoemde kraglyne teen 'n koste van R11 000 per kilometer uitgebrei kan word.

6.2.4 Rivieronttrekkingspunte

Huidige permanente pompstasies

Daar is net een permanente pompstasie en wel op die Cork gedeelte van die skema. Die dieselmotor is tans buite werking. Onderhoud word deur GAZDAF gedoen. Aangeheg is fotos van die pompstasie. Die moontlikheid om die diesel motor met 'n elektriese motor te vervang moet on-dersoek word.

Semi-permanente pompstasies

Die oorgrote meerderheid van die boere maak gebruik van verskuifbare pompe. Aangeheg is 'n foto van 'n tipiese pompinstallasie.

Toekomstige pompstasies

Daar is drie moontlike rivieronttrekkingsterreine geïdentifiseer:

a) **Big Bend**

Twee pompstasie terreine is in die gedeelte geidentifiseer. Beide posisies is sentraal geleë en is die besproeiingspersele relatief maklik bereikbaar. Die "Ten Farms" gedeelte is ook bereikbaar d.m.v. 'n duiker onder deur die spoorlyn. Aangeheg is ook twee fotos van die onderskeie posisies.

b) **Seholokoane**

Die posisie is sentraal geleë en daar kan moontlik gebruik gemaak word van 'n balanseerdam wat op die Seholokoane berg gebou kan word. Die hele Seholokoane gedeelte van die skema is van hier af bereikbaar.

6.2.5 **Kanale**

a) Cork kanaal

Die Cork gedeelte van die skema bestaan uit 'n pompstasie, twee balanseerdamme asook 'n betonkanaal. Onderhoud op die damme en op die kanaal word deur GAZDAF gedoen. Alhoewel die pompstasie tans buite werking is, is die strukture oor die algemeen in 'n goeie toestand.

b) Seholokoane kanaal

Die kanaal is 'n grond kanaal wat klaarblyklik deur die enkele boere wat dit bedien onderhou word.

6.2.6 **Boerderyinstellings en Dienste aan die Boere**

a) GAZDAF Dienste

Die landbou streekskantoor in die Mhaladistrik is op Thulumhase geleë sowat 50km noord van die skema. Daar word voltyds 'n landbouvoorligter op die skema voorsien deur GAZDAF.

Betreffende landbouwerktuie is daar vier trekkers op die skema met implemente. Die huidige ploegkoste beloop sowat R55/ha. Onderhoud op die trekkers word gedoen vanaf Allandale sitrusskema sowat 50km noord van die Hoxani skema. Hierdie toestand is onbevredigend.

b) Ngonini Landboukoöperasie

Die koöperasie is in 1971 geproklameer onder die Wet op Landbou koöperasies in selfregerende nasionale state. Die registrasie nommer is GP2.

Die koöperasie word tans bedryf onder toesig van GAZDAF. Die senior klerk in die koöperasie word finansieel vergoed deur G.D.C. Die bestuur van die koöperasie word elke twee jaar onder die boere van die skema self verkies. Aangeheg hierby as Bylaag 6A is 'n konsep ouditeursverslag vir die 1988 boekjaar. Verdere data van die koöperasie word vervat in Bylaag 6B.

c) Siringwa sitruslandgoed

Die Siringwa sitruslandgoed is sowat vyf kilometer oos vanaf Cork. Dit word deur G.D.C. bedryf. Die watertoekenning word beskryf in par. 2.2.1 van die Verslag. Dit is belangrik om in ag te neem dat daar 'n inmaakfabriek op die skema is wat tot die boere op die Hoxani skema se beskikking is. Tydens samesprekings ten tye van die ondersoek is daar ook deur die bestuurder aangetoon dat die fabriek as 'n mark gebruik kan word. So 'n aksie moet egter goed gekoördineer word veral ten opsigte van die tipe gewas en aanplantdatums. Op die huidige stadium is daar slegs een boer (Willie Mnisi van Ten Farms) op die Hoxani skema wat sy produkte hier bemark. In die verlede is daar wel deur die Hoxani boere produkte aan die fabriek gelewer maar nie op 'n georganiseerde

basis nie. Een van die probleme wat onder andere navore gekom het, is dat die produkte in onhanteerbare hoeveelhede gelewer word.

d) Lisbon sitrus- en mangolandgoed

Die landgoed word ook deur G.D.C. bedryf en het 'n watertoekenning uit die Sabierivier soos beskryf in par. 2.2.5 van die Verslag. Tydens samesprekings met die bestuur is daar aangetoon dat die goedtoegeruste werkswinkels op die landgoed wel beskikbaar is vir dienste aan die Hoxani skema.

6.2.7 **Woongebied**

a) Mkhuhlu

Mkhuhlu is 'n industriële gebied wat bestaan uit 'n spoorwegstasie en verskeie klein fabrieke. Die gebied grens aan die Calcutta A, B en C woongebiede. Hierdie woongebiede is voorsien van 'n moderne hospitaal, gesuiwerde water, 'n rioolverwyderingstelsel en ongeteerde strate. Daar is ook vyf primêre skole, twee sekondêre skole en 'n Onderwyskollege. Volgens die dorpsbestuurder word daar nie groot ontwikkelings vir 1989 voorsien nie behalwe vir die verbetering van dienste in die Calcutta C woongebied.

b) Cork

Die Cork woongebied grens aan die noordekant van die Cork gedeelte van die skema. Verskeie boere van die skema woon hier. Die woongebied is voorsien van gesuiwerde water per staankrane. Die strate is ongeteer en daar is nie 'n rioolverwyderingstelsel nie. Daar is een privaat kafee in die woongebied asook 'n primêre en sekondêre skool.

6.3 DEMOGRAFIE

6.3.1 Bevolkingsgetalle

		1985 (Landbousensus)	1987 (Magistraatsensus)	
Madras	A	3034	4909	
	B	1793	1569	
	C	1091	1140	
Calcutta	A	4279	4793	insluitende Mkhuhlu
	B	5816	1263	
	C	-	298	
Cork		2915	4981	
Belfast		1378	2237	

6.4 BOERDERYEENHEDE (persele)

Aangeheg as Bylaag 6C is 'n ongekontroleerde lys van boere en oppervlaktes.

Tydens die ondersoek is daar vasgestel dat daar op sekere gedeeltes van die skema redelike twyfel bestaan oor waar presies die perseelgrense loop. So is daar ook gevind dat nuwe persele ontbos is. Die de facto boerdery besetting sal egter eers bepaal kan word deur 'n omvattende opname.

6.5 Boerdery data

'n Monster van 13 boere word hierna in tabelvorm beskryf. Die gegewens is selfverduidelikend.

PERSEEL LIGGING	NAAM	GEBOORTEDATUM	INWONENDE FAMILIE	VERALGEMENE GRADERING	PERSEEL GROOTTE (ha) BRUTO (NETTO)	VEEVOER	LANDBOU WERKTUIE	TREKKER DIENSTE	INKOMSTE PER JAAR	ANDER INKOMSTE	EIE ARBEID	HUUR ARBEID	AANTAL HUUR ARBEID	LOON VAN HUUR ARBEID	BEMARKING WORD GEHOU OP:	VEE	WAAR WORD VEE GEHOU	METODE VAN BESPROEIING	OPMERKINGS
BELFAST	S. MASUKU	1922	6	B	33	LAW	TREKKER	GAZDAF	R6000-R10000	GEEN	JA	JA	3	R65/M	HECTORSPRUIT KATOENFABRIEK	2	KAMP	VLOED	
CORK SCHEME	T. MHLANGA NO. 14	1942	17	A	7,9 (6,0)	LAW	TREKKER	GAZDAF	R12000	GEEN	JA	JA	4	R40/M	NGONINI PLAASLIK	0		CORK VLOEDSKEMA	PERSEEL IS GOED GEORGANISEERD
UPPER CORK	F. SILUBANE NO. 5	1945	9	A	14,1 (10,0)	LAW	TREKKER	GAZDAF	R7000-R10000	GEEN	JA	JA	6	R62/M	WITRIVIER BOSBOKRAND PLAASLIK	14	KAMP	VLOED	PERSEEL IS GOED GEORGANISEERD
CORK	A. MARIMANI NO. 11	1944	20	C	6,7 (5,0)	-	-	GAZDAF	R3000-R4000	SIEN OPMERKING	JA	JA	4	R60/M	NGONINI	-	-	CORK VLOEDSKEMA	MAN WERK BY TRANSPORT BESIGHEID VIR R800/M; VROU BOER
CORK SCHEME	M. THEMBA NO. 10	1938	4	C	7,2 (5,0)	-	-	GAZDAF	ONBEKEND	GEEN	JA	GEEN	GEEN	-	NGONINI	-	-	CORK VLOEDSKEMA	
UPPER CORK	J. SAMBU NO. 1A	1930	4	C	11,8 (6,0)	-	-	GAZDAF	ONBEKEND	GEEN	JA	JA	2	R60/M	PLAASLIK	-	-	GEEN	
MKHULHU	K. MDLULI NO. 6	1926	4	B	9,9 (8,0)	-	-	GAZDAF	ONBEKEND	GEEN	JA	JA	2	R120/M	PLAASLIK	-	-	VLOED	HET LAW EN TREKKER VERKOOP VIR INKOMSTE
BIG BEND	A. MANZINI NO. 8	1944	8	A	14,2 (11,0)	LAW	TREKKER	GAZDAF	R6000	GEEN	JA	JA	2	R75/M	PLAASLIK	-	-	VLOED	
BIG BEND	E. MALUKA NO. 2	1924	2	B	8,3 (5,0)	LAW	TREKKER	GAZDAF	R2000-R4000	GEEN	JA	JA	2	R120/M	PLAASLIK	-	-	VLOED	
BIG BEND	E. MASHABA NO. 5	1922	2	B	7,1 (5,0)	2xLAW	TREKKER	GAZDAF	ONBEKEND	GEEN	JA	JA	1	R30/M	PLAASLIK	-	-	VLOED	
TEN FARMS	J. MNISI NO. 4	1918	3	B	11,8 (8,0)	LAW	TREKKER	GAZDAF	R4000	GEEN	JA	JA	1	R60/M	PLAASLIK	-	-	VLOED	
TEN FARMS	P. NKUNA NO. 1	1942	4	C	11,5 (8,0)	MOTOR LAW	-	GAZDAF	ONBEKEND	VROU WERK	JA	JA	4	R40/M	PLAASLIK	-	-	VLOED	
TEN FARMS	W. MNISI NO. 7	1923	6	A	18,6 (13,0)	LAW	TREKKER	GAZDAF	R4000		JA	JA	4	R3/DAG	SARINGWA WITRIVIER HAZYVIEW	-	-	VLOED	KOM GEORGANISEERD VOOR

Annexure 6A

1989 01 19

The Chairman and Members
Ngonini Koöperatiewe Vereniging Beperk
BUSHBUCKRIDGE

Dear Sirs,

AUDITORS REPORT FOR THE YEAR ENDED 30 JUNE 1988

We have examined the financial statements for the year ended 30 June 1988 as set out on pages 3 to 9 which we have prepared on the historical cost basis.

Subject to the above, the financial statements in our opinion fairly presents the financial position of your Co-operative, and the results of its operations in the manner required by Clause 29, Proclamation R117 of 1971.

WEGNER, MARITZ, MULLER AND GROBLER

PER:

CHARTERED ACCOUNTANTS (S.A.).

NGONINI KOÖPERATIEWE VERENIGING BEPERK

FINANCIAL STATEMENTS FOR THE YEAR ENDED 30 JUNIE 1988

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The annual financial statements were approved and are hereby signed by:

Nelspruit
1989 01 19

6/10

NGONINI KOÖPERATIEWE VERENIGING BEPERK

BALANCE SHEET AT 30 JUNE 1988

	Notes	1988	1987
CAPITAL EMPLOYED			
Capital account	2	3 820-00	3 645
(Accrued loss)		(209 416-46)	(209 759)
Reserve fund		2 099-00	2 099
Loan	3	250 620-13	250 620
		R47 122-67	R46 605
EMPLOYMENT OF CAPITAL			
Building - at cost plus improvements	1 & 4	6 896-31	6 896
Equipment	1 & 4	237-93	2 633
Current assets			
- Stock	1	20 561-83	17 015
- Debtors	5	35 864-13	32 959
- Cash at bank		5 232-44	1 294
		R61 658-40	R51 268
Current liabilities			
- Provision for audit fees		1 400-00	1 300
- Provision for sales tax		309-37	122
- Sabie Scheme account		5 808-97	-
- Creditors		14 151-63	12 730
		R21 669-97	R14 152
Net current assets		39 988-43	37 077
		R47 122-67	R46 605

Nelspruit
1988-01-19
GR/MdR
ID 7867A (334)

NGONINI KOÖPERATIEWE VERENIGING BEPERK

INCOME STATEMENT FOR THE YEAR ENDED 30 JUNE 1988

	1988	1987
INCOME		
Gross profit brought forward	12 299-89	6 832
Interest received	-	2 693
Depreciation recovered	729-50	-
Surplus cash banked	0-41	6
	13 029-80	9 531
LESS EXPENSES	12 687-14	17 576
Bank charges	786-99	866
Depreciation for the year	124-46	952
Interest paid	2 692-96	-
Loose tools replaced	10-68	16
Penalties	-	1 399
Provision for audit fees	1 400-00	1 300
Salary	4 761-92	5 179
Services to Members and overpayments	-	6 606
Stationery	391-67	415
Sundries	1 671-32	-
Transport	847-14	843
Nett loss for the year	(342-66)	(2 345)
Accumulated loss beginning of the year	(209 759-12)	(207 715)
Accumulated loss end of the year	R(209 416-46)	R(209 760)

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NGONINI KOÖPERATIEWE VERENIGING

TRADING STATEMENT FOR THE YEAR ENDED 30 JUNE 1988

	Fertilizer	Seed	Insecticide	Fuel	Sugarbeans	Maize	Packaging	Implements & sundries	Total 1988	Total 1987
Sales	18 582-85	13 563-96	3 798-21	65 090-14	223-40	532-50	1 873-22	968-98	104 633-26	111 066
Less cost of sales	14 193-73	14 807-73	3 359-81	57 968-03	190-00	355-00	(230-16)	1 689-23	92 333-37	104 232
- Stock at beginning of the year	9 194-79	1 556-86	1 667-54	3 051-44	-	-	-	1 245-13	17 014-76	18 166
- Purchases	8 922-58	14 529-47	7 106-39	58 982-08	190-00	2 665-00	1 979-00	1 505-90	95 880-42	103 081
	18 417-37	16 086-33	8 773-93	62 033-52	190-00	2 665-00	1 979-00	2 751-03	112 895-20	121 247
- Less stock at end of year	4 223-64	1 277-62	5 414-12	4 065-49	-	2 310-00	2 209-16	1 061-80	20 561-83	17 015
Gross profit for the year	R4 389-12	(1 243-77)	438-40	7 122-11	33-40	177-50	2 103-38	(720-25)	12 299-89	6 832

NGONINI KOÖPERATIEWE VERENIGING BEPERK

POOL ACCOUNTS FOR THE YEAR ENDED 30 JUNE 1988

	1988	1987
Gross proceeds		
- Maize	177-50	1 276
- Sugarbeans	33-40	1 944
	210-90	3 220
Less deducted from Member's accounts	210-90	3 220
	R NIL	R NIL

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NGONINI KOÖPERATIEWE VERENIGING BEPERK

STATEMENT OF SOURCE AND APPLICATION OF FUNDS FOR THE YEAR ENDED 30 JUNE 1988

	1988	1987
SOURCE OF FUNDS		
Net loss before depreciation	343	(6 045)
Add depreciation (net)	(606)	-
Membership fees received	175	275
Asset sold	3 000	-
Increase in loan received from Gazankulu Landboumaatskappy Beperk	-	8 503
	R2 912	R 733
APPLICATION OF FUNDS		
Equipment purchased	-	(853)
Improvements to buildings	-	424
Increase in net current assets	2 912	1 162
	R2 912	R 733
ANALYSIS OF CHANGES IN WORKING CAPITAL		
Increases/(decreases) in working capital		
- Stock	3 547	(1 152)
- Cash at bank	3 978	(5 305)
- Debtors	2 905	1 633
- Sales tax	(187)	180
- Creditors	(1 422)	6 006
- Sabie Scheme account	(5 809)	-
- Provision for audit fees	(100)	(100)
Net increase in working capital	R2 912	R1 162

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NGONINI KOÖPERATIEWE VERENIGING BEPERK

NOTES TO THE FINANCIAL STATEMENTS AT 30 JUNE 1988

1. Accounting policies:

During the year there were no changes in the accounting policies of the Co-operative.

Fixed assets
Fixed property of the Society is reflected at the original cost price thereof plus the cost price of capital improvements since date of purchase.

The cost price of vehicles, furniture, machinery and equipment represents the invoiced price of the relative asset, which also includes finance charges if the asset has been acquired on hire purchase.

Depreciation
Provision has been made for depreciation of 20% on the cost price of machinery and equipment on the straight line method.

Stock
Stock is valued at the lower of cost on a first-in-first-out basis and realisable value and the method of valuation is consequent with that used in previous years.

	1988	1987
2. Capital account:		
Membership fees	3 820-00	1 785
Buildingfund contributions		1 860
	R3 820-00	R3 645
3. Loan:		
Gazankulu Landboumaatskappy Beperk	R250 620-13	R250 620
- The loan was taken up to finance production loans to members of the Co-op.		

NGONINI KOÖPERATIEWE VERENIGING BEPERK

NOTES TO THE FINANCIAL STATEMENTS AT 30 JUNE 1988 (CONTINUED)

4. Fixed assets:

	Cost Price	Book-value 1/7/87	Pur-chases	Depre-ciation	Total depre-ciation	Book-value 30/6/88
Building	R6 472-81	6 472-81	-	-	-	6 472-81
Equipment						
Deterrent machine	153-40	1-00	-	-	152-40	1-00
Wheelbarrow	24-02	1-00	-	-	23-02	1-00
Scale	13-50	1-00	-	-	12-50	1-00
Scale	518-25	1-00	-	-	517-25	1-00
2 Micro Sprays	114-40	1-00	-	-	113-40	1-00
Cotton stand	39-08	1-00	-	-	38-08	1-00
Calculator	177-21	78-74	-	35-44	133-91	43-30
Lister pump	4 130-00	2 270-50	(3 000-00)	(729-50)	1 130-00	NIL
Gate	123-00	24-60	-	23-60	122-00	1-00
Greenbord	37-40	23-64	-	7-48	23-24	14-16
Calculator	189-28	148-06	-	38-06	79-28	110-00
Lug boxes	87-36	71-34	-	17-48	33-49	53-87
Sundry	12-00	10-00	-	2-40	4-40	7-60
	R5 620-90	2 632-88	(3 000-00)	605-04	2 382-97	237-93

*

* Depreciation : Written off for the year 124-46
Depreciation recovered 729-50

R605-04

	1988	1987
5. Debtors:		
Hire purchase debtors	13 766-91	11 267
Members for goods received	222 007-22	21 692
Less provision for bad debts	(200-000-00)	-
	R35 864-13	R32 959

Nelspruit
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Annexure 6B

NGONINI COOPERATIVE

Overview (1)

Financial year	No. of member	Assets	Turnover	Nett Profit (Losses)
1980	-	-	R 35 000	R9 000
1981	-	-	R 60 000	R1 000
1982	50	R 92 151	R 70 200	(R1 500)
1983	58	R 6 612	R103 394	R 893
1984	58	R115 152	R 85 515	(R1 793)

CORK-CALCUTTA IRRIGATION SCHEME

Annexure 6C

DETAILS OF EXISTING FARM PLOTS & ENVIRONS

LOCALITY	PLOT NO	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
TEN FARMS	1	PAUL NKUNA	3,2 2,4	8,3 5,6	-	11,5 8,0
	2	WILSON NTUBANE	1,6 1,1	5,4 3,9		7,0 5,0
	3	ALBERT MANZINI	1,3 0,9	6,5 4,1		7,8 5,0
	4	JACK MNISI	1,3 0,9	10,5 7,1		11,8 8,0
	5	JACKSON NKUNA	1,9 1,4	9,5 6,6		11,4 8,0
	6	FREDDIE LUBISI	3,0 2,3	5,4 3,7		8,4 6,0
	7 (FM)	WILLIAM MNISI	4,0 3,1	14,6 9,9		18,6 13,0
	8	JOANS MAHOLE	1,4 1,0	8,0 5,0		9,4 6,0
	9	JEREMIA MHAULE	0,7 0,4	12,3 8,6		13,0 9,0
	10	WILLIAM MAPOSA	8,0 6,0	14,0 10,0		22,0 16,0
		SUBTOTAL	26,4 19,5	94,5 64,5		120,9 84,0
	TFA		47,0 38,0	16,0 13,0		+63,0 51,0
	TFB		7,0 6,0	5,0 4,0		+12,0 10,0
	TFC		2,8 2,2	2,2 1,8		+5,0 4,0
		TOTAL	26,4 + 56,8 65,7	94,5 + 23,2 83,3		120,9 + 80,0 149,0

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation								
			CLASS A 1 & 2			CLASS B 2 & 3			CLASS C 5		TOTAL		
BIG BEND	1	WILSON NTONGA	1,8	+	0,7	6,2			-		8,0		0,7
				1,8			3,2			-		5,0	
	2	ENOG MABUKA	3,0	+	0,9	5,3			-		8,3	+	0,9
				3,0			2,0			-		5,0	
	3	FORCE KNUBENI	1,7	+	4,0	2,4			-		4,1		4,0
				4,4			0,6			-		5,0	
	4	PETRUS MAKUKULE	1,5	+	1,0	3,6			-		5,1		1,0
				2,0			1,0			-		3,0	
	5	ELMON MASHABA	2,2		1,8	4,9			-		7,1		1,8
	(FM)			3,0			2,0			-		5,0	
	6	LOUIS MADONSELA			0,6	7,8			-		7,8		0,6
				0,5			4,5			-		5,0	
	7	EZECHIAL MOHLALA	0,3		2,0	1,6			-		1,9		2,0
				1,8			1,2			-		3,0	
	8	APOLS MANZINI	0,8		3,8	13,4			-		14,2		3,8
				3,6			7,4			-		11,0	
	9	JULIUS SIBIYA	-			10,9			-		10,9		
							7,0			-		7,0	
	10	DANIEL MASUKU	-			18,4			-		18,4		
							10,0			-		10,0	
	11	SULU THELEDI	-			6,4			-		6,4		
							3,0			-		3,0	
	12	COLLY MAGAGULA				7,6			-		7,6		
							4,0			-		4,0	
		TOTAL	11,3		14,8	88,5					99,8		14,8
				20,1			45,9					66,0	

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
MKHUHLU	1	MAJOBA MHLONGO	0,5 0,4	4,2 3,6		4,7 4,0
	2	MAJOBA MHLONGO	0,1 0,1	4,9 3,9		5,0 4,0
	3	BELFAST NCUBE	0,3 0,1	5,4 3,9		5,7 4,0
	4	WILSON MASHEGO	2,2 1,8	3,6 2,2		5,8 4,0
	5	SANKY MAGAGULA	-	4,0 3,0	4,6	8,6 3,0
	6 (FM)	KAIZER MDLULI	-	9,9 8,0		9,9 8,0
	7	JACKSON MAPHANGA	-	19,3 13,0		19,3 13,0
	8	CAIPHUS SIBUYI	-	13,3 9,0		13,3 9,0
	9	PAUL SIBIYA	-	13,7 8,0		13,7 8,0
	10	HOXANI TRIBAL AUTHORITY (Prev. GDC)	-	56,1 40,0		56,1 40,0
		TOTAL	3,1 2,4	134,4 94,6	4,6	142,1 97,0

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation			
			CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
SEHOLOKOANE	1	PHINIAS MAVIMBELA	- 	24,5 16,0		24,5 16,0
	1A	DANIEL NKUNA	- 	9,5 7,0	-	9,5 7,0
	2	JOHN MALUKA	9,0 7,2	4,5 2,8	-	13,5 10,0
	3	DAVID MASHABA	9,1 7,3	17,4 13,7	-	26,5 21,0
	4	CHIEF NKUNA	18,1 14,6	9,2 6,4		27,3 21,0
	5	MACK MNISI	0,3 0,2	21,7 + 3,0 19,8	4,4	26,4 + 3,0 20,0
	6	BENJAMIN FANKOMO	- 	32,0 22,0		32,0 22,0
		TOTAL	36,5 29,3	118,8 3,0 87,7	4,4	159,7 3,0 117,0

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
UPPER CORK	1	VELLI NTIMANA	-	22,8 13,0		22,8 13,0
	1A	HOFUSA SAMBO	-	11,8 7,0		11,8 7,0
	2	PAUL MABUSA	-	27,1 18,0		27,1 18,0
	3	LAZARUS MHLANGA	-	7,3 4,5		7,3 4,5
	4	BARNABAS NGOMANA	-	4,0 3,0		4,0 3,0
	5	SGT. ANDREW MANZINI	1,4 + 2,0 3,0	29,2 20,0		30,6 + 2,0 23,0
	6 (FM)	FRANK SILUBANA		14,1 + 0,4 11,5		14,1 0,4 11,5
		TOTAL	1,4 + 2,0 3,0	116,3 0,4 77,0		117,7 2,4 80,0

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
CORK SCHEME	1	JULLY BOLUNGA	-	5,3 6,0	-	5,3 6,0
	2	VACANT	-	10,0 7,0	-	10,0 7,0
	3	REUMAN NGOBENI	-	7,6 6,0		7,6 6,0
	4	JOSIA MDLULI	-	6,5 5,0		6,5 5,0
	5	ELMON SIBUYI	4,8 3,8	3,9 3,2		8,7 7,0
	6	ALPHONS MDLULI	3,3 2,6	7,9 + 1,4 7,4		11,2 + 1,4 10,0
	7	ABSALOM MASUKU	6,2 4,9	10,3 8,1		16,5 13,0
	8	ELIAS MONA	1,7 1,3	13,5 10,7		15,2 12,0
	9	BAFANA MHAULE	3,3 2,6	3,4 2,4		6,7 5,0
	10	MATIAS THEMBA	3,4 2,7	3,8 2,3		7,2 5,0
	11	ARONE MARIMANE XIKAJA	5,2 4,1	1,5 0,9		6,7 5,0
	12	FARRIES HLANTSWAYO	1,8 1,4	4,7 3,6		6,5 5,0
	13	JAMES MAHOLE	3,0 2,4	4,5 2,6		7,5 5,0
	14 (FM)	THEMBA MHLANGA	6,2 4,8	1,7 1,2	-	7,9 6,0
	15	PHILLIP MASINGI	-	5,9 4,0	-	5,9 4,0

LOCALITY	PLOT NO.	NAME	AREAS IN HECTARE a) Gross area within present plot boundaries and area of extensions readily possible. b) Possible nett areal extent of FSP plot to be cultivated under irrigation			
			CLASS A 1 & 2	CLASS B 2 & 3	CLASS C 5	TOTAL
	16	ROBERT MDAKA	0,2 0,1	5,5 3,9	-	5,7 4,0
	17	WILLIAM MDLULI	2,7 2,0	6,5 5,0	-	9,2 7,0
	18	NELSON MONDLANA	4,0 3,0	7,8 6,0		11,8 9,0
		SUBTOTAL	45,8 35,7	110,3 1,4 85,3		156,1 + 1,4 121,0
		CSA		0,0 + 5,0 4,0		0,0 + 5,0 4,0
		CSB		0,0 + 10,0 8,0		0,0 + 10,0 8,0
		TOTAL CORK SCHEME	45,8 35,7	110,3 + 16,4 97,3		156,1 + 16,4 133,0
GRAND TOTAL			124,5 73,6 156,2	662,8 43,0 485,8	9,0	796,3 116,6 642,0

Annexure 7

SOIL SURVEY DATA

7.1 Reconnaissance Survey by the University of Potchefstroom p. 7/2

7.2 Re-evaluation of existing soil survey data by T.C. Partridge May 1989 p.7/7

Annexure 7

7.1 **Reconnaissance Survey by the University of Potchefstroom**

The soil survey was recently conducted by the Institute for Pedological Research of the Potchefstroom University on the farms Belfast, Cork and Calcutta. The data was presented on 1:10 000 photo mosaic overlays. All of these data were transferred by EVN onto 1:5 000 orthophoto maps ref. 8723.2.1, .2.2 and .2.3. Soil descriptions are given in the tabulations herefollowing. All of the above information were monitored by the DBSA and general concurrence was reached.

The following tabulations are in Afrikaans, the language in which the original soil survey was presented.

"GRONDSERIES WAT OP DIE PLASE VOORKOM

Grondserie	Grondvorm	Grondserie	Grondvorm
Arniston	Valsrivier	Leeufontein	Oakleaf
Balfour	Estcourt	Levubu	Oakleaf
Bonheim	Bonheim	Litosols	Litosols
Bontberg	Hutton	Mayo	Mayo
Dansland	Milkwood	Mispah	Mispah
Davel	Westleigh	Nyoka	Swartland
Denhere	Clovelly	Pafuri	Mayo
Dumasi	Bonheim	Reveillie	Swartland
Dundee	Dundee	Sandveld	Fernwood
Estcourt	Estcourt	Shorrocks	Hutton
Glenrosa	Glenrosa	Skilderkrans	Swartland
Grootfontein	Sterkspruit	Slangkop	Kroonstad
Herschel	Valsrivier	Swartland	Swartland
Inhaminga	Shepstone	Uitvlugt	Estcourt
Jozini	Oakleaf	Vaalsand	Longlands
Katspruit	Katspruit	Venda	Oakleaf
Kinross	Shortlands	Vilafontes	Vilafontes
Klerksdorp	Pinedene	Wynberg	Constantia
Kusasa	Cartref	Zwartfontein	Hutton

SIM-BOOL	DOMINANTE GRONDSERIES	SUB-DOMINANTE GROND-SERIES	ANDER GRONDSERIES	GEMIDDELDE EFFEKTIEWE GRONDDIEPTE (cm)	MOEDERMATERIAAL	PLANTEGROEI	BESPROEIINGSKLAS	VERNAAMSTE BEPERKENDE FAKTORE VIR BESPROEIING
Diep, matig- tot goed gedreineerde sande								
H1	Inhaminga	Shorrocks Kusasa	Glenrosa	35-60	Graniet	Boomveld met Sclerocarya caffra; Pterocarpus angolensis; Terminalia sericea; Peltophorum africanum en Combretum spp.	B1	Sanderige teksture met 'n gevolglike lae waterhouvermoë en oormatige dreinering. Beperkte dieptes in sekere lokaliteite. Versperrende, struktureel ontwikkelde lae, in laerliggende gebied.
H2	Inhaminga	Shorrocks Wynberg	Glenrosa Kusasa Vaalsand	40-90	Kolluvium en graniet		A2	
H3	Inhaminga	Glenrosa Wynberg	Kusasa Swartland Zwartfontein	40-70	Graniet en kolluvium		A2	
H4	Wynberg	Inhaminga	Kusasa Glenrosa Vaalsand Mispah	50-90	Kolluvium en graniet		A2	
H5	Wynberg	Denhere Inhaminga Kusasa	Bontberg Sandveld Glenrosa	30-70	Graniet en kolluvium		A2	
H6	Wynberg	Glenrosa Kusasa	Balfour Inhaminga Shorrocks Slangkop Mispah Swartland	40-70	Graniet en kolluvium		B1	
H7	Zwartfontein	Kinross Wynberg Skilder-krans	Kusasa Mispah	40-70	Kolluvium en graniet		B1	
H8	Wynberg Vaalsand	Kusasa	Glenrosa	70-100	Kolluvium, eoliese sand en graniet		A2	
H9	Wynberg Glenrosa	Kusasa	Mispah Inhaminga Kierksdorp	30-50	Graniet en kolluvium		B2	
Baie vlak, gruiserige sande								
G1	Glenrosa	Kusasa	Wynberg Mispah Inhaminga Swartland Slangkop	<30	Graniet	Boomveld met Combretum spesies. Verspreide Peltophorum africanum; Dichrostachys cinerea; Terminalia sericea; Acacia nigrescens en Pillostigma thonningii.	B2	Beperkte dieptes (30cm). Lae waterhouvermoë. Beperkte bewerkbaarheid met meganiese implemente. Moontlike versuiptoestande in laerliggende gebiede.
G2	Glenrosa	Kusasa	Jozini Mispah Slangkop Wynberg	<30	Graniet		B2	
G3	Glenrosa	Kusasa Wynberg	Balfour Inhaminga Slangkop Vaalsand Mispah	<30	Graniet		B2	
G4	Glenrosa	-	Zwartfontein Kusasa Inhaminga Jozini Swartland Wynberg	<30	Graniet		B2	
G5	Glenrosa	Kusasa	Swartland Mispah Slangkop Balfour	<30	Graniet		B2	

SIM-BOOL	DOMINANTE GRONDSERIES	SUB-DOMINANTE GROND-SERIES	ANDER GRONDSERIES	GEMIDDELDE EFFEKTIEWE GRONDDIEPTE (cm)	MOEDERMATERIAAL	PLANTEGROEI	BESPROEIINGSKLAS	VERNAAMSTE BEPERKENDE FAKTORE VIR BESPROEIING
G6	Glenrosa	Mispah	Swartland Estcourt Slangkop	<40	Graniet, kolluvium en doleriet		B2	
G7	Glenrosa	Kusasa Balfour	Mispah Litosols Swartland Wynberg Grootfontein Jozini	<30	Graniet en kolluvium		B2	
G8	Glenrosa	Swartland Kusasa	Reveillie Inhaminge Wynberg Mispah Litosols	10-35	Graniet, kolluvium en verspreide doleriet-gange		B2	
G9	Glenrosa Kusasa	-	Balfour Wynberg Slangkop Swartland	<30	Graniet en kolluvium		B2	
Vlak gruiserige gronde met 'n E-horison								
C1	Kusasa	Glenrosa Swartland	Balfour Mispah Slangkop Vaalsand	<35	Graniet	Terminalia sericea boomveld met Combretum spp.	B2	Beperkte dieptes. Sanderige tekstuur met 'n gevolglike oormatige dreinering en 'n lae waterhouvermoë.
C2	Kusasa	Swartland Balfour	Slangkop Glenrosa Grootfontein Jozini	<40	Kolluvium en graniet		B2	
C3	Kusasa	Swartland Jozini	Glenrosa	<40	Graniet, doleriet en kolluvium		B2	
C4	Kusasa	Balfour	Glenrosa Estcourt Vaalsand Slangkop Swartland Wynberg Villafontes	<35	Graniet, kolluvium en enkele verspreide dolerietgange		B2	
Swak gedreineerde duplieksgrondassosiasies								
E1	Balfour	Estcourt Grootfontein	Swartland	<35	Kolluvium en graniet	Gras- en onkruidveld met verspreide Terminalia sericea	C	Sterk ontwikkelde prismatiese strukture in die ondergrond beperk waterbeweging. Versuipings en verbrakkingsgevaar hoog a.g.v. die relatiewe vlak dieptes van swak deurlaatbare horisonte.
E2	Balfour	Swartland Estcourt	Grootfontein Kusasa	<30	Kolluvium, alluvium, graniet en doleriet		C	
E3	Balfour Glenrosa	Estcourt Mispah Grootfontein Jozini	Venda Levubu Swartland	<30	Graniet, kolluvium en alluvium		C	Meganiese bewerkbaarheid beperk by matig tot hoë voggehaltes. Hoe erosiegevaar met bewerking.
E4	Balfour	-	Slangkop Kusasa Vaalsand Estcourt	<30	Kolluvium en graniet		C	
E5	Balfour	Kusasa Swartland	Slangkop Mispah Grootfontein Glenrosa Vaalsand Skilderkrans	<35	Kolluvium en graniet met enkele verspreide dolerietgange		C	
E6	Balfour	Slangkop Grootfontein Kusasa	Swartland Estcour Vaalsand	<35	Kolluvium en graniet		C	

STM-BOOL	DOMINANTE GRONDSERIES	SUB-DOMINANTE GROND-SERIES	ANDER GRONDSERIES	GEMIDDELDE EFFEKTIEWE GRONDDIEPTE (cm)	MOEDERMATERIAAL	PLANTEGROEI	BESPROEI-INGSKLAS	VERNAAMSTE BEPERKENDE FAKTORE VIR BESPROEIING
E7	Balfour Swartland	Kusasa	Katspruit Slangkop Vaalsand Glenrosa Bonheim Jozini	<35	Kolluvium en graniet		C	
E9	Balfour Slangkop	Swartland Kusasa	Davel Grootfontein	<40	Kolluvium, graniet en doleriet		C	
S1	Grootfontein	Balfour	Slangkop Kusasa	<30	Kolluvium en graniet	Struik- en boomveld met Uclea sp. en verspreide Acacia nigrescens	C	
S2	Grootfontein Swartland	-	Estcourt Jozini	<30	Kolluvium en doleriet		C	
S3	Grootfontein	-	-	<15	Kolluvium en alluvium		C	
Swak-tot matig gedreineerde, kleierige gronde								
V1	Swartland	-	Mispah	<40	Kolluvium en doleriet	Acacia nigrescens boomveld met Dichrostachys cinerea en Combretum spp. Gemengde grasveld in verspreide lokaliteite. Gemengde boom-, bos- en grasveld op Vals-rivierg ronde.	B2	Hoe klei-inhoud. Infiltrasietempo baie laag. Matig tot sterk struktur ele ontwikkeling in die ondergrond. Meganiese bewerkbaarheid beperk by matig tot hoë voggehaltes.
V2	Swartland	Balfour	-	<40	Kolluvium en doleriet		B2	
V3	Skilderkrans	-	Revellie Balfour Swartland Glenrosa	<40	Kolluvium en doleriet		B2	
V4	Swartland	Kusasa Slangkop	Balfour Grootfontein Glenrosa	<40	Kolluvium en doleriet		B2	
V5	Swartland	-	Jozini Glenrosa Kusasa Herschel	<40	Kolluvium en alluvium op doleriet en graniet		B2	
V6	Swartland	Skilder-krans	Mispah Jozini	<45	Kolluvium en graniet		B2	
V7	Arnlston	-	Jozini Herschel	50	Alluvium		B2	
V8	Swartland	Glenrosa Kusasa	Uitvlugt Revellie Slangkop Mispah Litosols Jozini	>40	Kolluvium en graniet		B2	
V9	Nyoka	Litosols Mayo	Swartland	50	Doleriet en kolluvium		B2	
V10	Herschel	-	-	<30	Alluvium		B1	
B1	Bonheim	Swartland	Litosols Pafuri	30 - 50	Doleriet, kolluvium en alluvium		B2	
Litosols en vlak klipperige gronde								
L	Litosols	-	-	<5	Graniet en doleriet	Grasveld met swak basale bedekking en verspreide bome. Combretum spp., Acacia spp.; Dichrostachys cinerea.	C	Beperkte diepte. Beperkte meganiese bewerkbaarheid.
L1	Litosols	Pafuri Nyoka	Kinross Dansland	<10	Doleriet		C	
L2	Litosols	Mispah Mayo	Dansland Dumasi	<10	Doleriet		C	

SIM-BOOL	DOMINANTE GRONDSERIES	SUB-DOMINANTE GROND-SERIES	ANDER GRONDSERIES	GEMIDDELDE EFFEKTIEWE GRONDDIEPTE (cm)	MOEDERMATERIAAL	PLANTEGROEI	BESPROEIINGSKLAS	VERNAAMSTE BEPERKENDE FAKTORE VIR BESPROEIING
L3	Litosols	Kinross Mispah	Bonheim Skilderkrans Mayo Dansland	<10	Doleriet		C	
L4	Litosols	Mispah Swartland	Mayo	<10	Doleriet		C	
Rooilerige gronde								
R1	Kinross Glendale	Shorrocks	Swartland Skilderkrans Jozini Leeufontein Revellile	40 - 90	Kolluvium en doleriet	Gras- en struikveld met verspreide bome.	A2	Strukturele ontwikkeling in in ondergrond vorm versperrende laag in profiel met 'n gevolglike stadiger deurlatendheid.
R2	Kinross Glendale	-	Litosols Skilderkrans	50	Doleriet en kolluvium		A2	Beperkte dieptes in sekere lokaliteite.
Swak- tot matig gedreineerde gronde met vergleyde of plintiese ondergrondse horisonte								
P1	Klerksdorp	Uitvlugt	Swartland	30 - 70	Kolluvium, doleriet en graniet	Grasveld met verspreide Terminalia sericea	B2	Versperrende horisonte in die profiel. Verbrakkings- en versuipings-gevaar a.g.v. beperkte
P2	Stangkop	Wynberg	Balfour Kusasa Glenrosa	50	Kolluvium en graniet		C	waterbeweging.
P3	Vaalsand	Kusasa	Glenrosa Balfour	60	Kolluvium en graniet	Terminalia sericea boomveld	B2	
Alluviale gronde								
01	Jozini	Levubu Mispah	Swartland Dundee	100	Alluvium en graniet	Gemengde boom- en bosveld.	B1	Gebroke landskap en wisselende hellings.
02	Levubu	-	Jozini Herschel	70	Alluvium		A2	Wisselende fisiese kenmerke in opeenvolgende horisonte met 'n gevolglike nadelige effek op
03	Jozini	Dundee	-	60	Alluvium en resente alluvium		B1	waterbeweging
04	Jozini	Swartland	Leeufontein Herschel Glenrosa Mispah Dundee Levubu	70	Alluvium en kolluvium		B1	
05	Jozini	Leeufontein Zwartfontein	Herschel Wynberg Levubu Dundee Glenrosa Mispah Katspruit	70	Alluvium		A2	

7.2 Re-evaluation of existing soil survey data by Partridge, May 1989

7.2.1 General

The reconnaissance soil survey of the area that was previously undertaken by the University of Potchefstroom was not detailed and involved a fair degree of generalization. Furthermore the Irrigable Value system of classification applied in the course of this survey was devised during the 1950's for conditions of surface irrigation; many of the soils in the survey area are not suited to surface irrigation, and overhead systems will have to be used. Partridge et al have, therefore, reclassified the mapping units, as far as was possible on the basis of the data available, in accordance with the system proposed by Maud and Partridge (1985) which is applicable to both surface and overhead irrigation and which has been used with success in other schemes. In terms of the Maud and Partridge classification the overall rating of many of the units is improved. Attention should also be drawn to the fact that, in their view, the soils available in this scheme compare favourably with those of the Hoedspruit Scheme (below the Blydepoort Dam) and other schemes in the Transvaal Lowveld. In some respects it may be better than other schemes in the apparent absence of saline soils in the area. There seems to be absolutely no reason why this scheme cannot be successfully operated, provided that class 5 soils are excluded and provided that overhead irrigation, with a reasonable level of management, is used. In support of this contention attention is drawn to the excellent quality of the vegetables presently being grown on soils within the scheme area which would classify as marginal or non-irrigable in terms of the old Irrigable Value System.

Partridge et al differ somewhat from Potchefstroom University on the classification and delineation of certain of the soils in the area. For example, they do not agree that soils with an E-horizon are as

widespread within the area as claimed. This applies particularly to soils of the Estcourt, Constantia and Shepstone forms, which they do not consider to be widely represented. They further note the presence of significant areas of red soil of the Hutton and Shortlands forms within units E6 and V8 in the Upper Cork area. Such boundary discrepancies are expectable in a reconnaissance survey of this kind.

7.2.2 Land Irrigability Classification

(For surface and overhead irrigation)

Land Irrigability Class	Description	Slope	Soil Depth	Soil Texture	Soil Structure	Possible Limiting Factors
1	Good	1 - 6%	> 120cm	15 - 35% Clay	Good	
2	Moderate	<1% & 6 - 9%	> 60cm	10 - 15% & 35 - 50% Clay	Good	Potential salinity
3	Marginal	9 - 15%	> 30cm	< 10% & > 50% Clay	Moderate	Potential salinity
4	Presently non-irrigable	Implementation of remedial measures required				High water table, salinity, etc.
5	Non-irrigable	>15%	<30cm			Eroded areas, water courses, stoniness, poor soil structure, salinity, etc.

Symbols for Limiting Factors

S - Slope
D - Depth
T - Texture
ST - Structure
NA - Salinity and Potential Salinity
WT - Water Table
E - Erosion
WC - Water Courses
SN - Stoniness

Classification by R.R. Maud and T.C. Partridge, May 1985

7.2.3 REVISED LEGEND TO MAPPING UNITS AND IRRIGABILITY CLASSIFICATION, BASED ON RECONNAISSANCE PITTING AND FIELD TRAVERSES, MAY 1989

UNIT(S)	COMMON CHARACTERISTIC SERIES	PRINCIPAL IRRIGABILITY CLASSES*
H3, H5, H6, H7	Portsmouth (shallow), Glenrosa, Shorrocks (shallow), Kusasa	$2_{D,T}$
G4, G6, G7, G8	Glenrosa, Robmore, Portsmouth (shallow) Shorrocks (shallow), Swartland	$2_{D,T}$ and $3_{D,T}$
C3, C4	Glenrosa, Kusasa, Grootfontein	$2_{D,T}$ and 3_{ST}
E5, E6, E7, E9	Sterkspruit, Velddrif, Umtentweni, Grootfontein	3_{ST} and 2_{T}
S2	Grootfontein (?)	3_{ST}(?)
V8, V9	Pafuri, Swartland, Glenrosa	$3_{D,T}$ and 5_{D}
B1	Bonheim (?), Pafuri (?)	$3_{D,T}$(?)
L1, L2	Mispah	5_{D}
R1, R2	Glendale (shallow), Shorrocks (shallow)	$2_{D,(T)}$
O5	Leeufontein, Jozini	I

* Classification of R.R.Maud and T.C.Partridge, May 1985

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 1 Parent material Colluvium Location/airphoto/map .....

Landform Hill crest Soil form Hutton Soil series/phase Portsmouth (Shallow)

Vegetation/land use Terminalia tall grassveld Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Apedal B2	Lithocutanic C	
Extent (cm-cm)	0 - 30	30 - 50	50 - 90+	
Munsell colour	10 YR 4/3	5 YR 4/6	Soft friable weathering	
Colour description	Brown	Yellowish red	granite (tongueing	
Texture	Loamy sand	Sandy loam	above)	
Sand grade	Coarse	Coarse		
% Clay	6 - 15	6 - 15		
Consistency	Friable	Friable to slightly hard		
Structure	Apedal	Weak fine subangular blocky		
Mottles	Nil	Nil		
Roots	Numerous	Numerous		
Permeability	Very rapid	Rapid		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Nil	Nil		
Transition	Gradual	Fairly abrupt		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 2 Parent material Colluvium Location/airphoto/map .....

Landform Middle slope Soil form Glenrosa Soil series/phase Glenrosa

Vegetation/land use ..... Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 30	30 - 90+		
Munsell colour	5 YR 4/3			
Colour description	Reddish brown	Soft, friable highly		
Texture	Sandy loam	weathered granite		
Sand grade	Coarse			
% Clay	6 - 15			
Consistency	Friable			
Structure	Weak, fine subangular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	Occasional rounded gravel			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 3 ..... Parent material Alluvium ..... Location/airphoto/map .....

Landform River Terrace ..... Soil form .....Oakleaf..... Soil series/phase .Leeufontein.....

Vegetation/land use Old cultivation ..... Observer and date .TCP 19/5/89.....

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Neocutanic B2		
Extent (cm-cm)	0 - 40	40 - 150+		
Munsell colour	7,5 YR 3/2	5 YR 4/4		
Colour description	Dark brown	Reddish brown		
Texture	Sandy loam	Sandy clay loam		
Sand grade	Fine	Fine		
% Clay	6 - 15	15 - 35		
Consistency	Friable	Friable		
Structure	Weak fine subangular blocky	Weak fine subangular blocky		
Mottles	Nil	Few fine brown mottles		
Roots	Numerous	Numerous		
Permeability	Rapid	Moderate to rapid		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Nil	Nil		
Transition	Gradual	Continues		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 4 Parent material Colluvium Location/airphoto/map .....

Landform Middle to lower slope Soil form Sterkspruit Soil series/phase Sterkspruit

Vegetation/land use Old cultivation Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Prismacutanic B2		
Extent (cm-cm)	0 - 30	30 - 120+		
Munsell colour	10 YR 2/2	10 YR 4/2		
Colour description	Very dark brown	Dark greyish brown		
Texture	Sandy clay loam	Sandy clay		
Sand grade	Coarse	Coarse		
% Clay	15 - 35	35 - 55		
Consistency	Friable to slightly hard	Hard		
Structure	Weak to moderate medium subangular blocky	Strong coarse prismatic		
Mottles	Nil	Coarse dark grey and yellowish brown		
Roots	Numerous	Few		
Permeability	Moderate	Slow		
Seepage	Nil	Nil		
Concretions	Nil	Occasional fine $CaCO_3$		
% Stone and size	Occasional pebbles	Nil		
Transition	Fairly abrupt	Continues		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 5 Parent material Colluvium/diabase Location/airphoto/map .....

Landform Upper slope Soil form Shortlands Soil series/phase Glendale

Vegetation/land use Old cultivation Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Structured B2	Lithocutanic C	
Extent (cm-cm)	0 - 20	20 - 60	60 - 90+	
Munsell colour	5 YR 3/2	5 YR 3/3		
Colour description	Dark reddish brown	Dark reddish brown	Soft weathering diabase	
Texture	Clay loam	Clay		
Sand grade	Fine	Fine		
% Clay	35 - 55	35 - 55		
Consistency	Firm	Firm		
Structure	Moderate to strong medium subangular blocky	Strong fine to medium subangular blocky		
Mottles	Nil	Nil		
Roots	Numerous	Numerous		
Permeability	Moderate	Moderate to slow		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Occasional quartz gravel	Fairly abrupt		
Transition	Gradual			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 6 Parent material Colluvium/diabase Location/airphoto/map .....

Landform Middle slope Soil form Mayo Soil series/phase Pafuri

Vegetation/land use Acacia grassland Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Melanic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 15	Soft weathered diabase		
Munsell colour	10 YR 3/1	with diffuse $CaCO_3$		
Colour description	Very dark grey			
Texture	Clay			
Sand grade	Coarse			
% Clay	35 - 55			
Consistency	Friable			
Structure	Strong medium sub-angular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Moderate			
Seepage	Nil			
Concretions	Occasional fine nodular $CaCO_3$			
% Stone and size	Nil			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 7 Parent material Granite Location/airphoto/map .....

Landform Upper slope Soil form Glenrosa Soil series/phase Glenrosa (Shallow)

Vegetation/land use Bush and grassland Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 20	20 - 50+		
Munsell colour	7,5 YR 3/2	Friable weathering soft		
Colour description	Dark brown	granite		
Texture	Sandy loam	Tongueing contact above		
Sand grade	Coarse			
% Clay	6 - 15			
Consistency	Friable			
Structure	Weak fine subangular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	Abundant medium and fine gravel			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. ....8..... Parent material ...Colluvium..... Location/airphoto/map .....

Landform ...Middle slope..... Soil form .....Kroonstad..... Soil series/phase ..Velddrif.....

Vegetation/land use ...Old cultivation..... Observer and date ..TCP 19/5/89.....

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	E Horizon	Gleycutanic B2	
Extent (cm-cm)	0 - 35	35 - 45	45 - 120+	
Munsell colour	10 YR 4/2	10 YR 5/2	10 YR 4/3	
Colour description	Dark greyish brown	Greyish brown	Brown	
Texture	Sandy loam	Sand	Sandy clay loam	
Sand grade	Medium	Medium	Medium	
% Clay	6 - 15	0 - 6	15 - 35	
Consistency	Friable	Friable	Hard	
Structure	Weak fine subangular blocky	Apedal	Moderate medium to coarse subangular blocky	
Mottles	Nil	Occasional fine yellowish brown	Diffuse fine yellow brown, & dark grey cutans	
Roots	Abundant	Numerous	Few	
Permeability	Rapid	Rapid	Moderate to slow	
Seepage	Nil	Nil	Nil	
Concretions	Nil	Nil	Occasional fine diffuse & nodular $CaCO_3$	
% Stone and size	Nil	Nil	Nil	
Transition	Gradual	Abrupt	Continues	
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. .....9..... Parent material ..Granite..... Location/airphoto/map .....

Landform .....Hillton..... Soil form .....Hutton..... Soil series/phase ..Shorrocks.(Shallow)...

Vegetation/land use Cultivation ..... Observer and date ..TCP 19/5/89.....

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Apedal B2	Lithocutanic C	
Extent (cm-cm)	0 - 25	25 - 35	Soft friable highly	
Munsell colour	2,5 YR 3/4	2,5 YR 3/6	weathered granite	
Colour description	Dark reddish brown	Dark red		
Texture	Sandy clay loam	Sandy clay loam		
Sand grade	Coarse	Coarse		
% Clay	15 - 35	15 - 35		
Consistency	Friable	Friable		
Structure	Weak fine subangular blocky	Weak fine subangular blocky		
Mottles	Nil	Nil		
Roots	Numerous	Numerous		
Permeability	Moderate	Moderate		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Occasional fine gravel	Occasional fine gravel		
Transition	Gradual	Fairly abrupt		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. ....10..... Parent material ..Granite..... Location/airphoto/map .....

Landform ....Middle slope..... Soil form .....Glenrosa..... Soil series/phase .....Robmore.....

Vegetation/land use Old cultivation ..... Observer and date .....TCP 19/5/89.....

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 25	25 - 100+		
Munsell colour	7,5 YR 3/2			
Colour description	Dark brown	Soft friable weathering		
Texture	Sandy clay loam	granite		
Sand grade	Coarse	Tongueing contact above		
% Clay	15 - 35			
Consistency	Friable			
Structure	Weak fine subangular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	Occasional gravel			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 11 Parent material Granite Location/airphoto/map .....

Landform Upper slope/Hill Crest Soil form Sterkspruit Soil series/phase Grootfontein

Vegetation/land use Cultivation (Irrigated) Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Prismacutanic B2	Lithocutanic C	
Extent (cm-cm)	0 - 20	20 - 80+	80 - 110+	
Munsell colour	10 YR 3/2	10 YR 4/2		
Colour description	Very dark greyish brown	Dark greyish brown	Soft friable weathered	
Texture	Sandy loam	Sandy clay	granite	
Sand grade	Coarse	Coarse		
% Clay	6 - 15	35 - 55		
Consistency	Friable	Hard		
Structure	Weak fine subangular blocky	Strong coarse prismatic		
Mottles	Nil	Nil		
Roots	Few	Few		
Permeability	Rapid	Slow		
Seepage	Nil	Nil		
Concretions	Nil	Occasional fine nodular $CaCO_3$		
% Stone and size	Occasional fine gravel	Nil		
Transition	Fairly abrupt	Fairly abrupt		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 12 Parent material Granite/colluvium Location/airphoto/map .....

Landform Upper slope Soil form Hutton Soil series/phase Portsmouth

Vegetation/land use Old cultivation Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Apedal B2	Lithocutanic C1	Lithocutanic C2
Extent (cm-cm)	0 - 30	30 - 60	60 - 90	90 - 120+
Munsell colour	5 YR 3/2	2,5 YR 3/4		Soft friable
Colour description	Dark reddish brown	Dark reddish brown	Quartz gravel	weathered granite
Texture	Sandy loam	Sandy loam		
Sand grade	Coarse	Coarse		
% Clay	6 - 15	6 - 15		
Consistency	Friable	Friable		
Structure	Weak fine subangular blocky	Weak fine subangular blocky		
Mottles	Nil	Nil		
Roots	Numerous	Numerous		
Permeability	Rapid	Rapid		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Occasional quartz gravel	Occasional quartz gravel		
Transition	Gradual	Abrupt	Abrupt	
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 13 Parent material Granite Location/airphoto/map .....

Landform Middle slope Soil form Glenrosa Soil series/phase Glenrosa

Vegetation/land use Old cultivation Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 30	30 - 70+		
Munsell colour	7,5 YR 3/2			
Colour description	Dark brown	Soft friable		
Texture	Sandy loam	weathered granite		
Sand grade	Coarse	Tongueing contact above		
% Clay	6 - 15			
Consistency	Friable			
Structure	Weak fine subangular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	Frequent medium gravel			
Transition	Abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

.....

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 14 Parent material Colluvium Location/airphoto/map .....

Landform Lower slope Soil form Shortlands Soil series/phase Sunvalley

Vegetation/land use Cultivation (Beans) Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Apedal B21	Red Apedal B22	
Extent (cm-cm)	0 - 30	30 - 80	80 - 130+	
Munsell colour	5 YR 3/2	5 YR 3/3	5 YR 4/6	
Colour description	Dark reddish brown	Dark reddish brown	Yellowish red	
Texture	Sandy clay loam	Clay loam	Sandy clay	
Sand grade	Fine	Fine	Fine	
% Clay	15 - 35	35 - 55	35 - 55	
Consistency	Friable to slightly hard	Firm	Firm	
Structure	Weak fine subangular blocky	Strong fine to medium subangular blocky	Moderate to strong medium subangular blocky	
Mottles	Nil	Nil	Nil	
Roots	Few	Few	Nil	
Permeability	Rapid	Moderate	Moderate	
Seepage	Nil	Nil	Nil	
Concretions	Nil	Nil	Occasional fine nodular $CaCO_3$	
% Stone and size	Nil	Nil	Nil	
Transition	Gradual	Gradual	Continues	
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/23

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 15 Parent material Colluvium Location/airphoto/map .....

Landform Middle slope Soil form Hutton Soil series/phase Shorrocks

Vegetation/land use Old cultivation Observer and date TCP 19/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Red Apedal B2	Lithocutanic C	
Extent (cm-cm)	0 - 20	20 - 80	80 - 120+	
Munsell colour	2,5 YR 3/2	2,5 YR 3/6		
Colour description	Dusky red	Dark red	Soft friable	
Texture	Sandy loam	Sandy clay loam	weathered granite.	
Sand grade	Coarse	Coarse		
% Clay	6 - 15	15 - 35		
Consistency	Friable	Friable to slightly hard		
Structure	Weak fine subangular blocky	Weak fine subangular blocky		
Mottles	Nil	Nil		
Roots	Abundant	Numerous		
Permeability	Rapid	Moderate		
Seepage	Nil	Nil		
Concretions	Nil	Towards base occasional fine nodular Mn		
% Stone and size	Nil	Occasional quartz gravel		
Transition	Gradual	Fairly abrupt		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

.....

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 16 Parent material Colluvium Location/airphoto/map .....

Landform Lower slope Soil form Sterkspruit Soil series/phase Sterkspruit

Vegetation/land use Old cultivation Observer and date TCP 20/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Prismacutanic		
Extent (cm-cm)	0 - 15	15 - 90+		
Munsell colour	10 YR 2/2	10 YR 4/2		
Colour description	Very dark brown	Dark greyish brown		
Texture	Sandy clay loam	Clay		
Sand grade	Medium	Medium		
% Clay	15 - 35	35 - 55		
Consistency	Slightly hard	Hard		
Structure	Moderate medium subangular blocky	Strong coarse prismatic		
Mottles	Nil	Clay cutans on ped faces		
Roots	Numerous	Few		
Permeability	Moderate	Slow		
Seepage	Nil	Nil		
Concretions	Nil	Occasional fine nodular $CaCO_3$		
% Stone and size	Nil	Nil		
Transition	Fairly abrupt	Continues		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/25

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 17 Parent material Colluvium Location/airphoto/map .....

Landform Middle slope Soil form Sterkspruit Soil series/phase Sterkspruit

Vegetation/land use Cultivation Observer and date TCP 20/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Prismacutanic B2	Lithocutanic C	
Extent (cm-cm)	0 - 15	15 - 70	70 - 150+	
Munsell colour	10 YR 3/2	10 YR 4/2	Soft friable weathering	
Colour description	Very dark greyish	Dark greyish brown	diabase with some	
Texture	Sandy clay loam	Sandy clay	nodular $CaCO_3$	
Sand grade	Coarse	Coarse		
% Clay	15 - 35	35 - 55		
Consistency	Slightly hard	Hard		
Structure	Moderate medium sub-angular blocky	Strong coarse prismatic		
Mottles	Nil	Dark grey clay cutans on ped faces		
Roots	Numerous	Few		
Permeability	Rapid	Very slow		
Seepage	Nil	Nil		
Concretions	Nil	Nil		
% Stone and size	Nil	Nil		
Transition	Fairly abrupt	Fairly abrupt		
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/26

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 18 Parent material Granite Location/airphoto/map .....

Landform Middle slope Soil form Glenrosa Soil series/phase Glenrosa

Vegetation/land use Cultivation (Excellent cabbages) Observer and date TCP 20/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 30	30 - 120+		
Munsell colour	5 YR 3/3	Soft friable		
Colour description	Dark reddish brown	weathered granite		
Texture	Sandy loam	Tongueing contact		
Sand grade	Coarse	above		
% Clay	6 - 15			
Consistency	Friable			
Structure	Weak fine subangular blocky			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	Abundant fine gravel			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/27

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 19 Parent material Colluvium Location/airphoto/map .....

Landform Flat middle slope Soil form Kroonstad Soil series/phase Umtentweni

Vegetation/land use Cultivation Observer and date TCP 20/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	E Horizon	Gleycutanic B2	
Extent (cm-cm)	0 - 30	30 - 60	60 - 130+	
Munsell colour	10 YR 4/3	10 YR 6/3	10 YR 4/2	
Colour description	Brown	Pale Brown	Dark greyish brown	
Texture	Loamy sand	Loamy sand	Sandy clay	
Sand grade	Medium	Medium	Medium	
% Clay	6 - 15	0 - 6	35 - 55	
Consistency	Friable	Friable	Sticky	
Structure	Apedal	Apedal	Strong coarse angular blocky	
Mottles	Nil	Numerous medium yellowish brown	Numerous dark brown & grey mottles with dark grey clay cutans	
Roots	Numerous	Numerous	Few	
Permeability	Rapid	Rapid	Moderate	
Seepage	Nil	Nil	Nil	
Concretions	Nil	Nil	Nil	
% Stone and size	Nil	Nil	Nil	
Transition	Gradual	Fairly abrupt	Continues	
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/28

Hoxani Irrigation Scheme : Soil Profile Record Sheet

Profile No. 20 Parent material Granite/Colluvium Location/airphoto/map .....

Landform Upper slope/Hill crest Soil form Glenrosa Soil series/phase Glenrosa

Vegetation/land use Old cultivation Observer and date TCP 20/5/89

Parameter	Horizon 1	Horizon 2	Horizon 3	Horizon 4
Horizon No. and type	Orthic A1	Lithocutanic B2		
Extent (cm-cm)	0 - 25	25 - 90+		
Munsell colour	5 YR 3/3			
Colour description	Dark reddish brown	Soft friable weathered		
Texture	Sandy loam	granite		
Sand grade	Coarse	Tongueing contact above		
% Clay	6 - 15			
Consistency	Friable			
Structure	Apedal			
Mottles	Nil			
Roots	Numerous			
Permeability	Rapid			
Seepage	Nil			
Concretions	Nil			
% Stone and size	10% coarse alluvial gravel			
Transition	Fairly abrupt			
pH/conductivity (millisiemens/cm)				
Sample No.				

Comments: .....

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7/29

Annexure 8

MHALA SOUTH PRIMARY WATER SUPPLY SCHEME

1. GENERAL DESCRIPTION

A regional water supply scheme has recently (1988) been approved (funded by DBSA) for the supply of treated water to all residential areas surrounding the study area (i.e. Madras, Calcutta, Cork and Belfast) as part of the "Mhala South Water Scheme". The scheme would comprise extensions to the existing river pumpstation on the Sabie river (on the Madras-Calcutta farm border 1,5km upstream of the road bridge), water treatment works and pumped supply pipelines; all as shown on figure 1.

In the Consultant's report on the above scheme, the following information may have direct or indirect relevancy to the Sabie F.S.P. study:

a) **Ground water supplies**

Borehole water supplies in the granites of this area are problematical and have not in the past proved satisfactory and were not considered a viable alternative to the Sabie river scheme.

The use of boreholes has been considered a useful adjunct to the piped-supply. The boreholes will rapidly fall into disuse if a piped-supply is made available, but in future should any local demand exceed the capacity of the system, boreholes may be then used to augment separate supplies for animal watering. Interconnection with the proposed piped-supply is not favoured for health and other reasons.

Most (55%) boreholes in the area have test yields below 5 m^3/h and a further 24% have yields between 5 and 10 m^3/h with the remaining 21% have yields up to 20 m^3/h.

b) Need for an improved water supply is substantiated by the fact that health matters relating to the water supply were of importance as 75% of diseases treated in Gazankulu Clinics are water related.

Annexure 8

c) The extent of water distribution to the various consumer points are based on the following level of services: Standpipes at 250m intervals, metered connections to businesses, metered connections to 10% of private houses, metering and bulk metering were to form a basis for revenue collection. The supply was to be based on 50/80 l/head/day (300 l/erf/day) and 200 l/head/day x 6 persons, or 1 200 l/erf/day. The outlook of the present scheme was to be 20 years.

d) Estimated peak daily water demand i.e. representing abstraction capacity from the Sabie river.

	m^3/day	l/s
Phase 1 : up to yr 1997	6 500	75
2 : up to yr 2006	13 000	150
3 : up to yr 2015	21 000	225

e) It was found in the study that the economic base of the area is based on migratory labour, subsistence agriculture, industrial development in Mkhuhlu and community involvement.

f) Abstraction permits:

The following ruling and data were contained in letter B190/1/101 of 86-11-12 from the Director General of the RSA Department of Water Affairs to the Consultants:

"This Department has no objections to the proposed waterworks and the abstraction of water provided that a minimum quantity of 2 (two) cubic metres per second is allowed to flow past the abstraction point at all times for use by lower owners whose water rights and requirements are as follows:

1. KRUGER NATIONAL PARK

1.1 In terms of a permit issued in respect of the farm Belfast 296 KU, a quantity of 1 m^3/sec shall be allowed to flow down the Sabie River to the Kruger National Park.

2. THE FARM LISBON 297 KU

2.1 Remaining portion

In terms of a Water Court Order dated 1954, a quantity of up to 2,49 m^3/sec may be abstracted from the Sabie River for the generation of power and irrigation on this property.

Annexure 8

The Transvaal Board for the Development of peri-urban areas and David Graaf Foods (Pty) Ltd., the owner of this property are developing a new township along the Sabie River known as Sabie Park and the future water requirements for this township are estimated at 150 000 m^3 per annum or 411 m^3 per day.

3. THE FARM BELFAST 296 KU

3.1 An abstraction right of 0,25 m^3/sec has been granted to this property.

4. THE FARMS CORK 295 KU AND CALCUTTA 294 KU

4.1 Approximately 400ha are being irrigated on these properties and for this purpose a quantity of water is being abstracted at a rate of 0,4 m^3/sec.

The aforementioned figures are maximum abstraction rates and are subject to restrictions should the flow in the Sabie River decrease to less than the quantity required."

2. EFFECT OF SCHEME ON PROPOSED SABIE F.S.P.

2.1 Water supply to irrigation farmers

The pipeline routes do not come close to the farming plots except perhaps those near Mkhuhlu. The farmers will therefore have to rely on either borehole water or irrigation water for primary use.

2.2 The river abstraction for the scheme would not affect the volume of water available for irrigation on the Sabie irrigation plots.

DEPARTEMENT VAN WATERWESE
REPUBLIEK VAN SUID-AFRIKA
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DEPARTMENT OF WATER AFFAIRS
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Navrae Inquiries M.L.J. Botha
Telefoon Telephone 299-2246

mljb/rw/0002K/6§

Sekretaris: Landbou en Bosbou
Gazankulu-Regering
Privaatsak X577
GIYANI
0826

1989 -02- 27.

AANDAG: MNR. P.W.A. VAN DER MERWE

Meneer

SABIERIVIER: BESTAANDE WATERREGTE EN MAGTIGINGS

'n Mondelingse navraag deur u mnr. P.W.A. van der Merwe in verband met bostaande het hierop betrekking. Hiermee 'n samevatting van waterregte en magtigings uitgereik vanuit die Sabierivier.

1. SKUKUZA

Geen geskrewe magtiging vir die onttrekking van water te Skukuza is sover bekend uitgereik nie. Daar word egter vermoed dat die onttrekking by hierdie punt laer as die perk van 110ℓ/s, soos in artikel 9B van die Waterwet, Wet 54 van 1956, gestel, sal wees. 'n Geskrewe magtiging is dus nie nodig nie.

2. DIE PLAAS LISBON 297KU

2.1 Restant

'n Waterhofuitspraak van 1954 magtig die onttrekking van ongeveer 2,49m^3/s vir kragopwekking en ongeveer 0,29m^3/s hiervan mag ook vir besproeiing op Lisbon 297KU Restant gebruik word.

Die res van hierdie hoeveelheid water wat onttrek word moet weer in die Sabierivier teruggestort word.

2.2 Gedeeltes 1 en 2

Onttrekking van water vir gebruik in die dorpsgebied Sabiepark vind reeds plaas. Dieselfde opmerkings soos vir Skukuza geld ook in hierdie geval.

3. SARINGWARIVIER

Sover bekend bestaan daar geen Waterhofuitsprake en is daar geen magtigings vir die onttrekking van water vanuit hierdie rivier uitgereik nie.

4. DIE PLAAS BELFAST 296KU

'n Artikel 9B(1)-magtiging (Waterwet, Wet 54 van 1956) vir die onttrekking van water teen 'n maksimum onttrekkingstempo van $0,25m^3/s$ vir besproeiing op hierdie eiendom is aan die eienaars van hierdie eiendom uitgereik. Skynbaar het die Gazankulu-Regering besitreg van hierdie eiendom en is ontwikkeling van die besproeiingsprojek deur die Ekonomiese Ontwikkelingskorporasie onderneem.

5. GAZANKULU-REGERING: PRIMÊRE GEBRUIK

Die raadgewende ingenieurs Hawkins Hawkins & Osborn het namens die Gazankulu-Regering om 'n magtiging vir die onttrekking van water (vir primêre doeleindes in die Calcutta/Mkhuhlu-gebied) vanuit die Sabierivier te Madras aansoek gedoen. Daar is toe deur hierdie Departement aan die betrokke raadgewende ingenieurs uitgewys dat Gazankulu die reg het om so 'n aansoek self te oorweeg en die nodige magtiging vir die oprigting van die waterwerke uit te reik. Die raadgewers is ook daarop gewys dat Waterwese geen beswaar teen die beoogde onttrekking sou hê, op voorwaarde dat bestaande ontwikkeling stroom af erken sou word, nie. (Sien items 1, 2 en 4 hierbo).

6. KANGWANE-REGERING: PRIMÊRE GEBRUIK

Soortgelyk aan die aansoek vir primêre gebruik in Gazankulu (item 5), is daar deur Steinhobel Keller & Vennote namens KaNgwane aansoek om 'n magtiging vir die onttrekking van water vir primêre gebruik in die noordelike Nsikazi-gebied gedoen. Die onttrekkingspunt is ook op Madras geleë, oorkant die onttrekkingspunt van Gazankulu. Dieselfde uitleg soos in die geval van Gazankulu oor die reg om self magtigings uit te reik is ook aan hierdie raadgewers uiteengesit.

Buiten items 1 tot 6 is daar geen ander magtigings/waterregte nie, buiten heel bo in die opvanggebied van die Sabierivier.

Die uwe

DIREKTEUR-GENERAAL

Annexure 9

SABIE RIVER RUN-OF-THE-RIVER ABSTRACTION FLOW SCENARIOS

	Extent of irrigable areas during valuation period				Lowest Monthly river flow (Mcu.m) Oct.
	RSA	Lebowa	Kangwane	Gazankulu	
	Existing Added Total	Existing Added Total	Existing Added Total	Existing Added Total	
1.1 yr 1995	6550 - **6550**	730 + 770 **1500**	- +450 **450**	1165 + 500 **1665**	**3,28**
1.2 yr 2000	do	730 + 770 **1500**	do	do	**2,88**
2.1 yr 1995	do	730 +1270 **2000**	do	do	**2,88**
2.2 yr 2000	do	730 +1270 **2000**	do	do	**2,53**

Annexure 9

NOTES:

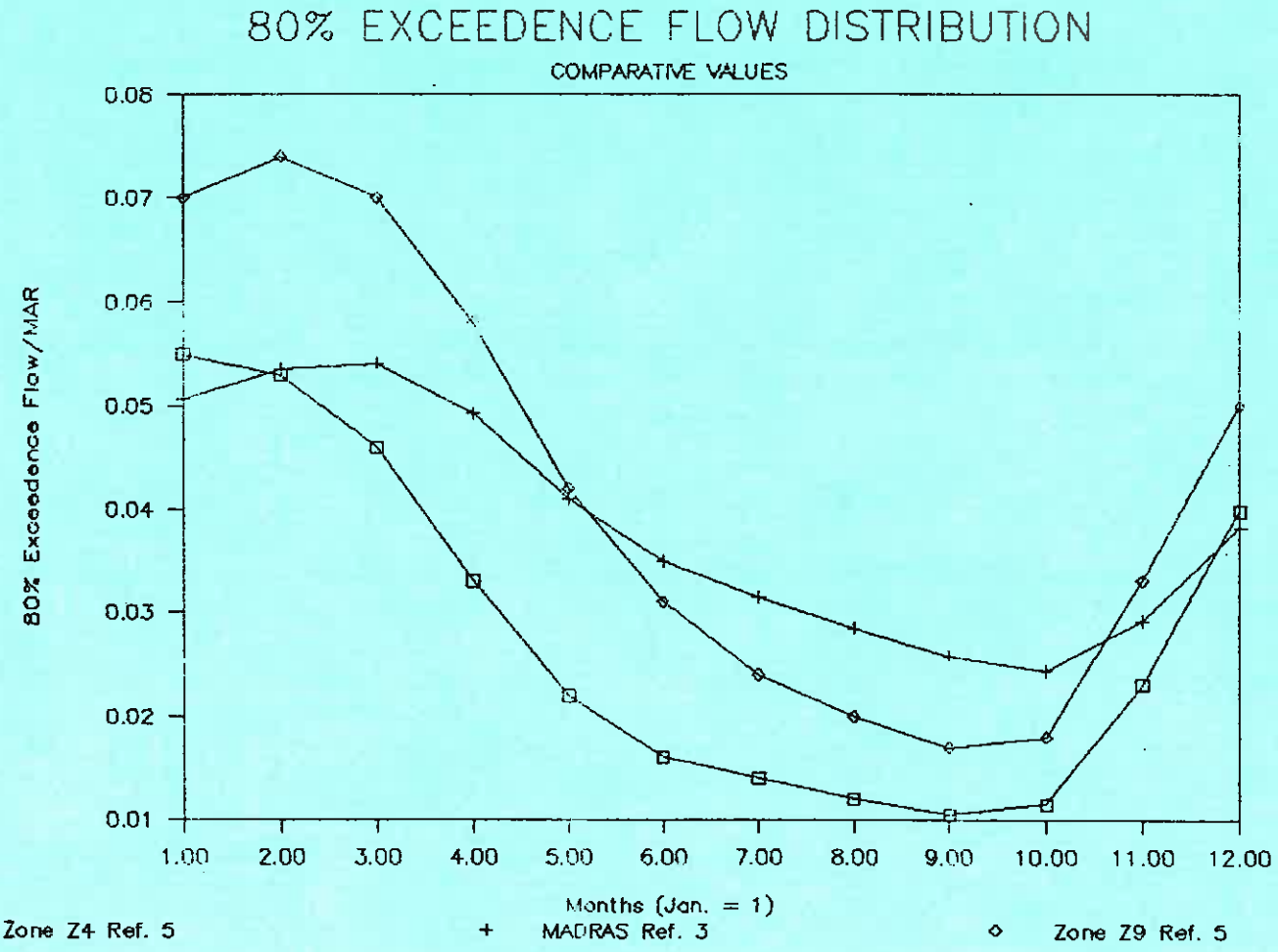
a) Figures for water use and demand pattern obtained from Ref. 1, Tables 16, 17 and 18.

b) Annual demand distribution for irrigation based on evaporation, effective rainfall and likely cropping factors.

c) Losses allocated pro-rata to demand.

d) Spreadsheet referenced notes :

1) Urban, livestock and game demand at 98% assurance converted to equivalent volume at 80% assurance by relevant ratios of unregulated runoff at Madras, Ref. 1, Table 21.
2) From Ref. 1, Table 18 for Madras site.
3) From Ref. 1, Table 28
4) Average flow less utilized flow. Utilized flow equals smaller of demand or utilizable flow.
5) Shortfall equals demand less utilizable flow if difference is greater than zero, else shortfall equals zero.
6) Runoff component downstream of Madras site to Kruger National Park (KNP) border.
7) Frequency distribution of monthly flows of 6) for 80% exceedence flow, ref. p 2.90 Addendum to Surface Water Resources of S.A., WRC Dec.1983.
8) From Ref. 1, Table 18, distributed pro-rata to irrigation demand.
9) 4+7+8.



SCENARIO 1.1 (YEAR 1995 / 1 500ha)

SHORT TERM FUTURE WATER REQUIREMENTS -YEAR 1995

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	Area, growth rate &irr. depth	
RSA:															
Urban	0.17	0.16	0.16	0.14	0.12	0.12	0.12	0.12	0.14	0.16	0.16	0.17	1.73	4.6%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	2.8%	
Evaporation	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.70		
Total urban/stock	0.31	0.28	0.28	0.25	0.22	0.22	0.22	0.22	0.25	0.28	0.28	0.31	3.13		
Irrigation	7.00	6.04	5.23	3.46	2.54	2.12	1.94	2.86	3.50	4.58	5.23	6.68	51.20	6550	ha
TOTAL:	7.62	6.61	5.79	3.96	2.98	2.56	2.38	3.30	4.00	5.14	5.79	7.31	57.46		
LEBOWA:															
Urban	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	1.89	9.0%	
Stock/Game	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	0.0%	
Losses	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	7.4%	
Total urban/stock	0.12	0.11	0.11	0.10	0.08	0.08	0.08	0.08	0.10	0.11	0.11	0.12	2.30		
Irrigation	1.85	1.59	1.38	0.91	0.67	0.56	0.51	0.75	0.92	1.21	1.38	1.76	13.50	1500	ha
KANGWANE:														900	mm
Urban	0.28	0.26	0.26	0.23	0.20	0.20	0.20	0.20	0.23	0.26	0.26	0.28	2.84	9.0%	
Stock/Game	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.0%	
Losses	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.25	9.6%	
Total urban/stock	0.32	0.29	0.29	0.25	0.22	0.22	0.22	0.22	0.25	0.29	0.29	0.32	3.19		
Irrigation	0.62	0.53	0.46	0.30	0.22	0.19	0.17	0.25	0.31	0.40	0.46	0.59	4.50	450	ha
GAZANKULU:														1000	mm
Urban	0.21	0.19	0.19	0.17	0.15	0.15	0.15	0.15	0.17	0.19	0.19	0.21	2.11	8.9%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.23	8.7%	
Total urban/stock	0.26	0.24	0.24	0.21	0.18	0.18	0.18	0.18	0.21	0.24	0.24	0.26	2.64		
Irrigation(exist.	1.97	1.70	1.47	0.97	0.72	0.60	0.55	0.81	0.98	1.29	1.47	1.88	14.40	1165	ha
incl.losses)														1070	mm
TOTALS:															
Urban/Stock	1.02	0.91	0.91	0.81	0.71	0.71	0.71	0.71	0.81	0.91	0.91	1.02	11.26		
Irrigation	11.43	9.87	8.54	5.66	4.16	3.46	3.17	4.67	5.71	7.47	8.54	10.91	83.60		
Total-	12.44	10.78	9.46	6.47	4.87	4.17	3.89	5.39	6.53	8.39	9.46	11.92	94.86		
1* Urban Equiv.80%	1.70	1.95	1.78	1.38	1.03	0.98	0.95	0.94	1.04	1.19	1.34	1.71			
Total 80% assr.	13.13	11.81	10.33	7.03	5.19	4.44	4.12	5.61	6.75	8.67	9.88	12.62			
GAZANKULU															
ADD. IRR.:													C/C	1000	mm
a) C/C	0.35	0.30	0.26	0.17	0.13	0.11	0.10	0.14	0.17	0.23	0.26	0.33	2.54	200	ha
b) S/L	0.49	0.42	0.36	0.24	0.18	0.15	0.14	0.20	0.24	0.32	0.36	0.47	3.57	300	ha
Sub-total	0.83	0.72	0.62	0.41	0.30	0.25	0.23	0.34	0.42	0.55	0.62	0.80	6.11		
TOTAL-	13.96	12.54	10.95	7.45	5.49	4.70	4.36	5.95	7.17	9.21	10.50	13.41	100.96		
2* AVERAGE FLOW:															
80% assr.	23.51	24.87	25.11	22.86	19.02	16.21	14.59	13.20	11.98	11.32	13.52	17.73	213.92		
3* Utilizable flow: Summer 88% Winter 95%															
80% ass.	20.69	21.89	22.10	21.72	18.07	15.40	13.86	12.54	11.38	9.96	11.90	15.60	195.10		
4* Passing flow:															
80% ass.	9.55	12.33	14.16	15.41	13.53	11.51	10.23	7.25	4.81	2.11	3.02	4.32	108.23		
5* Shortfall:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
(80% assr.)															
6* Madras to KNP															
contribution: MAR = 35.70 hm^3															
7* 80% ass. (%)	5.5%	5.3%	4.6%	3.3%	2.2%	1.6%	1.4%	1.2%	1.0%	1.2%	2.3%	4.0%			
80% ass. (hm^3)	1.96	1.89	1.64	1.18	0.79	0.57	0.50	0.43	0.37	0.41	0.82	1.42	11.99		
8* Seepage gains:															
RSA	0.68	0.59	0.51	0.34	0.25	0.21	0.19	0.28	0.34	0.45	0.51	0.65	5.00		
Gazankulu	0.48	0.41	0.36	0.24	0.17	0.14	0.13	0.20	0.24	0.31	0.36	0.46	3.50		
Sub-total	1.16	1.00	0.87	0.58	0.42	0.35	0.32	0.48	0.58	0.76	0.87	1.11			
9* Total flow to KNP:															
hm^3/m @ 80% ass.	12.67	15.23	16.67	17.17	14.74	12.44	11.06	8.15	5.77	3.28	4.71	6.85	128.72		

SCENARIO 1.1 (YEAR 1995 / 1 500ha)

SHORT TERM FUTURE WATER REQUIREMENTS -YEAR 1995

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	Area, growth rate &irr. depth
RSA:														
Urban	0.17	0.16	0.16	0.14	0.12	0.12	0.12	0.12	0.14	0.16	0.16	0.17	1.73	4.6%
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	2.8%
Evaporation	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.70	
Total urban/stock	0.31	0.28	0.28	0.25	0.22	0.22	0.22	0.22	0.25	0.28	0.28	0.31	3.13	
Irrigation	7.00	6.04	5.23	3.46	2.54	2.12	1.94	2.86	3.50	4.58	5.23	6.68	51.20	6550 ha
TOTAL:	7.62	6.61	5.79	3.96	2.98	2.56	2.38	3.30	4.00	5.14	5.79	7.31	57.46	
LEBOWA:														
Urban	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	1.89	9.0%
Stock/Game	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	0.0%
Losses	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	7.4%
Total urban/stock	0.12	0.11	0.11	0.10	0.08	0.08	0.08	0.08	0.10	0.11	0.11	0.12	2.30	
Irrigation	1.85	1.59	1.38	0.91	0.67	0.56	0.51	0.75	0.92	1.21	1.38	1.76	13.50	1500 ha
KANGWANE:														900 mm
Urban	0.28	0.26	0.26	0.23	0.20	0.20	0.20	0.20	0.23	0.26	0.26	0.28	2.84	9.0%
Stock/Game	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.0%
Losses	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.25	9.6%
Total urban/stock	0.32	0.29	0.29	0.25	0.22	0.22	0.22	0.22	0.25	0.29	0.29	0.32	3.19	
Irrigation	0.62	0.53	0.46	0.30	0.22	0.19	0.17	0.25	0.31	0.40	0.46	0.59	4.50	450 ha
GAZANKULU:														1000 mm
Urban	0.21	0.19	0.19	0.17	0.15	0.15	0.15	0.15	0.17	0.19	0.19	0.21	2.11	8.9%
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%
Losses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.23	8.7%
Total urban/stock	0.26	0.24	0.24	0.21	0.18	0.18	0.18	0.18	0.21	0.24	0.24	0.26	2.64	
Irrigation(exist. incl.losses)	1.97	1.70	1.47	0.97	0.72	0.60	0.55	0.81	0.98	1.29	1.47	1.88	14.40	1165 ha 1070 mm
TOTALS:														
Urban/Stock	1.02	0.91	0.91	0.81	0.71	0.71	0.71	0.71	0.81	0.91	0.91	1.02	11.26	
Irrigation	11.43	9.87	8.54	5.66	4.16	3.46	3.17	4.67	5.71	7.47	8.54	10.91	83.60	
Total-	12.44	10.78	9.46	6.47	4.87	4.17	3.89	5.39	6.53	8.39	9.46	11.92	94.86	
1* Urban Equiv.80%	1.70	1.95	1.78	1.38	1.03	0.98	0.95	0.94	1.04	1.19	1.34	1.71		
Total 80% assr.	13.13	11.81	10.33	7.03	5.19	4.44	4.12	5.61	6.75	8.67	9.88	12.62		
GAZANKULU ADD. IRR.:													C/C	1000 mm
													S/L	1100 mm
a) C/C	0.35	0.30	0.26	0.17	0.13	0.11	0.10	0.14	0.17	0.23	0.26	0.33	2.54	200 ha
b) S/L	0.49	0.42	0.36	0.24	0.18	0.15	0.14	0.20	0.24	0.32	0.36	0.47	3.57	300 ha
Sub-total	0.83	0.72	0.62	0.41	0.30	0.25	0.23	0.34	0.42	0.55	0.62	0.80	6.11	
TOTAL-	13.96	12.54	10.95	7.45	5.49	4.70	4.36	5.95	7.17	9.21	10.50	13.41	100.96	
2* AVERAGE FLOW:														
80% assr.	23.51	24.87	25.11	22.86	19.02	16.21	14.59	13.20	11.98	11.32	13.52	17.73	213.92	
3* Utilizable flow:	Summer		88%		Winter		95%							
80% ass.	20.69	21.89	22.10	21.72	18.07	15.40	13.86	12.54	11.38	9.96	11.90	15.60	195.10	
4* Passing flow:														
80% ass.	9.55	12.33	14.16	15.41	13.53	11.51	10.23	7.25	4.81	2.11	3.02	4.32	108.23	
5* Shortfall: (80% assr.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
6* Madras to KNP contribution:	MAR =	35.70	hm^3											
7* 80% ass. (%)	5.5%	5.3%	4.6%	3.3%	2.2%	1.6%	1.4%	1.2%	1.0%	1.2%	2.3%	4.0%		
80% ass. (hm^3)	1.96	1.89	1.64	1.18	0.79	0.57	0.50	0.43	0.37	0.41	0.82	1.42	11.99	
8* Seepage gains:														
RSA	0.68	0.59	0.51	0.34	0.25	0.21	0.19	0.28	0.34	0.45	0.51	0.65	5.00	
Gazankulu	0.48	0.41	0.36	0.24	0.17	0.14	0.13	0.20	0.24	0.31	0.36	0.46	3.50	
Sub-total	1.16	1.00	0.87	0.58	0.42	0.35	0.32	0.48	0.58	0.76	0.87	1.11		
9* Total flow to KNP:														
hm^3/m @ 80% ass.	12.67	15.23	16.67	17.17	14.74	12.44	11.06	8.15	5.77	3.28	4.71	6.85	128.72	

SCENARIO 1.2 (YEAR 2000 / 1 500ha)

SHORT TERM FUTURE WATER REQUIREMENTS -YEAR 2000

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	Area, growth rate &irr. depth	
RSA:															
Urban	0.22	0.19	0.19	0.17	0.15	0.15	0.15	0.15	0.17	0.19	0.19	0.22	2.16	4.6%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	2.8%	
Evaporation	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.70		
Total urban/stock	0.36	0.32	0.32	0.29	0.25	0.25	0.25	0.25	0.29	0.32	0.32	0.36	3.56		
Irrigation	7.00	6.04	5.23	3.46	2.54	2.12	1.94	2.86	3.50	4.58	5.23	6.68	51.20	6550	ha
TOTAL:	7.71	6.69	5.87	4.03	3.04	2.62	2.44	3.36	4.07	5.22	5.87	7.39	58.33		
LEBOWA:															
Urban	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	2.91	9.0%	
Stock/Game	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	0.0%	
Losses	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.29	7.4%	
Total urban/stock	0.13	0.12	0.12	0.10	0.09	0.09	0.09	0.09	0.10	0.12	0.12	0.13	3.41		
Irrigation	1.85	1.59	1.38	0.91	0.67	0.56	0.51	0.75	0.92	1.21	1.38	1.76	13.50	1500	ha
KANGWANE:														900	mm
Urban	0.44	0.39	0.39	0.35	0.31	0.31	0.31	0.31	0.35	0.39	0.39	0.44	4.36	9.0%	
Stock/Game	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	9.6%	
Total urban/stock	0.49	0.44	0.44	0.39	0.34	0.34	0.34	0.34	0.39	0.44	0.44	0.49	4.86		
Irrigation	0.62	0.53	0.46	0.30	0.22	0.19	0.17	0.25	0.31	0.40	0.46	0.59	4.50	450	ha
GAZANKULU:														1000	mm
Urban	0.32	0.29	0.29	0.26	0.23	0.23	0.23	0.23	0.26	0.29	0.29	0.32	3.24	8.9%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.35	8.7%	
Total urban/stock	0.39	0.35	0.35	0.31	0.27	0.27	0.27	0.27	0.31	0.35	0.35	0.39	3.89		
Irrigation(exist. incl. losses)	1.97	1.70	1.47	0.97	0.72	0.60	0.55	0.81	0.98	1.29	1.47	1.88	14.40	1165	ha
														1070	mm
TOTALS:															
Urban/Stock	1.36	1.22	1.22	1.09	0.95	0.95	0.95	0.95	1.09	1.22	1.22	1.36	15.71		
Irrigation	11.43	9.87	8.54	5.66	4.16	3.46	3.17	4.67	5.71	7.47	8.54	10.91	83.60		
Total-	12.79	11.09	9.77	6.74	5.11	4.41	4.13	5.63	6.80	8.70	9.77	12.27	99.31		
1* Urban Equiv.80%	2.28	2.60	2.39	1.84	1.38	1.31	1.27	1.25	1.39	1.59	1.79	2.29			
Total 80% assr.	13.70	12.47	10.93	7.50	5.54	4.78	4.45	5.93	7.10	9.07	10.33	13.20			
GAZANKULU ADD. IRR.:														C/C 1000	mm
														S/L 1100	mm
a) C/C	0.35	0.30	0.26	0.17	0.13	0.11	0.10	0.14	0.17	0.23	0.26	0.33	2.54	200	ha
b) S/L	0.49	0.42	0.36	0.24	0.18	0.15	0.14	0.20	0.24	0.32	0.36	0.47	3.57	300	ha
Sub-total	0.83	0.72	0.62	0.41	0.30	0.25	0.23	0.34	0.42	0.55	0.62	0.80	6.11		
TOTAL-	14.54	13.19	11.55	7.91	5.84	5.03	4.68	6.27	7.52	9.61	10.95	13.99	105.42		
2* AVERAGE FLOW:															
80% assr.	23.51	24.87	25.11	22.86	19.02	16.21	14.59	13.20	11.98	11.32	13.52	17.73	213.92		
3* Utilizable flow: Summer 88% Winter 95%															
80% ass.	20.69	21.89	22.10	21.72	18.07	15.40	13.86	12.54	11.38	9.96	11.90	15.60	195.10		
4* Passing flow:															
80% ass.	8.97	11.68	13.56	14.95	13.18	11.18	9.91	6.93	4.46	1.71	2.57	3.74	102.83		
5* Shortfall: (80% assr.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
6* Madras to KNP contribution:	MAR = 35.70 hm^3														
7* 80% ass. (%)	5.5%	5.3%	4.6%	3.3%	2.2%	1.6%	1.4%	1.2%	1.0%	1.2%	2.3%	4.0%			
80% ass. (hm^3)	1.96	1.89	1.64	1.18	0.79	0.57	0.50	0.43	0.37	0.41	0.82	1.42	11.99		
8* Seepage gains:															
RSA	0.68	0.59	0.51	0.34	0.25	0.21	0.19	0.28	0.34	0.45	0.51	0.65	5.00		
Gazankulu	0.48	0.41	0.36	0.24	0.17	0.14	0.13	0.20	0.24	0.31	0.36	0.46	3.50		
Sub-total	1.16	1.00	0.87	0.58	0.42	0.35	0.32	0.48	0.58	0.76	0.87	1.11			
9* Total flow to KNP: hm^3/m @ 80% ass.	12.10	14.57	16.07	16.70	14.39	12.11	10.74	7.83	5.42	2.88	4.25	6.27	123.31		

SCENARIO 2.1 (YEAR 1995 / 2 000ha)

SHORT TERM FUTURE WATER REQUIREMENTS -YEAR 1995

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	Area, growth rate &irr. depth	
RSA:															
Urban	0.17	0.16	0.16	0.14	0.12	0.12	0.12	0.12	0.14	0.16	0.16	0.17	1.73	4.6%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	2.8%	
Evaporation	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.70		
Total urban/stock	0.31	0.28	0.28	0.25	0.22	0.22	0.22	0.22	0.25	0.28	0.28	0.31	3.13		
Irrigation	7.00	6.04	5.23	3.46	2.54	2.12	1.94	2.86	3.50	4.58	5.23	6.68	51.20	6550	ha
TOTAL:	7.62	6.61	5.79	3.96	2.98	2.56	2.38	3.30	4.00	5.14	5.79	7.31	57.46		
LEBOWA:															
Urban	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	1.89	9.0%	
Stock/Game	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	0.0%	
Losses	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	7.4%	
Total urban/stock	0.12	0.11	0.11	0.10	0.08	0.08	0.08	0.08	0.10	0.11	0.11	0.12	2.30		
Irrigation	2.46	2.12	1.84	1.22	0.89	0.75	0.68	1.01	1.23	1.61	1.84	2.35	18.00	2000	ha
KANGWANE:														900	mm
Urban	0.28	0.26	0.26	0.23	0.20	0.20	0.20	0.20	0.23	0.26	0.26	0.28	2.84	9.0%	
Stock/Game	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.0%	
Losses	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.25	9.6%	
Total urban/stock	0.32	0.29	0.29	0.25	0.22	0.22	0.22	0.22	0.25	0.29	0.29	0.32	3.19		
Irrigation	0.62	0.53	0.46	0.30	0.22	0.19	0.17	0.25	0.31	0.40	0.46	0.59	4.50	450	ha
GAZANKULU:														1000	mm
Urban	0.21	0.19	0.19	0.17	0.15	0.15	0.15	0.15	0.17	0.19	0.19	0.21	2.11	8.9%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.23	8.7%	
Total urban/stock	0.26	0.24	0.24	0.21	0.18	0.18	0.18	0.18	0.21	0.24	0.24	0.26	2.64		
Irrigation(exist. incl.losses)	1.97	1.70	1.47	0.97	0.72	0.60	0.55	0.81	0.98	1.29	1.47	1.88	14.40	1165	ha
														1070	mm
TOTALS:															
Urban/Stock	1.02	0.91	0.91	0.81	0.71	0.71	0.71	0.71	0.81	0.91	0.91	1.02	11.26		
Irrigation	12.04	10.40	9.00	5.96	4.38	3.65	3.35	4.93	6.02	7.88	9.00	11.50	88.10		
Total-	13.06	11.32	9.92	6.77	5.09	4.36	4.06	5.64	6.83	8.79	9.92	12.51	99.36		
1* Urban Equiv.80%	1.70	1.95	1.78	1.38	1.03	0.98	0.95	0.94	1.04	1.19	1.34	1.71			
Total 80% assr.	13.74	12.35	10.79	7.34	5.41	4.63	4.29	5.86	7.06	9.07	10.34	13.20			
GAZANKULU ADD. IRR.:													C/C	1000	mm
													S/L	1100	mm
a) C/C	0.35	0.30	0.26	0.17	0.13	0.11	0.10	0.14	0.17	0.23	0.26	0.33	2.54	200	ha
b) S/L	0.49	0.42	0.36	0.24	0.18	0.15	0.14	0.20	0.24	0.32	0.36	0.47	3.57	300	ha
Sub-total	0.83	0.72	0.62	0.41	0.30	0.25	0.23	0.34	0.42	0.55	0.62	0.80	6.11		
TOTAL-	14.58	13.07	11.41	7.75	5.72	4.88	4.53	6.20	7.48	9.61	10.96	14.00	105.46		
2* AVERAGE FLOW:															
80% assr.	23.51	24.87	25.11	22.86	19.02	16.21	14.59	13.20	11.98	11.32	13.52	17.73	213.92		
3* Utilizable flow: Summer 88% Winter 95%															
80% ass.	20.69	21.89	22.10	21.72	18.07	15.40	13.86	12.54	11.38	9.96	11.90	15.60	195.10		
4* Passing flow:															
80% ass.	8.93	11.80	13.70	15.11	13.30	11.33	10.06	7.00	4.50	1.71	2.56	3.73	103.73		
5* Shortfall: (80% assr.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
6* Madras to KNP contribution:	MAR = 35.70 hm^3														
7* 80% ass. (%)	5.5%	5.3%	4.6%	3.3%	2.2%	1.6%	1.4%	1.2%	1.0%	1.2%	2.3%	4.0%			
80% ass. (hm^3)	1.96	1.89	1.64	1.18	0.79	0.57	0.50	0.43	0.37	0.41	0.82	1.42	11.99		
8* Seepage gains:															
RSA	0.68	0.59	0.51	0.34	0.25	0.21	0.19	0.28	0.34	0.45	0.51	0.65	5.00		
Gazankulu	0.48	0.41	0.36	0.24	0.17	0.14	0.13	0.20	0.24	0.31	0.36	0.46	3.50		
Sub-total	1.16	1.00	0.87	0.58	0.42	0.35	0.32	0.48	0.58	0.76	0.87	1.11			
9* Total flow to KNP:															
hm^3/m @ 80% ass.	12.06	14.70	16.21	16.86	14.51	12.25	10.89	7.90	5.46	2.88	4.25	6.26	124.22		

SCENARIO 2.2 (YEAR 2000 / 2 000ha)

SHORT TERM FUTURE WATER REQUIREMENTS -YEAR 2000

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	Area, growth rate &irr. depth	
RSA:															
Urban	0.22	0.19	0.19	0.17	0.15	0.15	0.15	0.15	0.17	0.19	0.19	0.22	2.16	4.6%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	2.8%	
Evaporation	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.70		
Total urban/stock	0.36	0.32	0.32	0.29	0.25	0.25	0.25	0.25	0.29	0.32	0.32	0.36	3.56		
Irrigation	7.00	6.04	5.23	3.46	2.54	2.12	1.94	2.86	3.50	4.58	5.23	6.68	51.20	6550	ha
TOTAL:	7.71	6.69	5.87	4.03	3.04	2.62	2.44	3.36	4.07	5.22	5.87	7.39	58.33		
LEBOWA:															
Urban	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	2.91	9.0%	
Stock/Game	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.20	0.0%	
Losses	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.29	7.4%	
Total urban/stock	0.13	0.12	0.12	0.10	0.09	0.09	0.09	0.09	0.10	0.12	0.12	0.13	3.41		
Irrigation	2.46	2.12	1.84	1.22	0.89	0.75	0.68	1.01	1.23	1.61	1.84	2.35	18.00	2000	ha
KANGWANE:														900	mm
Urban	0.44	0.39	0.39	0.35	0.31	0.31	0.31	0.31	0.35	0.39	0.39	0.44	4.36	9.0%	
Stock/Game	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.10	0.0%	
Losses	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.40	9.6%	
Total urban/stock	0.49	0.44	0.44	0.39	0.34	0.34	0.34	0.34	0.39	0.44	0.44	0.49	4.86		
Irrigation	0.62	0.53	0.46	0.30	0.22	0.19	0.17	0.25	0.31	0.40	0.46	0.59	4.50	450	ha
GAZANKULU:														1000	mm
Urban	0.32	0.29	0.29	0.26	0.23	0.23	0.23	0.23	0.26	0.29	0.29	0.32	3.24	8.9%	
Stock/Game	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.30	0.0%	
Losses	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.35	8.7%	
Total urban/stock	0.39	0.35	0.35	0.31	0.27	0.27	0.27	0.27	0.31	0.35	0.35	0.39	3.89		
Irrigation(exist.	1.97	1.70	1.47	0.97	0.72	0.60	0.55	0.81	0.98	1.29	1.47	1.88	14.40	1165	ha
incl.losses)														1070	mm
TOTALS:															
Urban/Stock	1.36	1.22	1.22	1.09	0.95	0.95	0.95	0.95	1.09	1.22	1.22	1.36	15.71		
Irrigation	12.04	10.40	9.00	5.96	4.38	3.65	3.35	4.93	6.02	7.88	9.00	11.50	88.10		
Total-	13.40	11.62	10.23	7.05	5.33	4.60	4.30	5.88	7.11	9.10	10.23	12.86	103.81		
1* Urban Equiv.80%	2.28	2.60	2.39	1.84	1.38	1.31	1.27	1.25	1.39	1.59	1.79	2.29			
Total 80% assr.	14.32	13.00	11.39	7.80	5.76	4.96	4.62	6.18	7.41	9.47	10.79	13.78			
GAZANKULU ADD. IRR.:														C/C 1000 mm	
														S/L 1100 mm	
a) C/C	0.35	0.30	0.26	0.17	0.13	0.11	0.10	0.14	0.17	0.23	0.26	0.33	2.54	200	ha
b) S/L	0.49	0.42	0.36	0.24	0.18	0.15	0.14	0.20	0.24	0.32	0.36	0.47	3.57	300	ha
Sub-total	0.83	0.72	0.62	0.41	0.30	0.25	0.23	0.34	0.42	0.55	0.62	0.80	6.11		
TOTAL-	15.15	13.73	12.01	8.22	6.06	5.21	4.85	6.52	7.83	10.02	11.41	14.58	109.92		
2* AVERAGE FLOW:															
80% assr.	23.51	24.87	25.11	22.86	19.02	16.21	14.59	13.20	11.98	11.32	13.52	17.73	213.92		
3* Utilizable flow:	Summer		88%		Winter		95%								
80% ass.	20.69	21.89	22.10	21.72	18.07	15.40	13.86	12.54	11.38	9.96	11.90	15.60	195.10		
4* Passing flow:															
80% ass.	8.36	11.14	13.10	14.64	12.96	11.00	9.74	6.68	4.15	1.36	2.11	3.15	98.38		
5* Shortfall: (80% assr.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00			
6* Madras to KNP contribution:	MAR =	35.70	hm^3												
7* 80% ass. (%)	5.5%	5.3%	4.6%	3.3%	2.2%	1.6%	1.4%	1.2%	1.0%	1.2%	2.3%	4.0%			
80% ass. (hm^3)	1.96	1.89	1.64	1.18	0.79	0.57	0.50	0.43	0.37	0.41	0.82	1.42	11.99		
8* Seepage gains:															
RSA	0.68	0.59	0.51	0.34	0.25	0.21	0.19	0.28	0.34	0.45	0.51	0.65	5.00		
Gazankulu	0.48	0.41	0.36	0.24	0.17	0.14	0.13	0.20	0.24	0.31	0.36	0.46	3.50		
Sub-total	1.16	1.00	0.87	0.58	0.42	0.35	0.32	0.48	0.58	0.76	0.87	1.11			
9* Total flow to KNP:															
hm^3/m @ 80% ass.	11.48	14.04	15.61	16.40	14.16	11.92	10.56	7.58	5.11	2.53	3.80	5.68	118.87		

Annexure 10

HOXANI FARMER MODELS : SAMPLE OF PRESENT SITUATION AS UNDERTAKEN BY MESSRS. MEASURED FARMING - APRIL 1989

DATA FOR 1988/89 WINTER/SUMMER RECORD

SUMMARY

Sample Farmer	Locality	Plot No.	General Suitability of soils	Crops		Gross Margin		Nett family Income a) Farming b) Other c) Total (R/a)
				Cultivation	Area ha	(R)	(R/ha)	
Willie Mnisi	Ten Farms	7	Average	Tomatoes	3,0	14 482	4 827	a) R15 564
				Maize	3,0	7 955	2 651	b) -
				Cabbage	0,25	- 33	- 133	c) R13 754
				Beetroot	0,25	232	928	
					6,50	22 636		
				Fallow	6,50			
Elmond Mashaba	Big Bend	5	Average to poor	Tomatoes	0,33	184	556	a) -R6 823
				Maize	4,0	-1 041	- 260	b) R3 750
				Sugar Beans	0,50	- 621	-1 243	c) -R4 273
				Sweet potatoes	0,50	- 354	- 707	
					5,33	-1 833		
Kaizer Mdluli	Mkhuhlu	6	Average	Maize	3,0	1 236	412	a) R 2 036
				Banana	1,0			b) R 1 800
				Sugar	1,0			c) R 3 211
					5,0ha	1 236		
				Fallow	4,0			
Frank Shilubane	Upper Cork	6	Average to poor	Bananas	2,0	-7 040	-3 520	a) R77 067
				Tomatoes	5,5	72 925	13 459	b) -
				Maize	6,0	5 749	958	c) R73 261
				Cabbage	1,0	4 177	4 177	
				Sweet potato	0,9	1 595	1 773	
				Green Beans	1,0	5 954	5 954	
					16,4	83 362		
Themba Mhlanga	Cork	14	Good	Maize	9,0	16 317	1 813	a) R31 063
				Sugar beans	2,0	4 363	2 182	b) R 9 000
				Tomatoes	0,5	344	688	c) R36 269
				Spinach	0,5	252	503	
				Onions	0,25	237	948	
					12,25	21 513		

MEASURED FARMING S.A.
(Pty.) Ltd./(Edms.) Bpk.
Reg. No 71/12682/07
Specialists in Agricultural & Forestry Management
Consultancy & Valuations
P.O Box 210 Heidelberg 2400
Tel 0151-3189 Telex 4-87984 S A
4181
3191

02-May-89 MEASURED FARMING(SA)(PTY)LTD
FARM_5

HOXANE FARMER SUPPORT PROGRAMME

PERSONAL DETAILS:-
NAME: ELMOND MASHABA
AREA: BIG BEND
FARM NO: 5
SIZE GR: 7.10
SIZE NT: 5.00

ACTIVITY TABLE (Ha)

	1	2	3	4	5	6	7
CROP:	MAIZE	SUGAR BEANS	SWEET POTATOES	TOMATOES	MANGOES	PAWPAWS	GUAVAS
SIZE:	4.00	0.50	0.50	0.33	100 TREES	50 TREES	6 TREES
ACTIVITY:							
PLOUGH	4.00	0.50	0.50	0.33			
DISC	4.00	0.50	0.50	0.33			
FURROW	4.00	0.50	0.50	0.33			
HAND SPRAY				4.67			
IRRIGATE	16.00	2.00	2.00	4.00			
TOTAL	28.00	3.50	3.50	9.67	0.00	0.00	0.00

MECHANIZATION COST:

	TRACTOR	PLOUGH	DISC	FURROW	PUMP
Ha	16.00	5.33	5.33	5.33	24.00
CAPITAL:					
VALUE	7000	600	500	500	3000
DEPRECIATION	1400	120	100	100	600
ANN.MAINT	2500	240	0	40	70
TOTAL	3900	360	100	140	670
COST/Ha	243.75	67.50	18.75	26.25	27.92
FUEL:					
LITRE/DAY	16.67				7.00
R/LITRE	0.48				0.48
RAND/DAY	8.00				3.36
Ha/DAY		1.00	2.00	2.00	0.66
RAND/Ha		8.00	4.00	4.00	5.09
TOTAL COST/Ha		319.25	266.50	274.00	33.01

FARM MODEL 5.33 Ha

FARM INCOME:	Ha	YIELD/Ha	TOT.SALES
MAIZE	4.00	1000.00	4000.01
S.BEANS	0.50	315.00	157.50
S.POTATOE	0.50	302.67	151.33
TOMATOES	0.33	1620.00	539.95
GROSS FARM INCOME			4848.79
MARKETING COST:			
MAIZE	4.00	11.33	45.32
S.BEANS	0.50	73.25	36.63
S.POTATOE	0.50	4.84	2.42
TOMATOES	0.33	0.00	0.00
TOTAL MARKETING COST			84.37
NET SALES			4764.42
PRODUCTION COST:			
MAIZE	4.00	1248.95	4995.82
S.BEANS	0.50	1484.43	742.21
S.POTATOE	0.50	1005.36	502.68
TOMATOES	0.33	1063.45	354.45
TOTAL PRODUCTION COST			6595.16
FARM INCOME			-1830.74
IRRIGATION COST	24.00	33.01	792.18
TRANSPORT			4200.00
NET FARM INCOME			-6822.92
OTHER INCOME			3750.00
PENSION			3600.00
MANGOES			100.00
PAWPAWS			50.00
LESS LIVING EXPENCES			1200.00
NET FAMILY INCOME			-4272.92

MAIZE

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	GRAIN			0	1000.00
	COBS	0.30	3333.34	1000.00	
TOTAL					11.33
LESS MARKETING COST				0.00	
COMBINE				0.00	
BAGS (70Kg)		1.30	2.50	3.25	
HARVEST		3.64	2.22	8.08	
TOTAL					11.33
NET SALES					988.67
PRODUCTION COSTS					
SEED		3.55	25.00	88.75	88.75
FERTILIZER					
-2:3:2		27.50	3.00	82.50	125.90
-LAN		21.70	2.00	43.40	
PESTICIDES					
-CUTWORM BAIT		1.19	42.02	50.00	120.00
-DIPTEREX		2.31	30.30	70.00	
MECHANIZATION COST					
-PLOUGH		319.25	1.00	319.25	859.76
-DISC		266.50	1.00	266.50	
-FURROWS		274.00	1.00	274.00	
PRE HARVEST MANDAYS					
-HOEING		3.64	15.00	54.55	54.55
TOTAL COST					1248.95
GROSS MARGIN					-260.28

SUGAR BEANS

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	0.75	420.00	315.00	315.00
TOTAL				73.25
LESS MARKETING COST			0.00	
COMBINE			0.00	
BAGS (70Kg)	1.30	6.00	7.80	
BAGGING(MANDAYS)	3.64	18.00	65.45	
TOTAL				73.25
NET SALES				241.75
PRODUCTION COSTS				
SEED	140.00	1.00	140.00	140.00
FERTILIZER				
-2:3:2	27.50	6.00	165.00	397.40
-LIME	3.64	40.00	145.60	
-LAN	21.70	4.00	86.80	
MECHANIZATION COST				
-PLOUGH	319.25	1.00	319.25	859.76
-DISC	266.50	1.00	266.50	
-FURROWS	274.00	1.00	274.00	
PRE HARVEST MANDAYS				
-HOEING	3.64	24.00	87.27	87.27
TOTAL COST				1484.43
GROSS MARGIN				-1242.68

SWEET POTATOES

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES		6.00	50.44	302.67	302.67
TOTAL					4.84
LESS MARKETING COST				0.00	
HARVEST		0.00	9.56	0.00	
TRANSPORT		0.20	24.21	4.84	
TOTAL					4.84
NET SALES					297.82
PRODUCTION COSTS					
SEED	OWN				0.00
FERTILIZER					
-LIME		3.64	40.00	145.60	145.60
MECHANIZATION COST					
-PLOUGH		319.25	1.00	319.25	859.76
-DISC		266.50	1.00	266.50	
-FURROW		274.00	1.00	274.00	
PRE HARVEST MANDAYS					
-HOEING		0.00	30.00	0.00	0.00
TOTAL COST					1005.36
GROSS MARGIN					-707.53

TOMATOES

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	7.50	216.00	1620.00	1620.00
TOTAL				0.00
LESS MARKETING COST			0.00	
PACK & SORT			0.00	
			0.00	
TOTAL				0.00
NET SALES				1620.00
PRODUCTION COSTS				
SEED	172.98	0.60	103.79	103.79
FERTILIZER				
-2:3:2	27.50	1.50	41.25	67.29
-LAN	21.70	1.20	26.04	
PESTICIDES				
-DIATHANE M45	10.34	0.11	1.12	10.80
-CUPROVIT	5.80	0.11	0.63	
-TAMARON	37.75	0.24	9.06	
MECHANIZATION COST				
-PLOUGH	319.25	1.00	319.25	859.76
-DISC	266.50	1.00	266.50	
-FURROWS	274.00	1.00	274.00	
PRE HARVEST MANDAYS				
-HOEING	3.64	6.00	21.82	21.82
TOTAL COST				1063.45
GROSS MARGIN				556.55

MEASURED FARMING(SA)(PTY)LTD

HOXANE FARMER SUPPORT PROGRAMME

PERSONAL DETAILS:-

NAME: WILLIE MNISI
AREA: TEN FARMS
FARM NO: 7
SIZE GR: 11.6
SIZE NT: 8

ACTIVITY TABLE (Ha)

	1	2	3	4	5	TOTAL
CROP:	TOMATOES	MAIZE	CABBAGE	BEETROOT		
SIZE:-	3.00	3.00	0.25	0.25		6.50
ACTIVITY:						
PLOUGH	3.00	3.00	0.25	0.25		6.50
DISC	3.00	3.00	0.25	0.25		6.50
CULT/ROW	3.00			0.25		3.25
SPRAY	33.00	3.00				36.00
HAND SPRAY			0.50			0.50
FURROW		3.00	0.25			3.25
IRRIGATE	72.00	36.00	0.75	0.75		109.50
TOTAL	42.00	12.00	1.25	0.75	0.00	56.00

MECHANIZATION COST:

	TRACTOR	PLOUGH	SPRAY	PUMP	CULT.	DISC
Ha	46.00	0.25	36.00	109.50	3.25	6.50
CAPITAL:						
VALUE	8000.00	700.00	800.00	10000.00	500.00	800.00
DEPRECIATION	1600.00	140.00	160.00	2000.00	100.00	160.00
ANN.MAINT	100.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1700.00	140.00	160.00	2000.00	100.00	160.00
COST/Ha	36.96	560.00	4.44	18.26	30.77	24.62
FUEL:						
LITRE/DAY	20.00			20.00		
R/LITRE	0.48			0.48		
RAND/DAY	9.60			9.60		
Ha/DAY	1.00	2.00	1.00	0.75	1.00	1.00
RAND/Ha		41.76	46.56	12.60	46.56	46.56
TOTAL COST/Ha	36.96	601.76	51.00	31.06	77.33	71.17

FARM MODEL 6.50 Ha

FARM INCOME:	Ha	YIELD/Ha	TOT.SALES
TOMATOES	3.00	10220.00	30660.00
MAIZE	3.00	3715.60	11146.80
CABBAGE	0.25	600.00	150.00
BEETROOT	0.25	2400.00	600.00
GROSS FARM INCOME			42556.80
MARKETING COST:			
TOMATOES	3.00	2514.00	7542.00
MAIZE	3.00	155.00	465.00
CABBAGE	0.25	0.00	0.00
BEETROOT	0.25	0.00	0.00
TOTAL MARKETING COST			8007.00
NET SALES			34549.80
PRODUCTION COST:			
TOMATOES	3.00	2878.51	8635.53
MAIZE	3.00	908.97	2726.91
CABBAGE	0.25	732.95	183.24
BEETROOT	0.25	1471.93	367.98
TOTAL PRODUCTION COST			11913.66
FARM INCOME			22636.14
IRRIGATION COST	109.50	31.06	3401.60
TRANSPORT			3670.00
NET FARM INCOME			15564.54
OTHER INCOME			0.00
LESS LIVING EXPENCES			1810.00
NET FAMILY INCOME			13754.54

TOMATOES

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	BOXES	5.50	200.00	1100.00	10220.00
	LUGS	12.00	760.00	9120.00	
TOTAL					2514.00
LESS MARKETING COST				0.00	
HARVEST		3.00	800.00	2400.00	
BOXES		0.57	200.00	114.00	
TOTAL					2514.00
NET SALES					7706.00
PRODUCTION COSTS					
SEED		21.50	2.50	53.75	53.75
POLES		0.60	1500.00	150.00	150.00
WIRE		110.00	0.30	33.00	33.00
FERTILIZER					
-2:3:2		27.50	10.00	275.00	851.96
-2:3:4		35.74	8.00	285.92	
-LAN		21.70	8.00	173.60	
-1:0:1		29.36	4.00	117.44	
PESTICIDES					
-DIATHANE M45		10.34	2.40	24.82	725.29
-CUPROVIT		5.80	6.00	34.80	
-THIODAN		24.15	0.60	14.49	
-TEMIK		16.65	15.00	249.77	
-RIDOMIL		48.90	8.00	391.22	
-KELTHANE		12.74	0.80	10.19	
MECHANIZATION COST					
-PLOUGH		55.00	1.00	55.00	764.51
-DISC		71.17	1.00	71.17	
-FURROW		77.33	1.00	77.33	
-SPRAY		51.00	11.00	561.01	
PRE HARVEST MANDAYS					
-HOEING		3.00	100.00	300.00	300.00
TOTAL COST					2878.51
GROSS MARGIN					4827.49

BEETROOT

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	(LUGS)	12.00	200.00	2400.00	2400.00
TOTAL					0.00
LESS MARKETING COST				0.00	
BAGS (30Kg)				0.00	
BAGGING(MANDAYS)				0.00	
TOTAL					0.00
NET SALES					2400.00
PRODUCTION COSTS					
SEED		3.70	16.00	59.20	59.20
FERTILIZER					
-2:3:4		35.74	12.00	428.88	602.48
-LAN		21.70	8.00	173.60	
MECHANIZATION COST					
-PLOUGH		601.76	1.00	601.76	750.25
-DISC		71.17	1.00	71.17	
-FURROWS		77.33	1.00	77.33	
PRE HARVEST MANDAYS					
-HOEING		3.00	20.00	60.00	60.00
TOTAL COST					1471.93
GROSS MARGIN					928.07

MAIZE

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	GRAIN	0.36	7000.00	2500.00	3715.60
	COBS	0.30	4052.00	1215.60	
TOTAL					155.00
LESS MARKETING COST				0.00	
COMBINE		0.25	100.00	25.00	
BAGS (70Kg)		1.30	100.00	130.00	
BAGGING(MANDAYS)				0.00	
TOTAL					155.00
NET SALES					3560.60
PRODUCTION COSTS					
SEED		3.50	25.00	87.50	87.50
FERTILIZER					
-SUPERS		20.60	4.00	82.40	279.20
-2:3:2		27.50	4.00	110.00	
-LAN		21.70	4.00	86.80	
PESTICIDES					
-CURATERR		6.65	25.00	166.25	167.77
-LANATE		30.41	0.05	1.52	
MECHANIZATION COST					
-PLOUGH		55.00	1.00	55.00	254.50
-DISC		71.17	1.00	71.17	
-FURROWS		77.33	1.00	77.33	
-SPRAY		51.00	1.00	51.00	
PRE HARVEST MANDAYS					
-HOEING		3.00	40.00	120.00	120.00
TOTAL COST					908.97
GROSS MARGIN					2651.63

CABBAGE

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	0.50	1200.00	600.00	600.00
TOTAL				0.00
LESS MARKETING COST			0.00	
BAGS (30Kg)			0.00	
BAGGING(MANDAYS)			0.00	
TOTAL				0.00
NET SALES				600.00
PRODUCTION COSTS				
SEED	90.10	4.00	360.40	360.40
FERTILIZER				
-2:3:2	27.50	4.00	110.00	153.40
-LAN	21.70	2.00	43.40	
PESTICIDES				
-LANATE	30.41	0.12	3.65	3.65
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	203.50
-DISC	71.17	1.00	71.17	
-FURROW	77.33	1.00	77.33	
-SPRAY CP3			0.00	
PRE HARVEST MANDAYS				
-HOEING	3.00	4.00	12.00	12.00
TOTAL COST				732.95
GROSS MARGIN				-132.95

HOXANE FARMER SUPPORT PROGRAMME

PERSONAL DETAILS:-

NAME: KAIZER MDLULI
AREA: MKHUHLU
FARM NO: 6
SIZE GR: 9.90
SIZE NT: 8.00

ACTIVITY TABLE (Ha)

	1	2	3	4	5	TOTAL
CROP:	MAIZE			BANANA	SUGAR CANE	
SIZE:	3.00			150 TREE	120 TREE	3.00
ACTIVITY:						
PLOUGH	3.00					3.00
FURROW	3.00					3.00
HAND SPRAY	15.00					15.00
IRRIGATE	24.00					24.00
						0.00
TOTAL	45.00	0.00	0.00	0.00	0.00	45.00

MECHANIZATION COST:

	PUMP
Ha	24.00
CAPITAL:	
VALUE	3000.00
DEPRECIATION	600.00
ANN.MAINT	0.00
TOTAL	600.00
COST/Ha	25.00
FUEL:	
LITRE/DAY	20.00
R/LITRE	0.46
RAND/DAY	9.60
Ha/DAY	0.75
RAND/Ha	12.80
TOTAL COST/Ha	37.80

FARM MODEL 5.00 Ha

FARM INCOME:	Ha	YIELD/Ha	TOT.SALES
MAIZE	3.00	1010.00	3030.00
BANANA	1.00	504.00	504.00
SUGARCANE	1.00	60.00	60.00
GROSS FARM INCOME			3594.00
MARKETING COST:			
MAIZE	3.00	26.32	78.95
BANANA	1.00		0.00
SUGARCANE	1.00		0.00
TOTAL MARKETING COST			78.95
NET SALES			3515.05
PRODUCTION COST:			
MAIZE	3.00		571.69
BANANA	1.00		0.00
SUGARCANE	1.00		0.00
TOTAL PRODUCTION COST			571.69
FARM INCOME			2943.35
IRRIGATION COST			907.20
TRANSPORT			0.00
NET FARM INCOME			2036.15
OTHER INCOME			1800.00
	PENSION		1800.00
LESS LIVING EXPENCES			625.20
NET FAMILY INCOME			3210.95

MAIZE
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TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	GRAIN	0.43	840.00	360.00	1010.00
	COBS	0.30	2166.67	650.00	
TOTAL					26.32
LESS MARKETING COST				0.00	
BAGS (70Kg)		2.00	12.00	24.00	
HARVEST		1.82	1.27	2.32	
TOTAL					26.32
NET SALES					983.68
PRODUCTION COSTS					
SEED		3.40	15.00	51.00	51.00
FERTILIZER					
-2:3:2		27.50	6.00	165.00	338.60
-LAN		21.70	8.00	173.60	
PESTICIDES					
-CYMBUSH		24.42	0.05	1.22	31.28
-LANATE		30.41	0.01	0.30	
-CUTWORM BAIT		1.19	25.00	29.75	
MECHANIZATION COST					
-PLOUGH		55.00	1.00	55.00	109.00
-DISC		20.00	1.00	20.00	
-FURROW		10.00	1.00	10.00	
-SPRAY CP3		4.80	5.00	24.00	
PRE HARVEST MANDAYS					
-HOEING		1.82	22.00	40.00	41.82
-SPRAYING		1.82	1.00	1.82	
TOTAL COST					571.69
GROSS MARGIN					411.99

02-May-89
FARM_6_7

MEASURED FARMING(SA)(PTY)LTD

HOXANE FARMER SUPPORT PROGRAMME

PERSONAL DETAILS:-
NAME: FRANK SHILUBANE
AREA: UPPER CORK
FARM NO: 6/7
SIZE GR: 14.10
SIZE NT: 10.00

ACTIVITY TABLE (Ha)

	1	2	3	4	5	6	7	8	TOTAL
CROP:	BANANAS	TOMATOES	MAIZE	CABBAGE	SWEET POTATO	GREEN BEANS	PAWPAWS	AVOCADO'S	
SIZE:	2.00	5.50	6.00	1.00	0.90	1.00	100 TREES	25 TREES	16.40
ACTIVITY:									
PLOUGH	2.00	5.50	6.00	1.00	0.90	1.00			16.40
DISC	2.00	5.50	6.00	1.00	0.90	1.00			16.40
FURROW	2.00	5.50	6.00	1.00	0.90	1.00			16.40
SPRAY		66.00							66.00
COMBINE			6.00						6.00
IRRIGATION	80.00	44.00	24.00	8.00	7.20	8.00			171.20
TOTAL	86.00	126.50	48.00	11.00	9.90	11.00			292.40

MECHANIZATION COST:

	TRACTOR	PLOUGH	SPRAY	PUMP
Ha	66.00		66.00	171.20
CAPITAL:				
VALUE	6000.00	750.00	350.00	2000.00
DEPRECIATION	1200.00	150.00	70.00	400.00
ANN.MAINT	127.00	40.00	0.00	2300.00
TOTAL	1327.00	190.00	70.00	2700.00
COST/Ha	20.11		1.06	15.77
FUEL:				
LITRE/DAY	25.00			20.00
R/LITRE	0.48			0.48
RAND/DAY	12.00			9.60
Ha/DAY	2.00		2.00	1.50
RAND/Ha			6.00	6.40
TOTAL COST/Ha			27.17	22.17

FARM MODEL 16.40 Ha

FARM INCOME:	Ha	YIELD/Ha	TOT.SALES
BANANAS	2.00	0.00	0.00
TOMATOES	5.50	18994.50	104469.75
MAIZE	6.00	1550.00	9300.00
CABBAGE	1.00	5000.00	5000.00
S.POTATOE	0.90	2100.00	1890.00
G.BEANS	1.00	7980.00	7980.00
GROSS FARM INCOME			128639.75
MARKETING COST:			
BANANAS	2.00	0.00	0.00
TOMATOES	5.50	3071.45	16893.00
MAIZE	6.00	20.00	120.00
CABBAGE	1.00	9.27	9.27
S.POTATOE	0.90	54.09	48.68
G.BEANS	1.00	1370.30	1370.30
TOTAL MARKETING COST			18441.26
NET SALES			110198.49
PRODUCTION COST:			
BANANAS	2.00	3520.18	7040.36
TOMATOES	5.50	2463.80	13550.89
MAIZE	6.00	571.68	3430.09
CABBAGE	1.00	813.73	813.73
S.POTATOE	0.90	273.24	245.92
G.BEANS	1.00	655.24	655.24
TOTAL PRODUCTION COST			25736.24
FARM INCOME			84462.25
IRRIGATION COST			3795.68
TRANSPORT			3600.00
NET FARM INCOME			77066.57
OTHER INCOME			
LESS LIVING EXPENCES			3805.60
NET FAMILY INCOME			73260.97

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES			0.00	0.00
TOTAL				0.00
LESS MARKETING COST			0.00	
HARVEST			0.00	
LUGS			0.00	
TOTAL				0.00
NET SALES				0.00
PRODUCTION COSTS				
SEED	50.00	3.00	150.00	150.00
PROPS	0.60	800.00	160.00	160.00
FERTILIZER				
-KCL	39.36	50.00	1968.00	3951.00
-LIME	3.64	50.00	182.00	
-LAN	21.70	30.00	651.00	
-KRAAL MANURE	250.00	1.00	250.00	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	85.00
-DICS	20.00	1.00	20.00	
-FURROWS	10.00	1.00	10.00	
PRE HARVEST MANDAYS				
-HOEING	3.09	24.00	74.18	74.18
TOTAL COST				3520.18
GROSS MARGIN				-3520.18

MAIZE

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	GRAIN(*70	35.00	10.00	350.00	1550.00
	COBS	0.30	4000.00	1200.00	
TOTAL					20.00
LESS MARKETING COST				0.00	
COMBINE		0.00	4700.00	0.00	
BAGS (70Kg)		2.00	10.00	20.00	
BAGGING(MANDAYS)				0.00	
TOTAL					20.00
NET SALES					1530.00
PRODUCTION COSTS					
SEED		3.04	25.00	76.00	76.00
FERTILIZER					
-2:3:2		27.50	6.00	165.00	295.20
-LAN		21.70	6.00	130.20	
PESTICIDES					
-CUTWORM BAIT		1.19	25.00	29.75	41.30
-DIPTEREX		2.31	5.00	11.55	
MECHANIZATION COST					
-PLOUGH		55.00	1.00	55.00	85.00
-DISC		20.00	1.00	20.00	
-FURROWS		10.00	1.00	10.00	
PRE HARVEST MANDAYS					
-HOEING		3.09	24.00	74.18	74.18
TOTAL COST					571.68
GROSS MARGIN					958.32

TOMATOES

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	4.22	4500.00	18994.50	18994.50
TOTAL				3071.45
LESS MARKETING COST			0.00	
BOXES	0.80	2970.00	2376.00	
HARVEST	3.09	225.00	695.45	
TOTAL				3071.45
NET SALES				15923.05
PRODUCTION COSTS				
SEED	25.00	2.00	50.00	50.00
POLES	133.33	1.00	133.33	133.33
WIRE	100.00	0.67	66.67	66.67
FERTILIZER				
-2:3:2	27.50	6.00	165.00	582.42
-LAN	21.70	3.00	65.10	
-1:0:1	29.36	12.00	352.32	
PESTICIDES				
-RIDOMIL	48.90	4.00	195.61	1193.29
-DIATHANE M45	10.34	25.00	258.58	
-CUPROVIT	5.80	25.00	145.00	
-LANATE	30.41	10.00	304.10	
-BUFFIN	3.00	10.00	30.00	
-KELTHANE	26.00	10.00	260.00	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	401.00
-DISC	20.00	1.00	20.00	
-SPRAY	27.17	12.00	326.00	
PRE HARVEST MANDAYS				
-HOEING	3.09	8.00	24.73	37.09
-FURROWS	3.09	4.00	12.36	
TOTAL COST				2463.80
GROSS MARGIN				13459.25

CABBAGE

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	0.50	10000.00	5000.00	5000.00
TOTAL				9.27
LESS MARKETING COST			0.00	
BAGS (30Kg)			0.00	
HARVESTING	3.09	3.00	9.27	
TOTAL				9.27
NET SALES				4990.73
PRODUCTION COSTS				
SEED	150.00	1.00	150.00	150.00
FERTILIZER				
-2:3:2	27.50	6.00	165.00	295.20
-LAN	21.70	6.00	130.20	
HERBICIDES				
-GRAMOXONE	10.96	2.00	21.92	21.92
PESTICIDES				
-TAMARON	37.75	3.00	113.25	113.25
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	85.00
-DISC	20.00	1.00	20.00	
-FURROWS	10.00	1.00	10.00	
PRE HARVEST MANDAYS				
-HOEING	3.09	48.00	148.36	148.36
TOTAL COST				813.73
GROSS MARGIN				4176.99

SWEET POTATOES

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	6.00	350.00	2100.00	2100.00
TOTAL				54.09
LESS MARKETING COST			0.00	
BAGS (30Kg)			0.00	
HARVESTING	3.09	17.50	54.09	
TOTAL				54.09
NET SALES				2045.91
PRODUCTION COSTS				
SEED (OWN)			0.00	0.00
FERTILIZER				
-SUPERS	20.60	4.00	82.40	151.15
-2:3:2	27.50	2.50	68.75	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	85.00
-DISC	20.00	1.00	20.00	
-FURROW	10.00	1.00	10.00	
PRE HARVEST MANDAYS				
-HOEING	3.09	12.00	37.09	37.09
TOTAL COST				273.24
GROSS MARGIN				1772.67

GREEN BEANS

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	6.00	1330.00	7980.00	7980.00
TOTAL				1370.30
LESS MARKETING COST			0.00	
COMBINE			0.00	
BAGS (70Kg)			0.00	
HARVEST	3.09	443.33	1370.30	
TOTAL				1370.30
NET SALES				6609.70
PRODUCTION COSTS				
SEED	2.80	50.00	140.00	140.00
FERTILIZER				
-2:3:2	27.50	6.00	165.00	295.20
-LAN	21.70	6.00	130.20	
PESTICIDES				
-DIATHANE M45	10.34	8.00	82.75	97.95
-LANATE	30.41	0.50	15.21	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	85.00
-DISC	20.00	1.00	20.00	
-FURROWS	10.00	1.00	10.00	
PRE HARVEST MANDAYS				
-HOEING	3.09	12.00	37.09	37.09
TOTAL COST				655.24
GROSS MARGIN				5954.46

02-May-89 MEASURED FARMING(SA)(PTY)LTD
FARM_14

HOXANE FARMER SUPPORT PROGRAMME

PERSONAL DETAILS:-
NAME: THEMBA MHLANGA
AREA: CORK
FARM NO: 14
SIZE GR: 7.90
SIZE NT: 6.00

ACTIVITY TABLE (Ha)

	1	2	3	4	5	6	7	8	TOTAL
CROP:	MAIZE	SUGAR BEANS	TOMATOES	SPINACH	ONIONS	MANGOES	AVOCADO'S	PAWPAWS	
SIZE:	9.00	2.00	0.50	0.50	0.25	100 TREES	40 TREES	400 TREES	12.25
ACTIVITY:									
PLOUGH	9.00	2.00	0.50	0.50	0.25				12.25
DISC	9.00	2.00	0.50	0.50	0.25				12.25
FURROW	9.00	2.00	0.50	0.50	0.25				12.25
HAND SPRAY	18.00	14.00	5.00	0.50	0.50				38.00
									0.00
TOTAL	45.00	20.00	6.50	2.00	1.25	0.00	0.00	0.00	74.75

FARM MODEL 12.25 Ha

FARM INCOME:	Ha	YIELD/Ha	TOT.SALES
MAIZE	9.00	2618.00	23562.00
S. BEANS	2.00	3600.00	7200.00
TOMATOES	0.50	2200.00	1100.00
SPINACH	0.50	1440.00	720.00
ONIONS	0.25	1536.00	384.00
PAW-PAWS			14600
GROSS FARM INCOME			47566.00
MARKETING COST:			
MAIZE	9.00		666.45
S. BEANS	2.00		150.00
TOMATOES	0.50		50.42
SPINACH	0.50		47.29
ONIONS	0.25		30.40
TOTAL MARKETING COST			944.55
NET SALES			46621.45
PRODUCTION COST:			
MAIZE	9.00		6578.81
S. BEANS	2.00		2686.58
TOMATOES	0.50		705.74
SPINACH	0.50		421.09
ONIONS	0.25		116.62
TOTAL PRODUCTION COST			10508.84
FARM INCOME			36112.61
IRRIGATION COST		NONE	
TRANSPORT			5050.00
NET FARM INCOME			31062.61
OTHER INCOME			9000.00
	HERBALIST		7200.00
	CHILDREN		1200.00
	STALL		600.00
LESS LIVING EXPENCES			3793.44
NET FAMILY INCOME			36269.17

MAIZE

TON/HA

		RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	GRAIN(70Kg	40.00	8.00	320.00	2618.00
	COBS	0.30	7660.00	2298.00	
TOTAL					74.05
LESS MARKETING COST				0.00	
COMBINE				0.00	
BAGS (70Kg)		2.00	8.00	16.00	
BAGGING(MANDAYS)		2.67	21.77	58.05	
TOTAL					74.05
NET SALES					2543.95
PRODUCTION COSTS					
SEED		3.43	50.00	171.50	171.50
FERTILIZER					249.80
-2:3:2(22)		27.50	6.00	165.00	
-LAN		21.20	4.00	84.80	
PESTICIDES					139.23
-CURATERR		7.43	6.67	49.53	
-LANATE		30.41	2.00	60.82	
-DIPTEREX		2.31	12.50	28.88	
MECHANIZATION COST					86.89
-PLOUGH		55.00	1.00	55.00	
-DISC		20.00	1.00	20.00	
-FURROWS		10.00	1.00	10.00	
-SPRAY CP3		1.89	1.00	1.89	
PRE HARVEST MANDAYS					83.56
-HOEING		2.67	13.33	35.56	
-SPRAYING		2.67	18.00	48.00	
TOTAL COST					730.98
GROSS MARGIN /Ha					1812.97

SUGAR BEANS

2100.00 Kg/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	120.00	30.00	3600.00	3600.00
TOTAL			.	75.00
LESS MARKETING COST			0.00	
HARVEST	0.50	30.00	15.00	
BAGS (70Kg)	2.00	30.00	60.00	
BAGGING(MANDAYS)			0.00	
TOTAL				75.00
NET SALES				3525.00
PRODUCTION COSTS				
SEED	3.00	75.00	225.00	225.00
FERTILIZER				
-2:3:2	27.50	7.00	192.50	301.00
-LAN	21.70	5.00	108.50	
PESTICIDES				
-DIATHANE M45	10.34	30.00	310.30	399.73
-COPROVIT	5.80	15.00	87.00	
-LANATE	30.41	0.08	2.43	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	66.89
-DISC	20.00	1.00	20.00	
-FURROWS	10.00	1.00	10.00	
-SPRAY CP3	1.89	1.00	1.89	
PRE HARVEST MANDAYS				
-HOEING	2.67	120.00	320.00	330.67
-SPRAYING	2.67	4.00	10.67	
TOTAL COST				1343.29
GROSS MARGIN				2181.71

TOMATOES

5.00 TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	8.80	250.00	2200.00	2200.00
TOTAL				100.83
LESS MARKETING COST			0.00	
HARVEST	2.67	7.81	20.83	
TRANSPORT	0.20	400.00	80.00	
TOTAL				100.83
NET SALES				2099.17
PRODUCTION COSTS				
SEED	21.00	1.00	21.00	21.00
POLES	0.00		0.00	0.00
WIRE	3.53	8.00	28.27	28.27
FERTILIZER				
-2:3:2	27.50	2.00	55.00	157.12
-LAN	21.70	2.00	43.40	
-1:0:1	29.36	2.00	58.72	
PESTICIDES				
-DIATHANE M45	10.34	0.29	2.98	14.19
-COPROVIT	5.80	0.19	1.11	
-LANATE	30.41	0.32	9.73	
-ANTRACOL	5.80	0.06	0.37	
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	86.89
-DISC	20.00	1.00	20.00	
-FURROWS	10.00	1.00	10.00	
-SPRAY CP3	1.89	1.00	1.89	
PRE HARVEST MANDAYS				
-HOEING	2.67	400.00	1066.67	1104.00
-SPRAYING	2.67	14.00	37.33	
TOTAL COST				1411.48
GROSS MARGIN				687.69

ONION

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	0.80	1920.00	1536.00	1536.00
TOTAL				121.60
LESS MARKETING COST			0.00	
BAGS (10Kg)	0.30	192.00	57.60	
HARVEST	2.67	24.00	64.00	
TOTAL				121.60
NET SALES				1414.40
PRODUCTION COSTS				
SEED	10.40	24.00	249.60	249.60
FERTILIZER				
-KRAAL MANURE	5.00	4.00	20.00	20.00
PESTICIDES				
-DIATHANE M45	10.34	0.06	0.66	0.66
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	86.89
-DISC	20.00	1.00	20.00	
-FURROW	10.00	1.00	10.00	
-SPRAY CP3	1.89	1.00	1.89	
PRE HARVEST MANDAYS				
-HOEING	2.67	40.00	106.67	109.33
-SPRAYING	2.67	1.00	2.67	
TOTAL COST				466.49
GROSS MARGIN				947.91

SPINACH

TON/HA

	RAND/ UNIT	PHYSICAL VOLUME	SUB TOTAL	TOTAL /HA
GROSS SALES	6.00	240.00	1440.00	1440.00
TOTAL				94.58
LESS MARKETING COST			0.00	
HARVEST	2.67	6.67	17.78	
TRANSPORT	0.20	384.00	76.80	
TOTAL				94.58
NET SALES				1345.42
PRODUCTION COSTS				
SEED	4.20	8.00	33.60	33.60
FERTILIZER				
-2:3:2	27.50	2.00	55.00	185.20
-LAN	21.70	6.00	130.20	
PESTICIDES				
-LANATE	30.41	0.02	0.49	0.49
MECHANIZATION COST				
-PLOUGH	55.00	1.00	55.00	86.89
-DISC	20.00	1.00	20.00	
-FURROW	10.00	1.00	10.00	
-SPRAY CP3	1.89	1.00	1.89	
PRE HARVEST MANDAYS				
-HOEING	2.67	200.00	533.33	536.00
-SPRAYING	2.67	1.00	2.67	
TOTAL COST				842.18
GROSS MARGIN				503.24

Annexure 11

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8723

HOXANI IRRIGATION UPGRADING AND FARMER SUPPORT PROGRAMME

Review of matters that were discussed during a meeting on 89-03-15 at Saringwa, Mhala District.

1. **ATTENDANCE**

GAZDAF

P.W.A. VAN DER MERWE
P.T. DE WITT
A.M. MATUKANE
P. TERWIN
E.M. ZWANE
Z.B. MOHLABA
T.N. DIDAKA

HOXANI TRIBAL AUTHORITY

B. NGOMANE
S.A. MANZINI
P. MABUZA

DBSA PROJECT TEAM

G. MASHILE
J.W. SAUERMANN
W. PRETORIUS
P. MKALIPE

EKSTEEN, VAN DER WALT & NISSEN

A.O. EKSTEEN
S.J. DE SWARDT

VISITORS

L.B. PEARSON (HH&O)
G. OOSTHUIZEN (HH&O)
M. PAGE (HH&O)
D. WESCOMB (Gaz. Dept. of Works)
K.A. RAMSAY (Dept. Development Aid)
D.J. MARAIS (DBSA)
J.I.K. ZERWICK (DBSA)
JAN SWART (DBSA)

2. PURPOSE OF MEETING

2.1 To discuss the information presented by the study consultants Messrs. Eksteen, Van der Walt and Nissen (EVN) in their first interim report of February 1989 in accordance with the terms of reference for Phase I Step 1, prior to proceeding with Phase I Step 2 after which Phase I of the proposed study would be concluded.

2.2 The DBSA programme leader, mr J.W. Sauermann has also invited responsible officials of the proposed Mkhuhlu sewage outfall works to the meeting so that liaison could be established in respect of the utilization of sewage effluent on the irrigation scheme.

3. MKHUHLU SEWAGE WORKS

3.1 The meeting was informed of the following:

a) Water would be treated so that the effluent can be used on irrigated pastures suitable for livestock farming but excluding dairy farming.

b) The aerial extent of pastures that could thus be provided with water would grow from about 3ha to 30ha some 30 years hence.

c) Provision would therefore have to be made in the layout of the Scheme to accommodate such effluent. This is therefore an extension to the original brief.

3.2 Mr Pearson of HH&O has agreed to provide EVN with a report as well as a layout map of the proposed sewage works so that EVN can do the necessary planning during Phase II of this Study.

4. SUITABILITY OF IRRIGABLE SOILS

4.1 The meeting learned that the occurrence of marginal Class B soils as well as Class C soils within the boundaries of existing farm plots would result that such areas could only be provided with an approved irrigation system if crops suitable on such soils such as irrigated pastures are to be established. A number of farmers would thus have to be coaxed to accept this conditions that annual crops would not be feasible on some of the lands (refer to par. 2.3.2 of the Report).

4.2 The importance of the above situation on the proposed FSP was established and the observation in par. 2.3.2 of the Report that a further monitor soil survey is needed so that the boundaries of Class B & C soils as well as the effect of the occurrence of such soils would have on crop selection, should be re-established. Provision of R20 000 would have to be made for such additional work. This is therefore an extension to the original brief.

5. EXTENDING OF IRRIGATION LAYOUT

The meeting accepted the principle that due to the occurrence of highly suitable class A soils just outside the present irrigation farms, but still within the borders of the proclaimed irrigation area, these should be included in the proposed FSP either as an extension of existing plots or establishment of new irrigation plots, all as proposed in the Report. This is therefore an extension to the original brief.

6. **FARM MODELS**

It was accepted that five representative farm models on existing plots would be investigated to comply with the requirements of Step 2 of Phase I. During later phases a farm model based on livestock farming as well as one based on dairy farming would also be included. The latter is an extension to the original brief. (Mr de Swardt expressed his view that it is doubtful that commercial dairy farming in this area would prove viable; subsistence dairies might however work).

7. **GENERAL**

7.1 It was confirmed that not much could be done to alleviate damages caused by monkeys and baboons on crops.

7.2 The proposed moving of the Ngonini Co-op to a more suitable site was briefly discussed but it was decided that it falls outside the scope of responsibilities of this meeting.

7.3 GAZDAF would approach DBSA to extend funding for the study so that additional work required as desribed in par. 3, 4, 5 & 6 could be accommodated.

7.4 Messrs. Measured Farming would undertake their follow up field survey during the period 3, 4 & 5 April 1989 in order to complete their inputs to the Phase I study.

8. **PROGRAMME**

A revised programme would be prepared by EVN after approval of the application for additional funds (7.3 above) has been obtained, to allow for additional work. At this stage it is considered that a 6 - 8 weeks delay can be expected.

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A.O. EKSTEEN